



SHOP DRAWING TRANSMITTAL

Project Name:		Project #:
Submitted to:		
Submittal #:	Date:	
Description:		

General Comments:

Top Level Drawings

Revision 02

This Document Contains:

- Process Calculation Summary
- Piping & Instrumentation Diagram – 524.4100-PID
- Tag List
- Filter General Arrangement – 524.4100-GA

System Specifications

Installation Data	
Number of Tanks	2
Disks per Tank	4
Disk Size	54 ft ²
Total Filtration Area	464 ft ²

Arcadis Inc

The review of this Shop Drawing is for the sole purpose of ascertaining conformance with the general design concept and general arrangement only. This review does not constitute approval or verification of the design inherent in the Shop Drawings, and any omissions or errors therein remain the responsibility of the Contractor. The Contractor remains entirely responsible for complying with the Contract Documents, confirming all field dimensions and site conditions, for information that pertains to fabrication, techniques of construction and installation, and co-ordination of the Work.

Reviewed	Reviewed As Noted	Revise & Resubmit	Not Reviewed
	X		
Reviewed By:	S.G.	Date:	Sept 19, 2024

NOTE:

Overflow weir design should be for 6,600 m³/d peak hourly flow at worst cast scenario with one chamber duty and the other chamber isolated. (SG)

524.4100 Elmvale ON

Process Summary - **Metric**

INFLUENT FLOW PARAMETERS

Description	Acronym	m ³ /d	m ³ /h	L/s
Average Daily Flow, average TSS	ADF	1,800	75	21
Peak Hourly Flow, Peak TSS	PHF	6,600	275	76

DESIGN CONSTITUENT PARAMETERS

Description	Units	Inlet	Outlet
Water temperature	°C	1 to 30	NA
Alkalinity	mg/l	50 to 150	NA
pH	S.U.	6.5 to 7.5	NA
Average TSS	mg/l	10	4
Max TSS	mg/l	20	NA
Average TP	mg/l	0.18	0.1

1. Effluent TSS and TP are permitted or contractual target values.

FITLER MODEL PARAMETERS

Description	Unit	Parameter
Number of duty filters	-	1
Number of standby filters	-	1
Number of disks/frames per filter	-	4
Media sectors per disk	-	6
Model	-	MSF4/20PEC
Nominal media pore size	µm	5
Submerged area per disk	m ²	5
Submerged area per filter	m ²	20

DESIGN APPLIED LOADING CALCULATIONS

Description	Unit	@ ADF	@ PHF
Design hydraulic loading	m ³ /m ² h	3.8	13.8
Design solids loading, average TSS	kg/m ² h	0.046	0.167
Design solids loading, peak TSS	kg/m ² h	-	0.304

2. Solids loading rates are for Gross Solids applied to the media.

DESIGN BACKWASH

Approximate system solids removed	kg/d	14
Approximate backwash solids concentration	mg/L	3,800
Approximate backwash volume	m ³ /d	4.0
Approximate backwash volume, % of flow	%	0.2 to 0.5%
Approximate volume per filter backwash cycle	L	600
Maximum backwash rate/filter	L/s	10
Suction losses (maximum)	m	5.64
Discharge losses (to Nexom terminal point)	m	0.76
Pump elevation	m	207.00

Discharge elevation	m	208.70
Piping losses	m	1.00
Applied losses, gate valve	m	5.00
Calculated TDH	m	10.70
Pump discharge at TDH	L/s	10

3. Rates are calculated averages except where noted otherwise.

WEIR CALCULATIONS

Description	Unit	@ ADF	@ PHF
Design flows	m ³ /d	1,800	6,600
Filter operating headloss setpoint	m	0.590	0.590
Inlet weir equivalent length	m	1.62	-
Inlet weir operating headloss	m	0.04	0.09
Inlet weir elevation	m	207.70	
Inlet weir water surface elevation	m	207.74	207.79
Outlet weir equivalent length	m	2.49	-
Outlet weir operating headloss	m	0.03	0.07
Outlet weir elevation	m	207.00	-
Outlet weir water surface elevation	m	207.03	207.07
Overflow design	m ³ /d	3,300.00	3,300.00
Overflow weir equivalent length	m	2.49	-
Overflow weir operating headloss	m	0.04	0.04
Overflow weir elevation	m	207.63	-
Overflow weir water surface elevation	m	207.67	207.67

4. Operating headloss setpoint is headloss in excess of the effluent weir elevation before backwashing.

5. Overflow weir calculations are for 50% design peak hour flow.

6. Weir headloss is for non-flooded free-falling weirs.

Overflow design should be for 6,600 m³/d peak hourly flow at worst cast scenario with one chamber duty and the other chamber isolated. (SG)

D

PIPING SYMBOLS

	PRIMARY PROCESS FLOW PATH
	SECONDARY FLOW PATH
	HEAT TRACE
	INSULATED PIPELINE
	INFLUENT
	EFFLUENT
	REJECT
	SYSTEM EXTENTS

VALVE ACTUATOR SYMBOLS

(NO SYMBOL) = MANUAL FOR ON/OFF SERVICE	T HANDWHEEL (MANUAL OVERRIDE)	 ELECTRIC
 SOLENOID (WITHOUT)	 DIAPHRAGM AIR TO AIR (WITHOUT)	 DIAPHRAGM & SPRING TO OPEN (WITHOUT)
 SOLENOID (WITH) =MANUAL OVERRIDE	 DIAPHRAGM AIR TO AIR (WITH)=POSITIONER	 DIAPHRAGM & SPRING TO CLOSE (WITH)=POSITIONER

SYMBOLS FOR SELF-ACTUATED REGULATORS

PRESSURE REDUCING REGULATOR SELF CONTAINED	BACK PRESSURE REGULATOR SELF CONTAINED	RUPTURE DISC OR SAFETY HEAD PRESSURE RELIEF
PRESSURE REDUCING REGULATOR EXTERNAL TAP	BACK PRESSURE REGULATOR EXTERNAL TAP	RUPTURE DISC OR SAFETY HEAD VACUUM RELIEF
PRESSURE RELIEF ANGLE	VACUUM RELIEF ANGLE	PRESSURE VACUUM RELIEF
PRESSURE RELIEF STRAIGHT	VACUUM RELIEF STRAIGHT WITH WELL	TEMPERATURE REGULATOR FILLED SYSTEM
LEVEL REGULATOR FLOAT OPERATED MECHANICAL LINKAGE	TRAP CONTINUOUS DRAINER BALL FLOAT TYPE	TRAP WITH EQUALIZING CONNECTION

PRIME MOVERS FOR MOTOR DRIVEN EQUIPMENT

ELECTRIC MOTOR	PNEUMATIC ROTARY MOTOR

PIPING ACCESSORIES & DETAILS

Y STRAINER	CONE STRAINER	SCREEN STRAINER OR STATIC MIXER
MIXING SECTION	EJECTOR	BACKFLOW PREVENTER
SPRAY NOZZLE OR SPARGER	CHEMICAL SEAL	EXPANSION JOINT
FLEX HOSE	STRAIGHTENING VANES	
FILTER	SCOPE LIMITS	THERMOWELL
SIMPLEX BASKET STRAINER	DUPLEX BASKET STRAINER	AIR FILTER
AIR DRYER	MIST ELIMINATOR	PULSATION DAMPER
SIGHT GLASS	RESTRICTION ORIFICE	DU INSULATED FLANGE OR DIELECTRIC UNION
QUICK DISCONNECT ASSEMBLY	SUMP/DRAIN	CALIBRATION COLUMN
VARIABLE AREA FLOW INDICATOR WITH INTEGRAL NEEDLE VALVE	ORIFICE FLANGE	CONCENTRIC REDUCER
ECCENTRIC REDUCER FLAT ON TOP	ECCENTRIC REDUCER FLAT ON BOTTOM	

VALVE SYMBOLS

GATE	GLOBE	BALL
PLUG	3 WAY PLUG	BUTTERFLY
CHECK	DIAPHRAGM	PINCH
NEEDLE	3 WAY	4 WAY
ANGLE	KNIFE GATE	WEIGHTED RELIEF
VALVE (UNDEFINED TYPE)	V-PORT BALL VALVE	AIR RELEASE

C

INSTRUMENT LINE SYMBOLS

	PNEUMATIC SIGNAL
	CONTROL LOGIC
	ELECTRIC SIGNAL
	UNDEFINED SIGNAL
	INTERNAL SYSTEM LINK SOFTWARE OR DATA
	CAPILLARY TUBE

SYMBOLS FOR VALVE ACTION IN THE EVENT OF ACTUATOR POWER FAILURE

FO = FAIL OPEN
 FC = FAIL CLOSED
 FL = FAIL LOCKED
 FI = FAIL INDETERMINATE (LAST POSITION)
 F = USED WITH 3 WAY & 4 WAY VALVE- ARROWS SHOW PATHS OPEN TO FLOW ON POWER FAILURE.

SYMBOL LOCATED BY VALVE- USED ONLY WHERE NECESSARY TO INCREASE UNDERSTANDING OF THE SYSTEM.

DIFFERENTIAL PRESSURE REDUCING REGULATOR - SHOWN WITH INTERNAL AND EXTERNAL PRESSURE TAPS.

MOTOR DRIVEN EQUIPMENT

CENTRIFUGAL PUMP	ROTARY BLOWER OR COMPRESSOR	FAN / BLOWER
VERTICAL CENTRIFUGAL PUMP	SUBMERSIBLE PUMP	CHEMICAL FEED PUMP
VERTICAL TURBINE	PERISTALTIC PUMP	PROGRESSIVE CAVITY PUMP
DIAPHRAGM CHEMICAL FEED PUMP W/ INTERNAL RELIEF VALVE	LIQUID RING VACUUM PUMP	
VENT FAN	AGITATOR OR MIXER	DIAPHRAGM PUMP (PNEUMATIC OPER.)
AIR COMPRESSOR	DUPLEX AIR COMPRESSOR	

HEAT EXCHANGER SYMBOLS

SHELL & TUBE HEAT EXCHANGER	ELECTRICAL HEATING ELEMENT
AIR COOLED HEAT EXCHANGER	GENERAL HEAT EXCHANGER
DIRECT CONTACT JET MIXER	

TYPE

D = DUCT P = PIPE
 H = HOSE T = TUBE

GENERAL NOTES:

1. FOR INSTRUMENTATION SYMBOLS AND LIST OF RELAY FUNCTIONS SEE NEXOM DRAWING NO. PID-B.
 THIS DRAWING IS PROVIDED FOR INFORMATION ONLY.

B

PIPE LINE DESIGNATION

6"-S04P1-101A

BRANCH

LINE NUMBER

PRESSURE RATING (1 OR 2 DIGITS)

LINE TYPE

MATERIAL

SIZE

MATERIAL DESIGNATION

BRZ - BRASS/BRONZE
 CIR - CAST IRON
 CST - CARBON STEEL
 CPR - COPPER
 FRP - FIBERGLASS
 GCS - GALVANIZED CARBON STEEL
 LCS - LINED CARBON STEEL
 TEF - TEFLON
 PU - POLYURETHANE
 PET - POLYETHYLENE
 POP - POLYPROPYLENE
 PVC - POLYVINYL CHLORIDE
 RUB - RUBBER
 S04 - 304 STAINLESS STEEL
 S4L - 304L STAINLESS STEEL
 S16 - 316 STAINLESS STEEL
 S6L - 316L STAINLESS STEEL
 VIT - VITON
 CVC - CHLORINATED POLYVINYL CHLORIDE

TANK AND ACCESSORIES

MANHOLE/ACCESS	COUPLING (HALF OR FULL)	FLANGED NOZZLE
RECEIVER TANK	INSULATION	

A

D

C

B

A

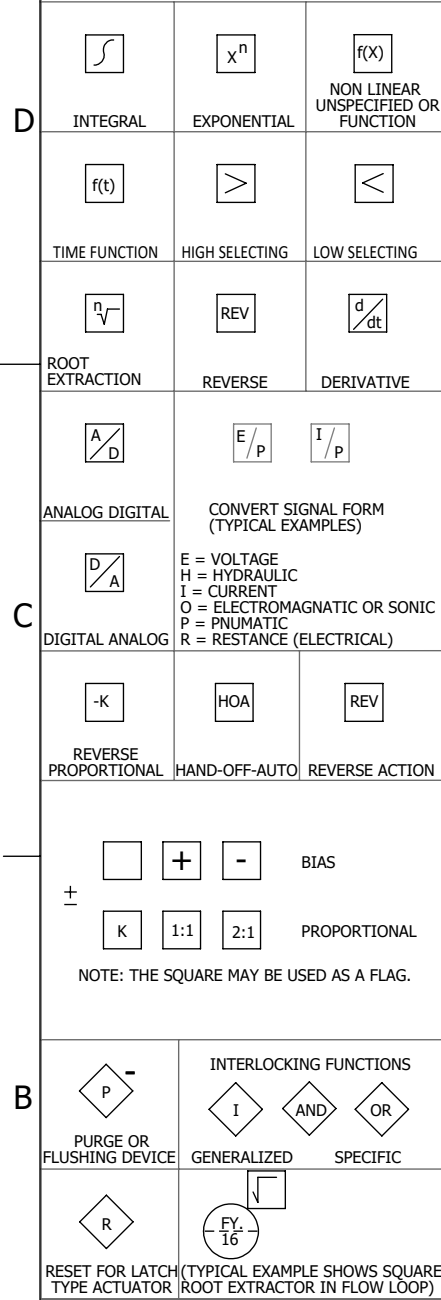


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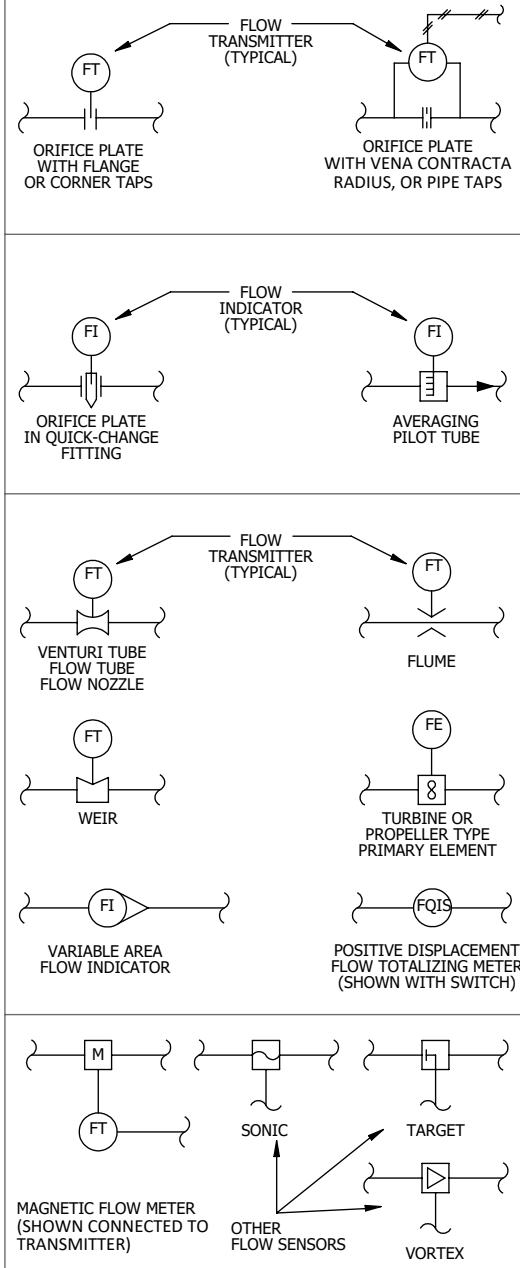
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ONE DECIMAL	± .125"
TWO DECIMAL	± .0625"
ANGULAR	± 2.0°

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DESCRIPTION: Piping & Instrumentation Diagram, 2X4/20	
NUMBER: CD4100	REV. 00
	PAGE 1/3

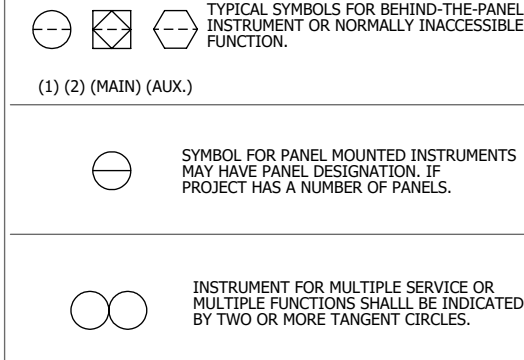
MISCELLANEOUS SYMBOLS



SYMBOLS FOR FLOW MEASUREMENT



SYMBOLS FOR LOGIC CONTROL



INSTRUMENT SYMBOLS

	PRIMARY CONTROL PANEL NORMALLY ACCESSIBLE TO OPERATOR	FIELD MOUNTED	AUXILIARY PANEL OR RACK NORMALLY ACCESSIBLE TO OPERATOR
DISCRETE INSTRUMENTS			
SHARED DISPLAY SHARED CONTROL			
COMPUTER FUNCTION INCLUDING DISTRIB. CNTL. SYS.			
PROGRAMMABLE LOGIC CONTROLLER FUNCTION			

INSTRUMENT IDENTIFICATION LETTERS

FIRST LETTER	SUCCEEDING LETTERS		
	MEASURE OR INIATING VARIABLE	MODIFIER	
A = ANALYSIS			
B = BURNER, COMBUSTION			
C = USER'S CHOICE			
D = USER'S CHOICE	DIFFERENTIAL		
E = VOLTAGE			
F = FLOW RATE	RATIO (FRACTION)		
G = USER'S CHOICE			
H = HAND			HIGH
I = CURRENT (ELECTRICAL)			
J = POWER	SCAN		
K = TIME, TIME SCHEDULE	TIME RATE OF CHANGE		
L = LEVEL			
M = USER'S CHOICE	MOMENTARY		
N = USER'S CHOICE			
O = USER'S CHOICE			
P = PRESSURE, VACUUM			
Q = QUANTITY	INTERGRATE, TOTALIZE		
R = RADIATION			
S = SPEED, FREQUENCY	SAFETY		
T = TEMPERATURE			
U = MULTIVARIABLE			
V = VIBRATION, MECH. ANALYSIS			
W = WEIGHT, FORCE			
X = UNCLASSIFIED	X AXIS		
Y = EVENT, STATE OR PRESENCE	Y AXIS		
Z = POSITION, DIMENSION	Z AXIS		

LETTER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ALARM		
B	USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
C		CONTROL	
D			
E	SENSOR (PRIMARY ELEMENT)		
F			
G	GLASS, VIEWING DEVICE		
H			HIGH
I	INDICATE		
J			
K		CONTROL STATION	
L	LIGHT		
M			MIDDLE, INTERMEDIATE
N	USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
O	ORIFICE, RESTRICTION		
P	POINT (TEST) CONNECTION		
Q			
R	RECORD		
S		SWITCH	
T		TRANSMIT	
U	MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V		VALVE, DAMPER, LOUVER	
W	WELL		
X	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y		RELAY, COMPUTE, CONVERT	
Z		DRIVE, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

NOTES:

- ANY FIRST LETTER COMBINED WITH MODIFIER REPRESENTS A NEW AND SEPARATE MEASURED VARIABLE. EXAMPLES: PD = DIFFERENTIAL PRESSURE FQ = TOTALIZED OR INTEGRATED FLOW. EXCEPTION IS THE MODIFIER "J" FOR MULTIPOINT SCANNING.
- FOR ANALYSIS NOT IDENTIFIED BY A SPECIFIC LETTER IN THE TABLE, USE THE LETTER "A" NEAR THE INSTRUMENT SYMBOL, SPECIFY THE NATURE OF THE ANALYSIS. EXAMPLE: PH
- MEANING OF A "USER CHOICE" LETTER SHALL BE CONSISTENT THROUGHOUT A PROJECT AND SHALL BE SPECIFIED IN THE DRAWING LEGEND.
- UNCLASSIFIED LETTERS MAY HAVE A FEW DIFFERENT MEANINGS ON A PROJECT, THE MEANING SHALL BE SPECIFIED NEAR EACH INSTRUMENT SYMBOL USING THE UNCLASSIFIED LETTER.
- THE MODIFIER "SCAN" APPLIES TO MULTIPOINT PRINTING INSTRUMENTS, SUCH AS CJRS (MULTIPOINT CONDUCTIVITY RECORDER WITH ALARM SWITCHES).

GENERAL NOTES:

- FOR MECHANICAL SYMBOLS AND ADDITIONAL NOTES, SEE NEXOM DRAWING NO. PID-A. THIS DRAWING IS PROVIDED FOR INFORMATION ONLY.



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TOLERANCES:

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TWO DECIMAL	$\pm .0625"$
ANGULAR	$\pm 2.0^\circ$

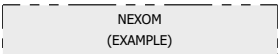
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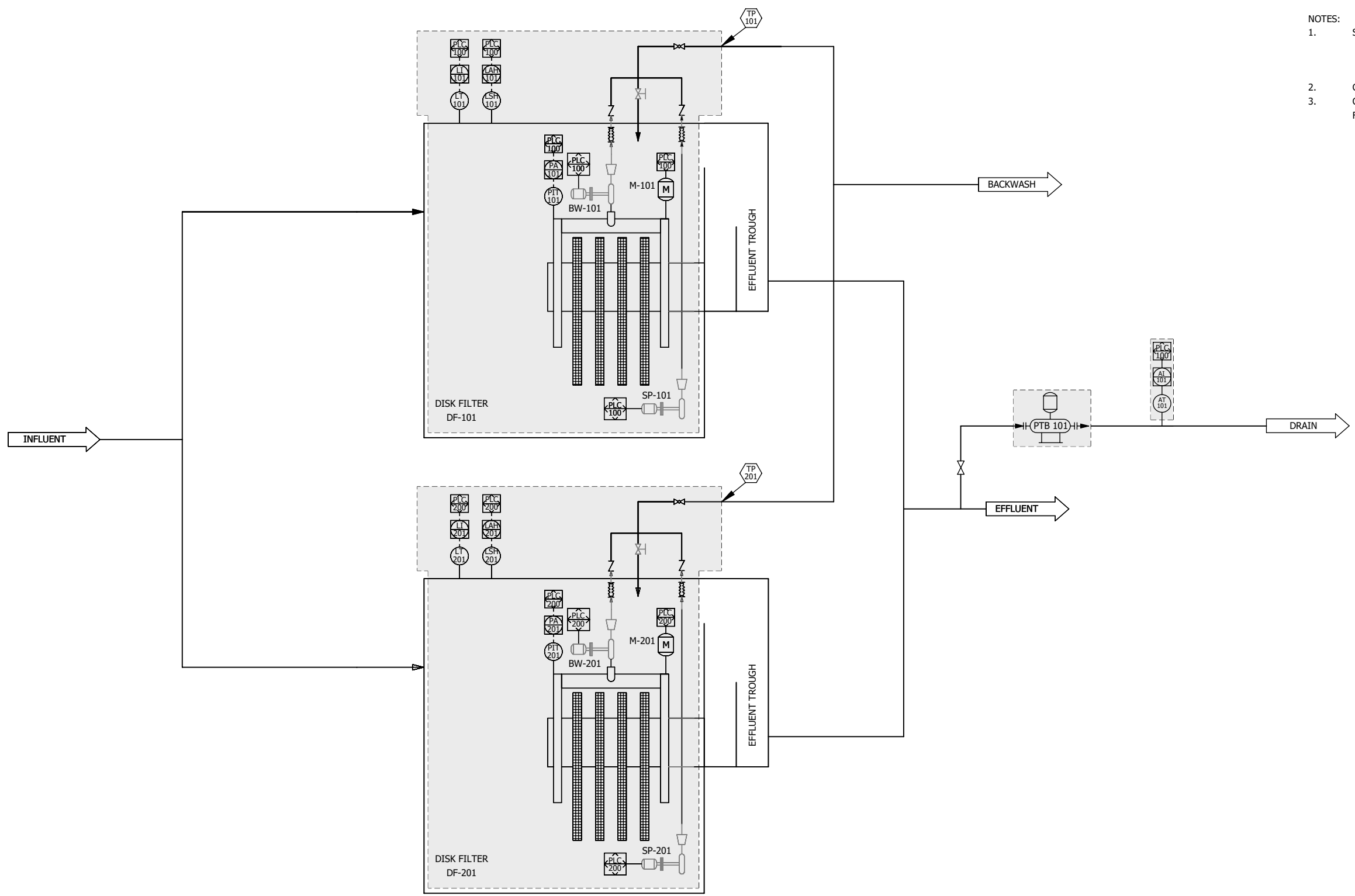
C

B

A

- NOTES:
1. SHADED AREAS ARE IN NEXOM'S SCOPE OF SUPPLY
 NEXOM (EXAMPLE)
 2. GRAY ITEMS FOR FUTURE INSTALLATION
 CONNECTION SIZES TO BE CONFIRMED DURING FINAL DESIGN

TERMINAL POINT TABLE	
TP-101	4" ANSI FLANGE
TP-201	4" ANSI FLANGE



REVISIONS			
REV.	DESCRIPTION	ENGINEER	DATE

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 THIRD ANGLE PROJECTION

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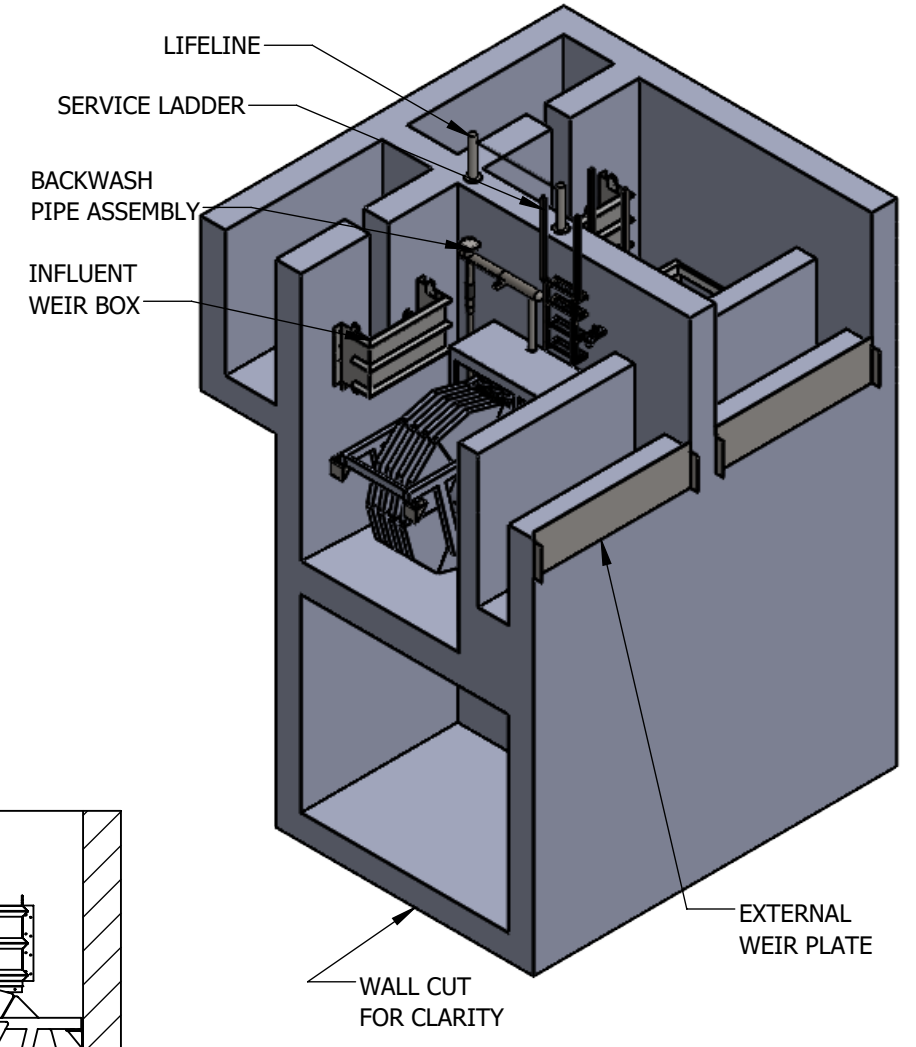
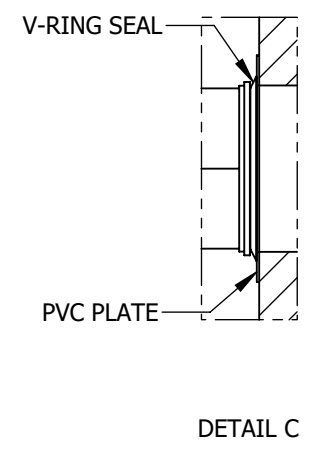
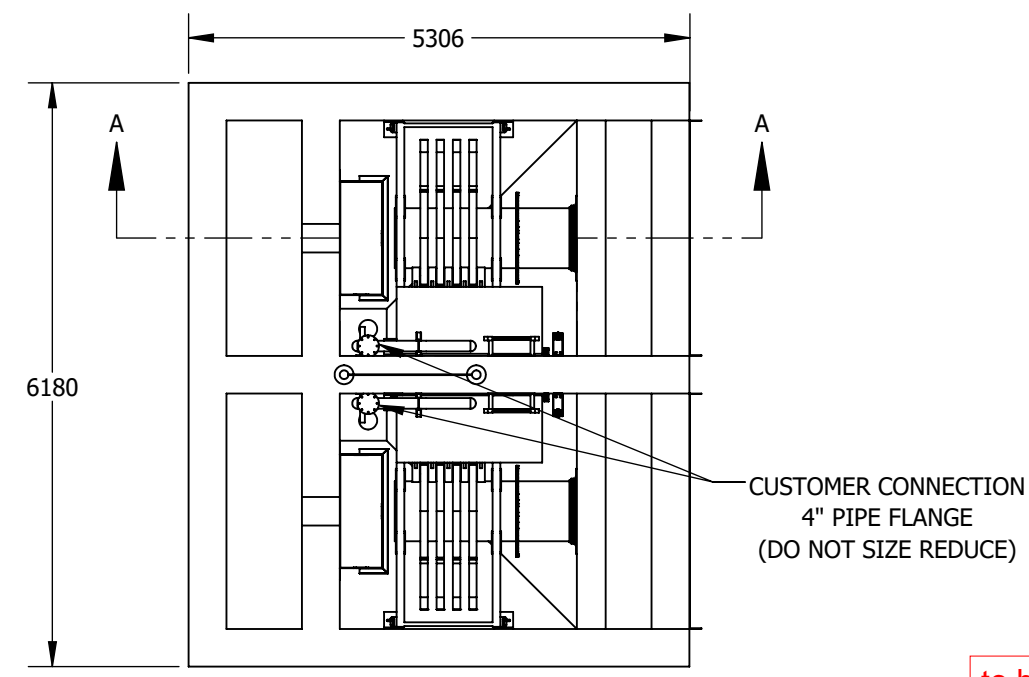
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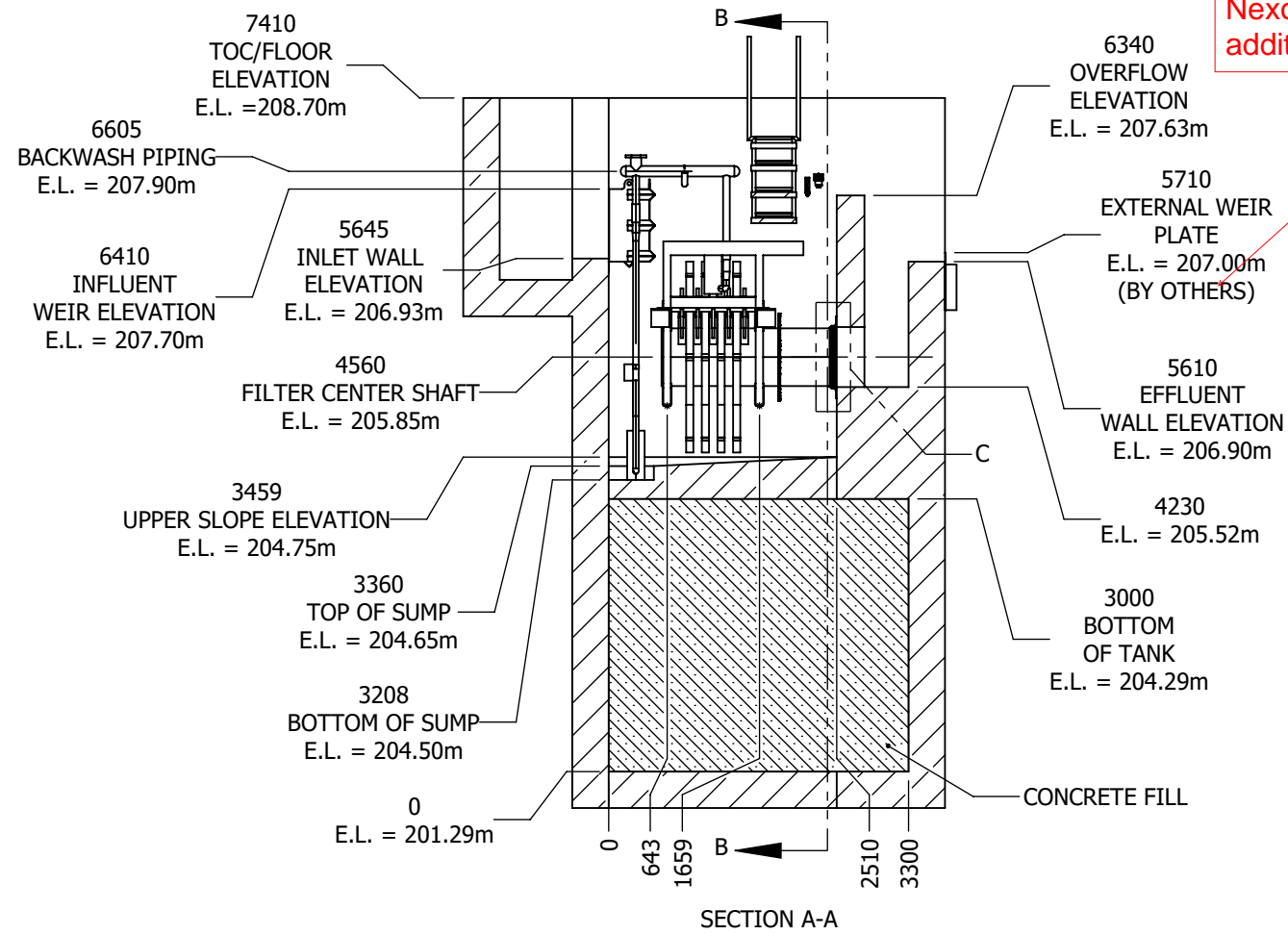
Tag List

Disk Filter: Sheet 1			
Tag Number	Mfg.	Description	Mfg. Part Number
DF-101, DF-201	Nexom	MITA 2-10 disk filter	MSF 2/10 PEC
M-101, M-201	SICEI	Chain drive motor	BTSC71B4
LSH-101, LSH-201	Vega	Level indicating float switches	Vegapoint 11
LT-101, LT-201	Vega	Level transmitter, tank	Vegapuls C11
PIT-101, PIT-201	IFM	Pressure switch, backwash line	PT0505
BW-101, SP-101, BW-201, SP-201	Ebara	Backwash and sludge pumps	DWZ 150 & DW 150
AT-101	Hach	Turbidimeter	TU5300sc
AI-101	Hach	Turbidimeter Controller	SC4500

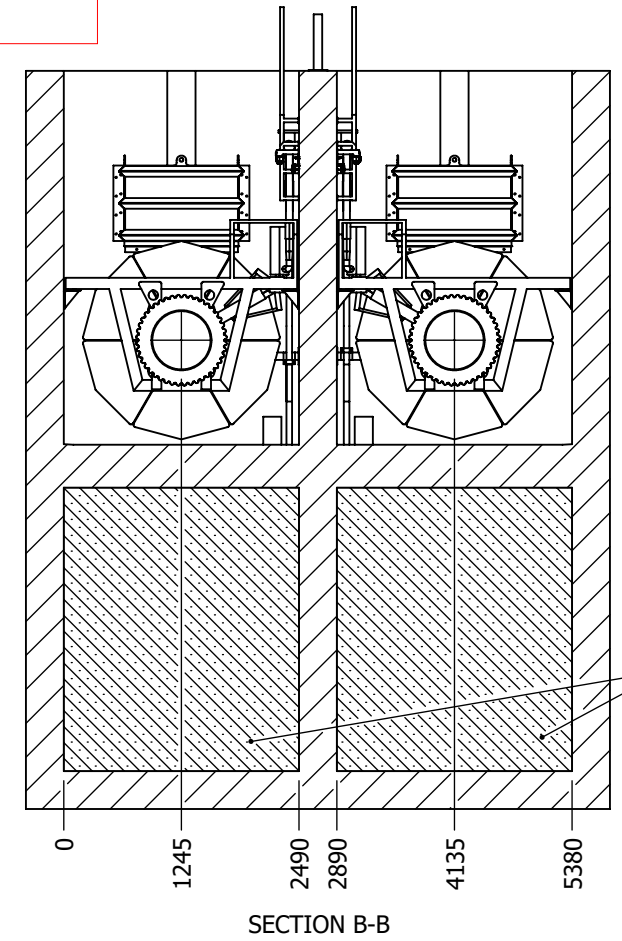
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to be provided by Nexom at no additional cost



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REVISIONS			
REV.	DESCRIPTION	ENGINEER	DATE
00	INITIAL RELEASE	GS	2024/06/27
01	REVISED	GS	2024/07/03

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DESCRIPTION: GENERAL ARRANGEMENT DRAWING, 2X4/20			
AUTH.	GS, 06/26/2024	CHKD.	DK, 06/27/2024
NUMBER: 524.4100		REV. 01	PAGE 1/5

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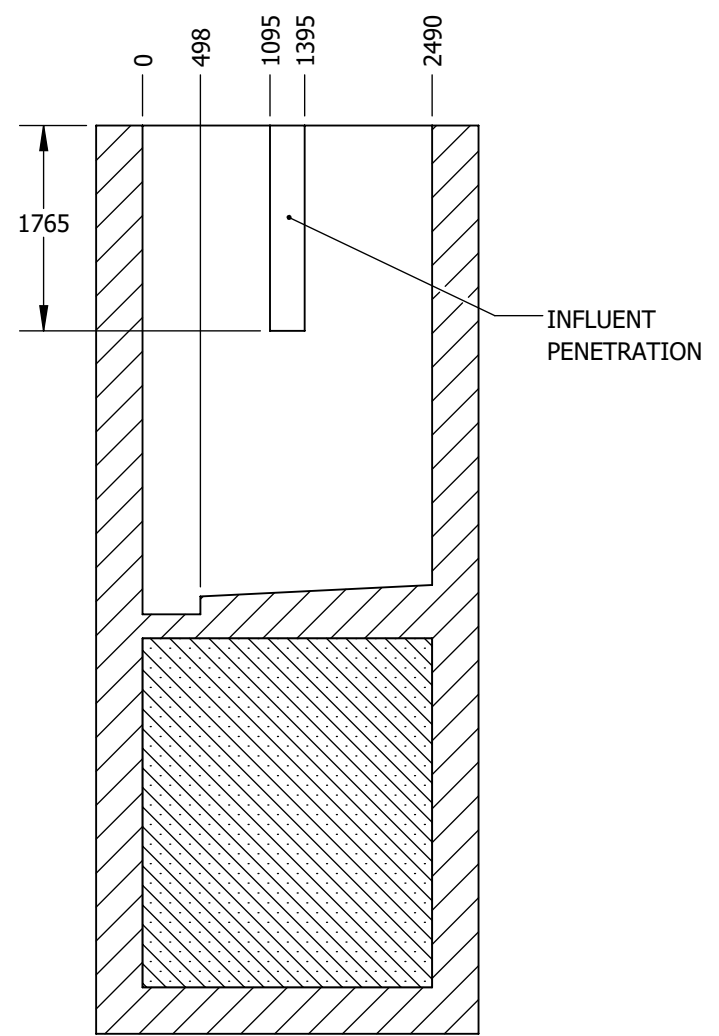
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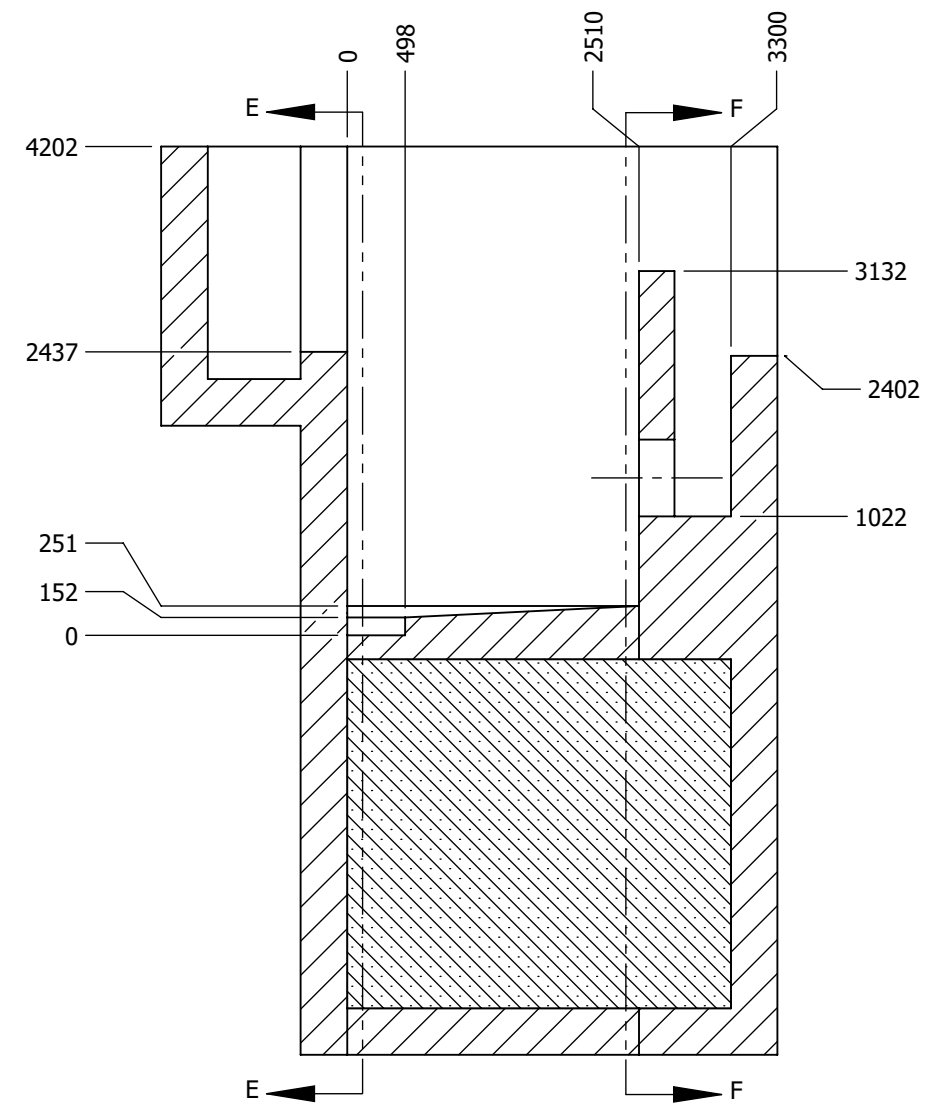
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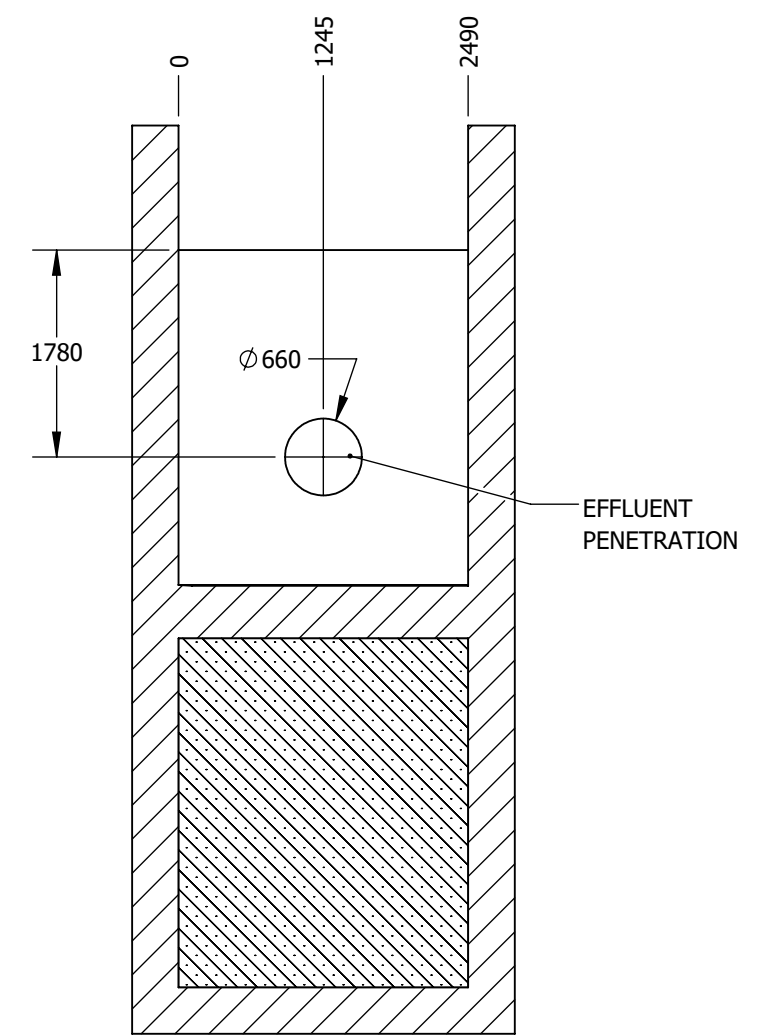
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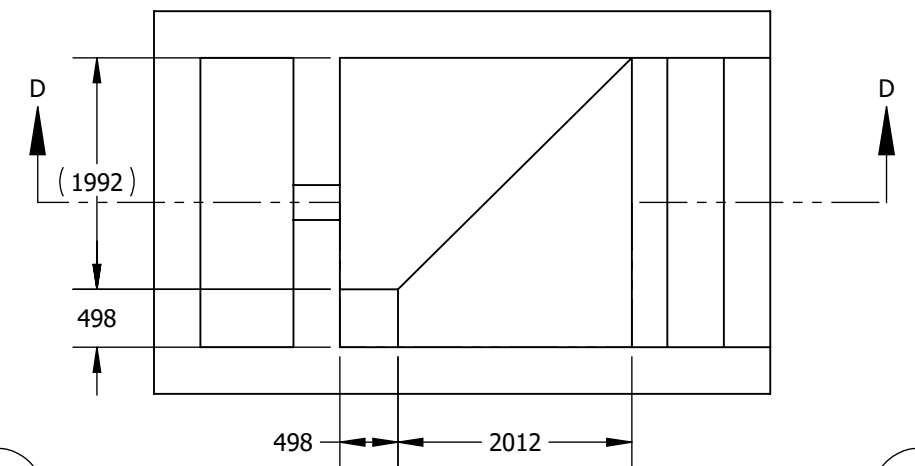
SECTION E-E



SECTION D-D



SECTION F-F



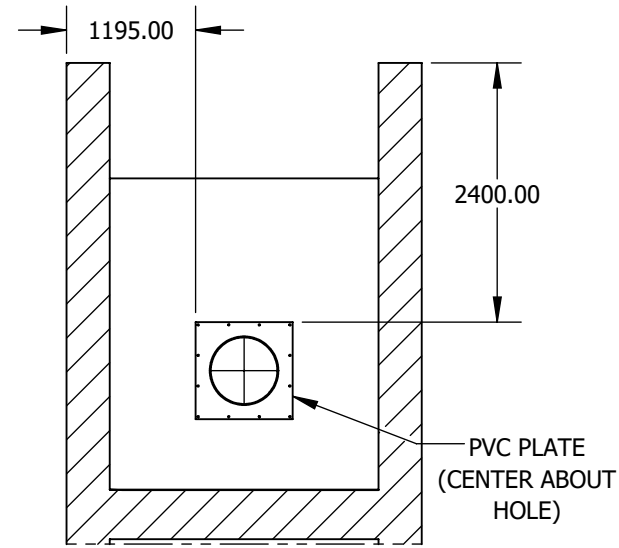
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LOCATION: ELMVALE, ON		SCALE 1:100	
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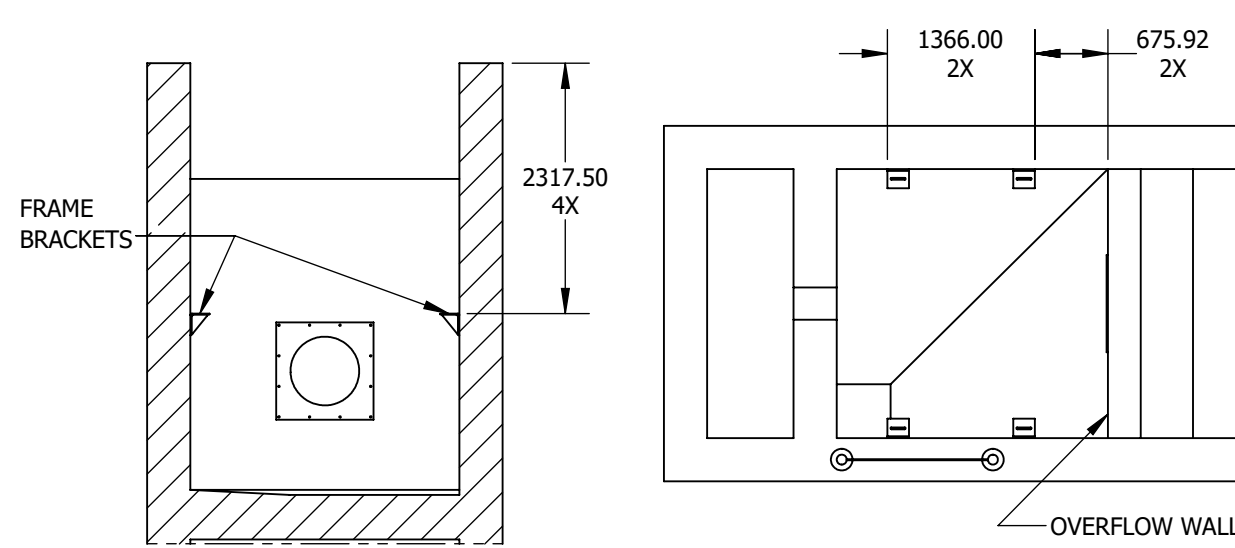
STEP 1

- ANCHOR THE PVC PLATE TO THE WALL USING 3/8" ANCHORS
- APPLY SILICONE AROUND THE PERIMETER TO SEAL IT



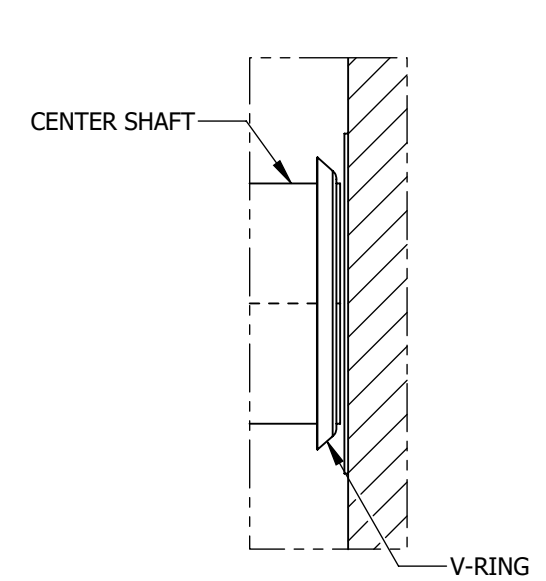
STEP 2

- INSTALL FRAME BRACKETS
- 4 X 1/2" ANCHORS PER BRACKET



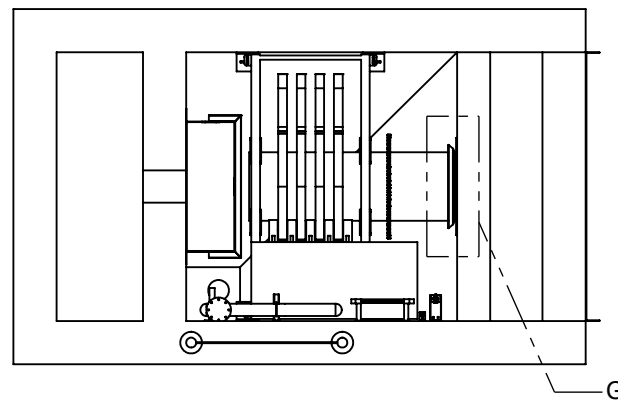
STEP 3

- INSTALL V-RING SEAL ON CENTER SHAFT OF THE FILTER
- ROLL THE RING BACK



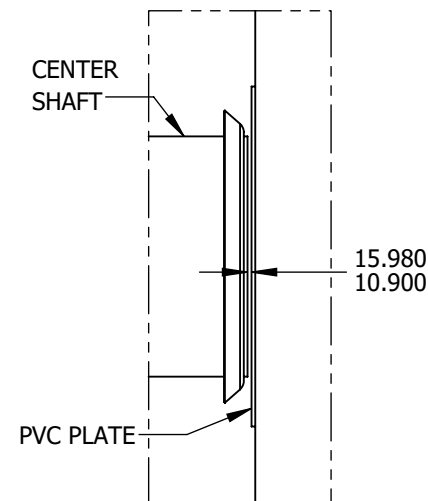
STEP 4

- BY A CRANE, LIFT THE FILTER UNIT INSIDE THE TANK
- LOOSELY BOLT THE FILTER UNIT TO THE BRACKETS, PLACING THE NUTS ON TOP



STEP 5

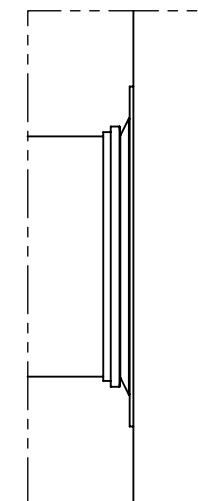
- THERE MUST BE ABOUT 11 mm TO 16 mm CLEARANCE BETWEEN THE CENTER SHAFT AND THE PVC PLATE



DETAIL G

STEP 6

- TIGHTEN THE BOLTS ON THE BRACKETS
- ROLL BACK THE V-RING AGAINST THE PVC PLATE.



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UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN MILLIMETERS

TOLERANCES:
 00 ± 10mm
 00.00 ± 5mm
 00.000 ± 2mm

THIRD ANGLE PROJECTION

LOCATION: ELMVALE, ON SCALE 1:100

DESCRIPTION:
 GENERAL ARRANGEMENT DRAWING, 2X4/20

AUTH. GS, 06/26/2024 CHKD. DK, 06/27/2024

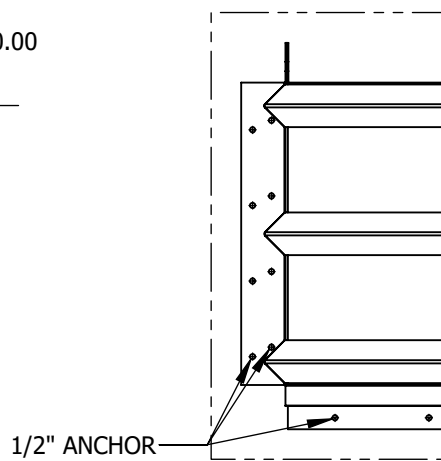
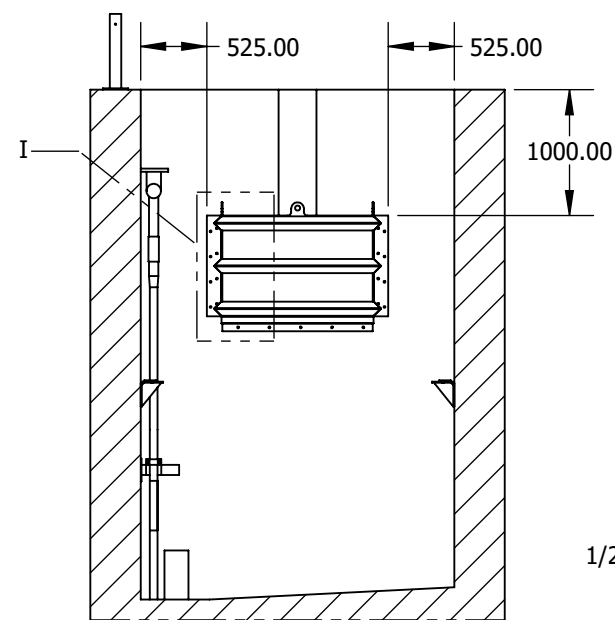
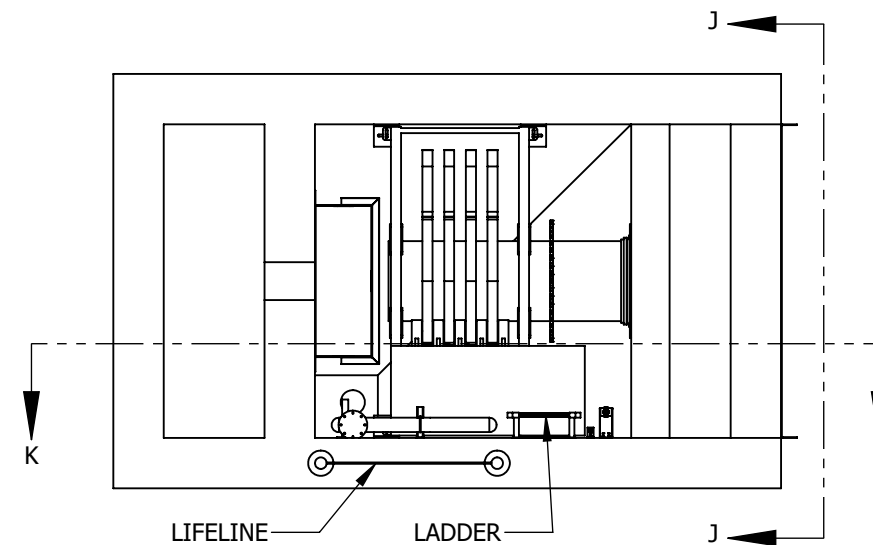
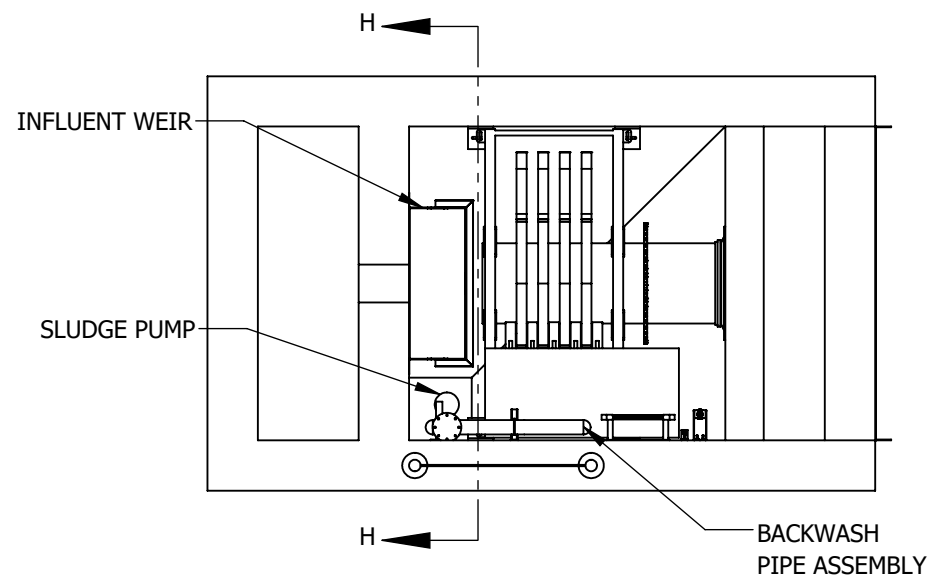
NUMBER: 524.4100 REV. 01 PAGE 3/5

STEP 7

- INSTALL
 1. INFLUENT WEIR BOX. USE 1/2" ANCHORS TO FASTEN WEIR BOX TO WALL
 2. SLUDGE PUMP
 3. BACKWASH ASSEMBLY

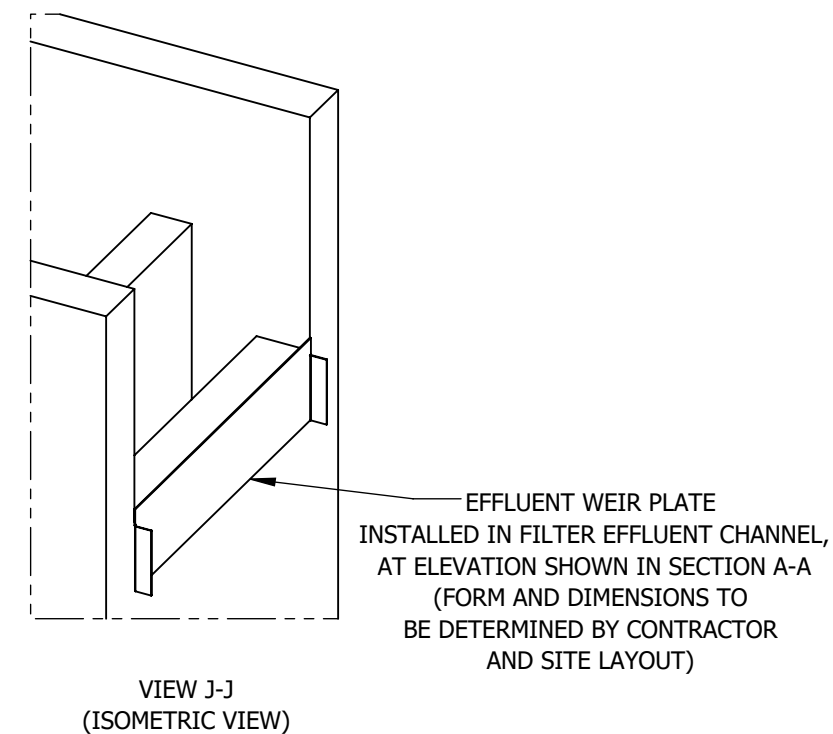
STEP 8

- INSTALL FOLLOWING PARTS
 1. LIFELINE
 2. LADDER
 3. EFFLUENT WEIR PLATE



SECTION H-H

DETAIL I



NEXOM CONFIDENTIALITY

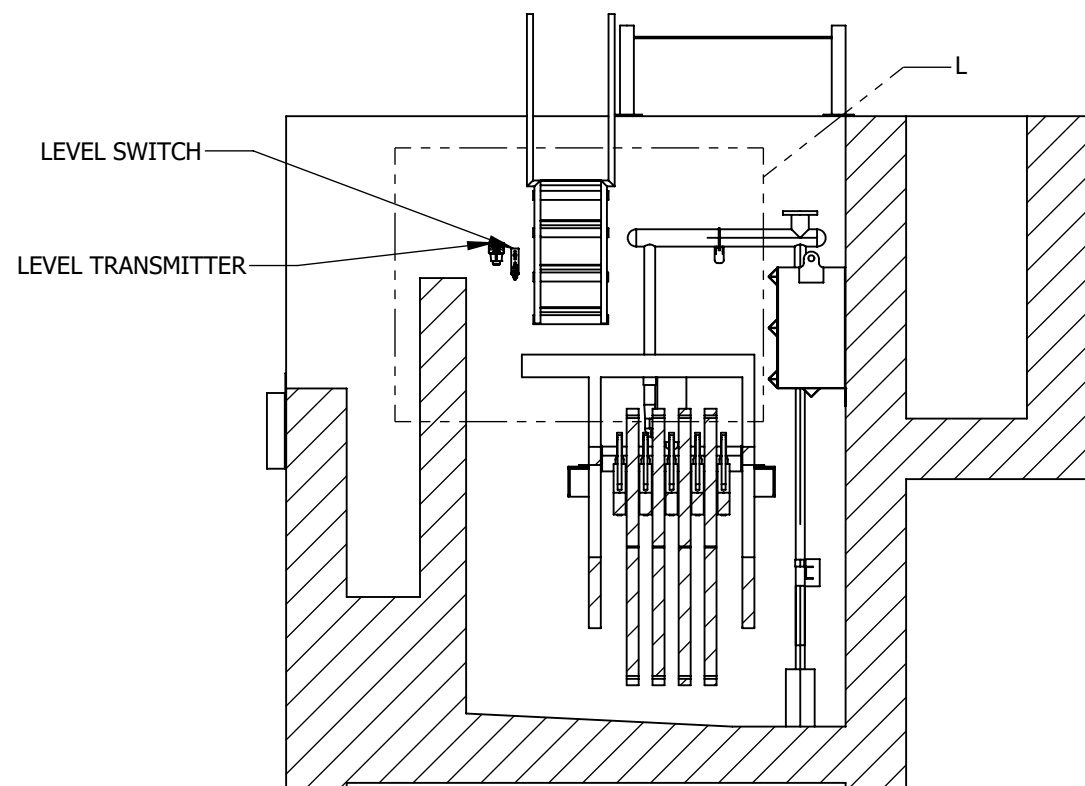
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UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN MILLIMETERS
TOLERANCES:
00 ± 10mm
00.00 ± 5mm
00.000 ± 2mm
THIRD ANGLE PROJECTION

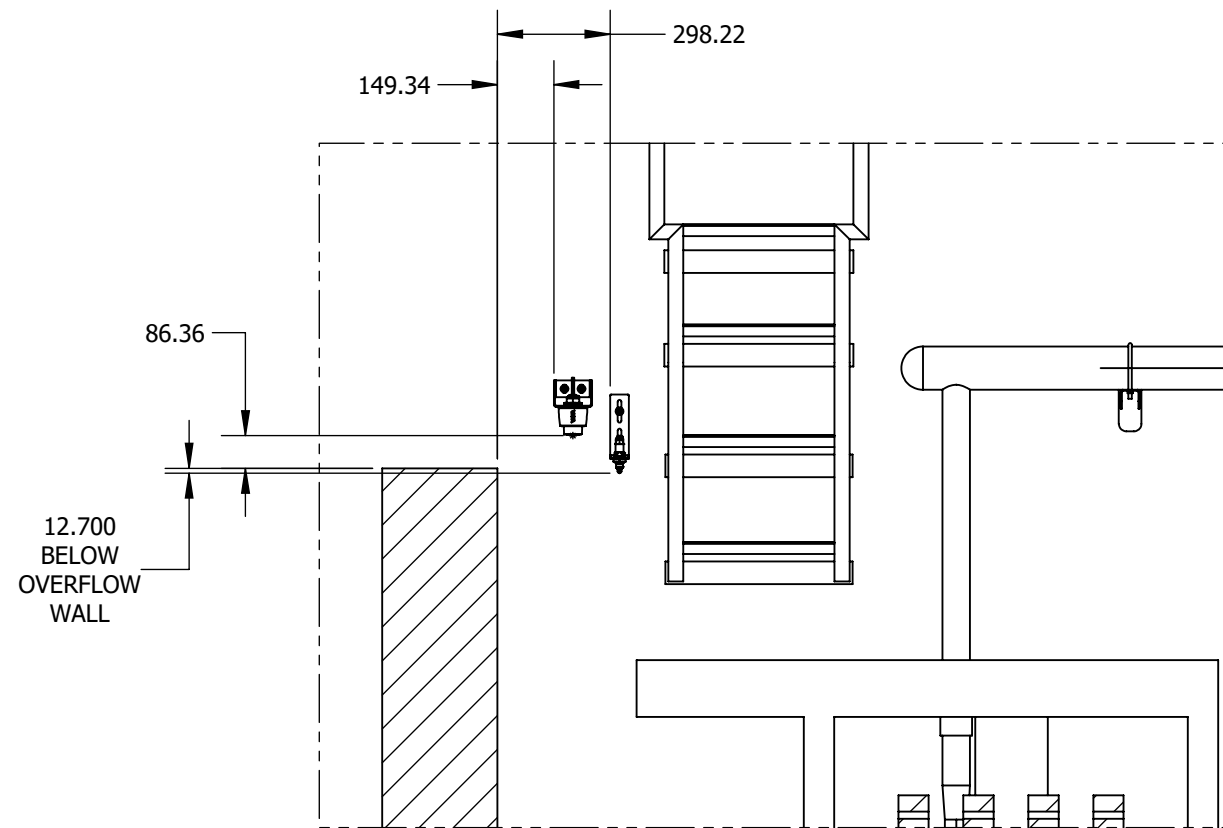
LOCATION: ELMVALE, ON		SCALE 1:75	
DESCRIPTION: GENERAL ARRANGEMENT DRAWING, 2X4/20			
AUTH.	GS, 06/26/2024	CHKD.	DK, 06/27/2024
NUMBER: 524.4100		REV. 01	PAGE 4/5

D

STEP 9
INSTALL INSTRUMENTATION



SECTION K-K



DETAIL L

D

C

B

A



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UNLESS OTHERWISE SPECIFIED
 DIMENSIONS ARE IN MILLIMETERS
 TOLERANCES:
 00 ± 10mm
 00.00 ± 5mm
 00.000 ± 2mm
 THIRD ANGLE PROJECTION

LOCATION: ELMVALE, ON		SCALE 1:75	
DESCRIPTION: GENERAL ARRANGEMENT DRAWING, 2X4/20			
AUTH.	GS, 06/26/2024	CHKD.	DK, 06/27/2024
NUMBER: 524.4100		REV. 01	PAGE 5/5

TEMPLATE LAST MODIFIED: 08.05.19



SHOP DRAWING TRANSMITTAL

Project Name:	Project #:
Submitted to:	
Submittal #:	Date:
Description:	

General Comments:



Filter Ancillaries

Revision 00

This Document Contains:

- Backwash/Sludge Pump Cutsheet
- Gear Box Cutsheet
- Drive Motor Cutsheet
- Drive Chain Cutsheet

Equipment Data			
Item	Installed	Loose Contractor Install	Loose Nexom Install
Backwash Pumps	X		
Sludge Pumps		X	
Gear Box	X		
Drive Motor	X		
Drive Chain	X		

Arcadis Inc

NOTE:
 Backwash/sludge pump capacity and TDH to be confirmed as per the supplier's design requirements. (SG)

The review of this Shop Drawing is for the sole purpose of ascertaining conformance with the general design concept and general arrangement only. This review does not constitute approval or verification of the design inherent in the Shop Drawings, and any omissions or errors therein remain the responsibility of the Contractor. The Contractor remains entirely responsible for complying with the Contract Documents, confirming all field dimensions and site conditions, for information that pertains to fabrication, techniques of construction and installation, and coordination of the Work.

Reviewed	Reviewed As Noted	Revise & Resubmit	Not Reviewed
	X		
Reviewed By:	S.G.	Date:	Sept 19, 2024

Technical Data

Pump Name

DWGZ 300 3~575/60

Customer	Date	2022-03-23	Company
Contact	Item no.		Issued by
Phone	Project		Phone
E-mail	Project ID	Progetto senza titolo 2022-03-23 16:58	E-mail

Requested data

1	Pump type		SUBMERSIBLE SEWAGE PUMPS	Fluid		Water
2	Number of pumps / Reserve	1 / 0		Liquid temperature	°C	20
3	Flow	m³/h		Kin. viscosity	mm²/s	1.005
4	Head	m		Vapour pressure	bar	0.0234
5	Geodetic head	m		PH value		
6	Inlet pressure (pin)	bar	0	Density	kg/m³	998.3
7	Available system NPSH			Solids	Weight %	0
8	Ambient temperature	°C	20			

Pump

9	Pump Name	DW 3006	Frequency	Hz	60
10	Design	SUBMERSIBLE SEWAGE PUMPS	Installation type		STANDARD
11	Manufacturer	EBARA	Impeller Diameter	Max.	mm 106
12	Speed	1/min 3400		Designed	mm 106
13	No. of Stage	1		Min.	mm 106
14	Connection	Suction side	Flow	Operating	m³/h
15	Connection	Discharge side		Max-	m³/h 54
16	Max. Working Pressure	bar		Min-	m³/h 6
17	Shut-off head	bar	Head	Operating	m
18	Total weight	kg		- (Qmax.)	m 5.0
19	Shaft power	kW		- (Qmin.)	m 20.0
20			Max. Shaft Power at max. impeller	kW	
21	Required pump NPSH	m	Efficiency	%	

Materials

22	Impeller	AISI 304		
23	Casing	AISI 304		
24	Shaft	AISI 303 (wet extension)		
25				
26				
27				

Motor

28	Manufacturer	EPE Standard	Insulation class	F
29	Type	DW 3006_575_Three Phase	Phases	3~
30	Specific design	Submersible dry type / 60 Hz / Pole pairs 1	Frame size	
31	Rated power	kW 2.2	Weight	kg
32	Number of poles	2	Electric voltage	V 575
33	Speed	1/min 3400	Electric current	A
34	Degree of protection	IP X8		
35				

Remarks

Performance Curve

Pump Name

DWGZ 300 3~575/60

Customer	Date 2022-03-23	Company
Contact	Item no.	Issued by
Phone	Project	Phone
E-mail	Project ID Progetto senza titolo 2022-03-23 16:58:30	E-mail

Requested data

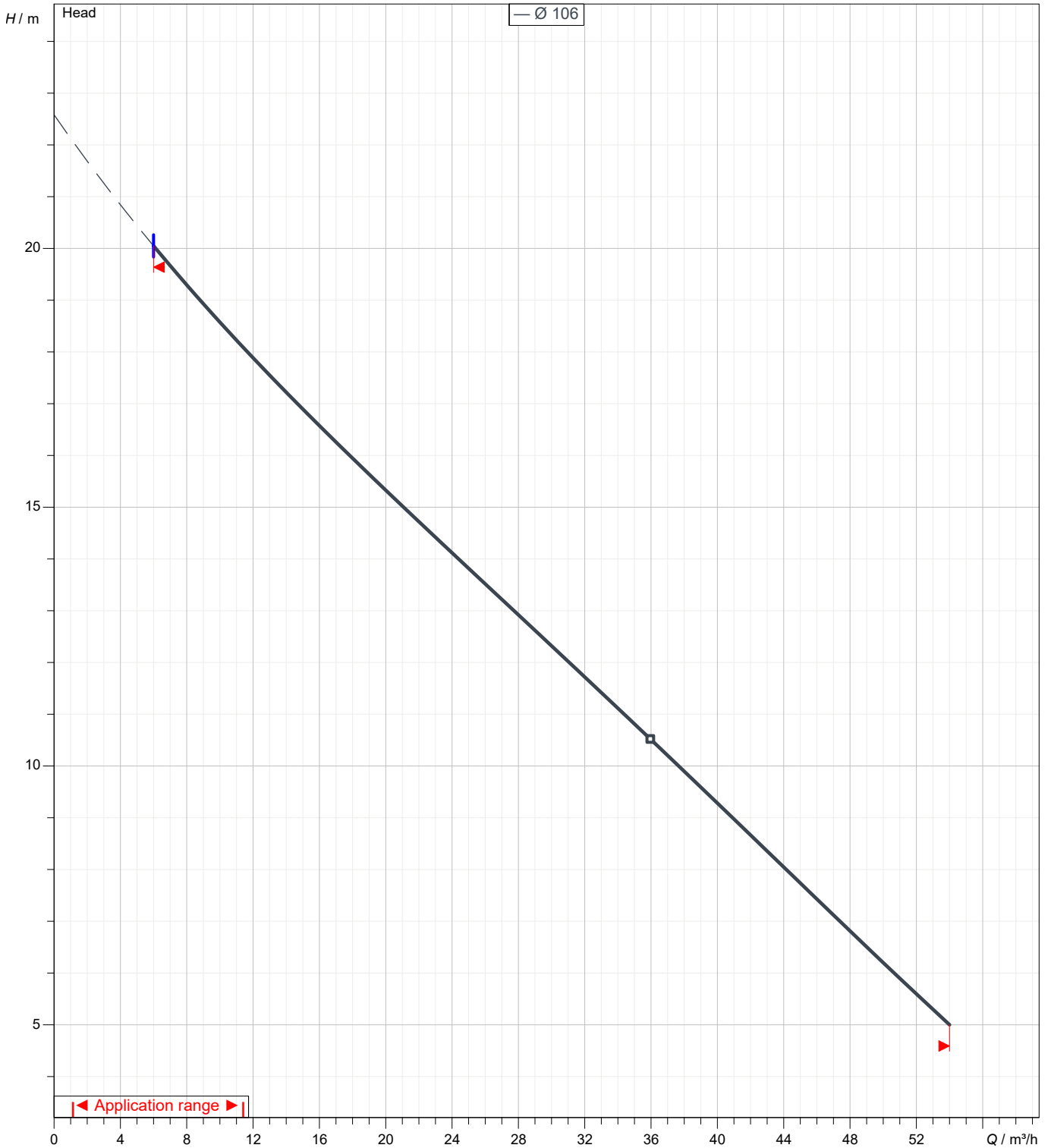
1	Flow	m ³ /h	
2	Head	m	
3	Geodetic head	m	

Pump

Operating Flow	m ³ /h	Frequency	Hz	60
Operating Head	m	Number of poles	2	
Impeller diameter designed	mm	106	Speed	1/min 3400

Test standard: ISO 9906:2012 - Grade3B

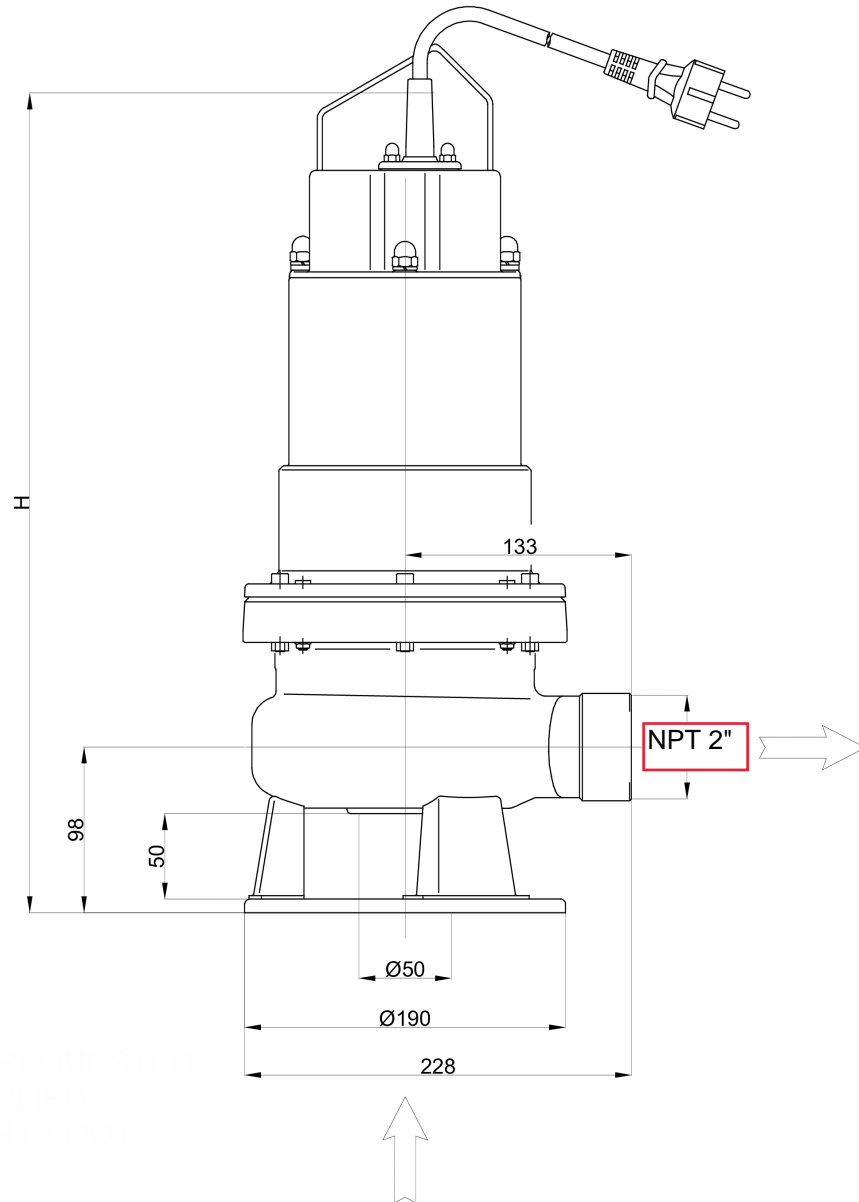
Water; 20°C; 998.3kg/m³; 1mm²/s



Dimensions

Pump name DWGZ 300 3~575/60

Customer	Date 2022-03-23	Company
Contact	Item no.	Issued by
Phone	Project	Phone
E-mail	Project ID Progetto senza titolo 2022-03-23 16:58:00	E-mail

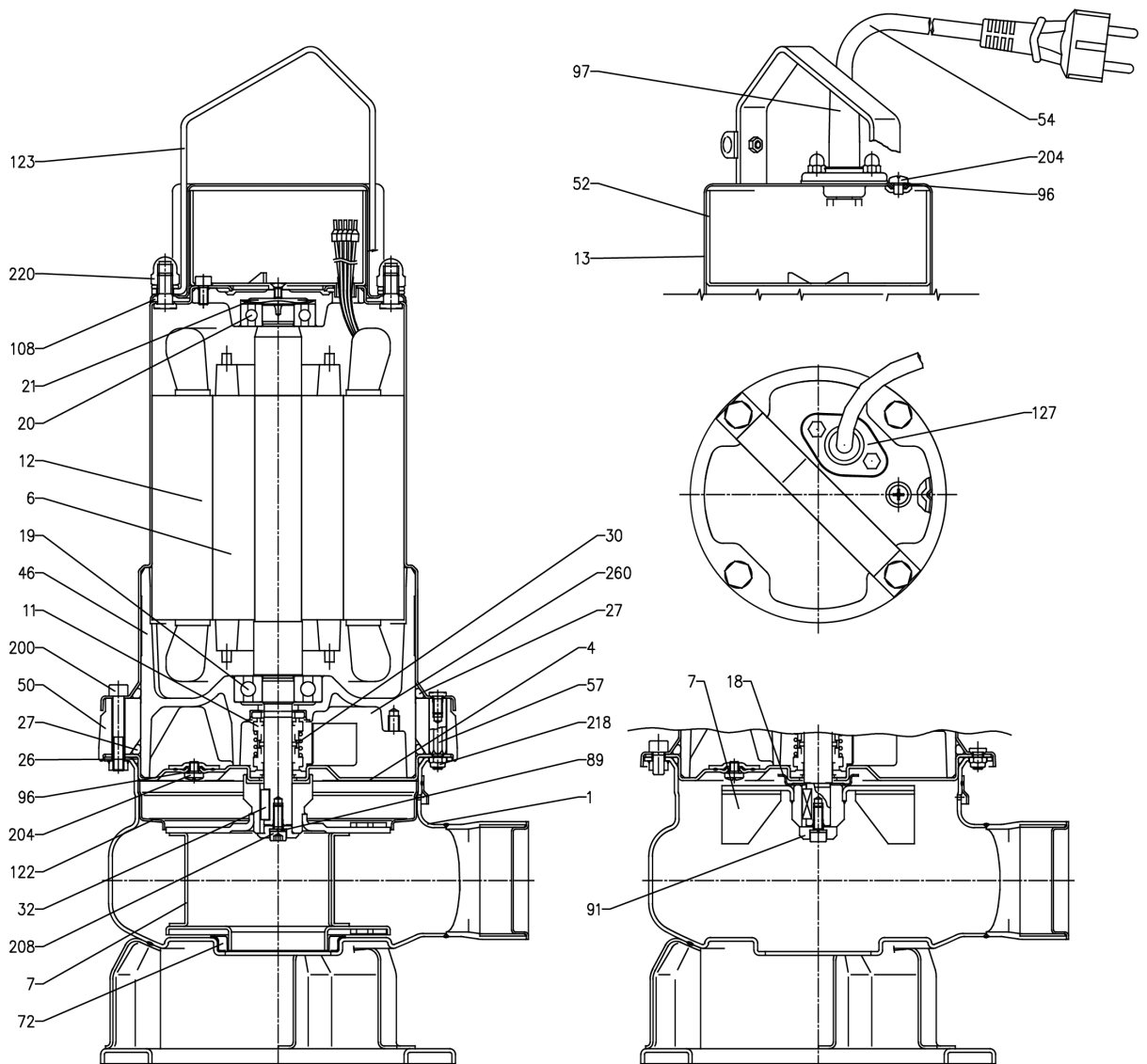


Dimensions in		mm					
1	H.	546					
2	Weight PUMP	25,8 kg					
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

(1/3) Construction

Pump name DWGZ 300 3~575/60

Customer	Date 2022-03-23	Company
Contact	Item no.	Issued by
Phone	Project	Phone
E-mail	Project ID Progetto senza titolo 2022-03-23 16:58	E-mail



DW

DW VOX

(2/3)

Construction

Pump name DWGZ 300 3~575/60

Customer	Date 2022-03-23	Company
Contact	Item no.	Issued by
Phone	Project	Phone
E-mail	Project ID Progetto senza titolo 2022-03-23 16:58	30.529

N°	PART NAME	MATERIAL	Q.TY
1	Casing	AISI 304	1
4	Casing cover	AISI 304	1
6	Shaft with rotor	AISI 303	1
7	Impeller	AISI 304	1
11	Mechanical seal impeller side [5]	SiC/SiC/NBR	1
11	Mechanical seal motor side [5]	Carbon/Ceramic/NBR	1
12	Motor frame with stator	-	1
13	Motor cover	AISI 304	1
16	Terminal	-	1
18	Mechanical seal protection [1]	AISI 304	1
19	Lower side ball bearing	-	1
20	Upper side ball bearing	-	1
21	Adjusting ring	Steel C70	1
26	O ring	NBR	1
27	O ring [2]	NBR	1
30	Mechanical seal spacer	Brass	1
32	Key	AISI 316	1
46	Bearing housing	G20	1
50	Spacer [2]	AISI 304	1
52	Terminal insulating box	PA66 glass fibre reinforced class V-0	1
54	Power cable	-	1
57	Spacer [2]	AISI 304	4
72	Casing ring [3]	NBR	1
89	Washer	AISI 304	1
91	Washer [1]	AISI 304	1
96	O ring	NBR	3
97	Power cable entry	NBR	1
108	Cover gasket	NBR	1
122	Impeller protection ring [4]	AISI 304	1
123	Handle	AISI 304	1
127	Power cable connector	AISI 304	1
200	Screw	Stainless steel A2 UNI 7323	6
204	Screw	Stainless steel A2 UNI 7323	3
208	Screw	Stainless steel A2 UNI 7323	1
218	Nut	Stainless steel A2 UNI 7323	4
220	Nut	Stainless steel A2 UNI 7323	4
260	Lubricating liquid	White mineral oil	385 cc

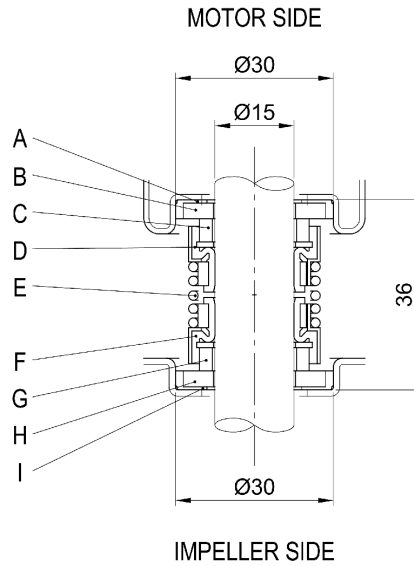
- [1] Except for DW-DW VOX 3006
- [2] Only for DW-DW VOX 3006
- [3] Only for DW
- [4] Except for DW VOX 1506, 2006 and 3006
- [5] See **CONSTRUCTION 3**

(3/3)

Construction

Pump name DWGZ 300 3~575/60

Customer	Date 2022-03-23	Company
Contact	Item no.	Issued by
Phone	Project	Phone
E-mail	Project ID Progetto senza titolo 2022-03-23 16:58	E-mail



REF	PART NAME	MATERIAL
A	Rubber cup	NBR
B	Seat	Ceramic
C	Seal face	Carbon
D	Bellow	NBR
E	Spring	AISI 304
F	Bellow	NBR
G	Seal face	Silicon carbide
H	Seat	Silicon carbide
I	Rubber cup	NBR

EP series

Imperial units



Planetary gear reducers and garmotors
Imperial units

Product range

Size

T_{N2} [lb in], T_{2max} [lb in]
 $F_{r2}^{1)}$ [lb] (C ...), $F_{r2}^{1)}$ [lb] (S ...)

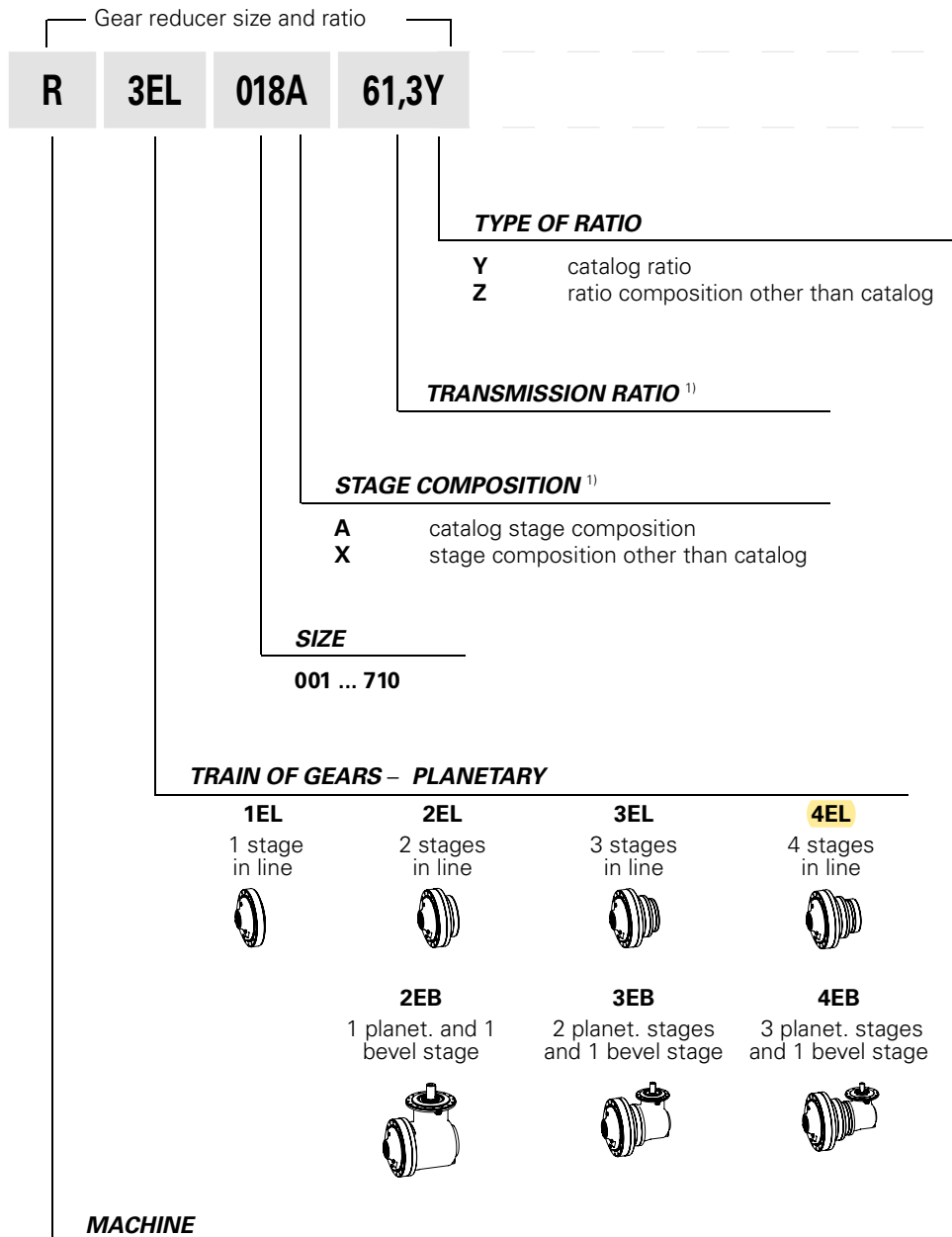
Train of gears - In Line

i_N

	1EL 3.55 ... 7.1	2EL 12.5 ... 50	3EL 50 ... 250	4EL 180 ... 3550
001A 14 160, 17 000 3750, 4 500				
002A 19 820, 23 600 4 500, 5 300				
003A 27 880, 33 500 6 300, 7 500				
004A 39 820, 47 500 8 000, 9 000				
006A 55 750, 67 000 9 500, 10 600				
009A 79 650, 95 000 12 500, 14 000				
012A 110 600, 132 000 16 000, 18 000				
015A 132 750, 160 000 14 000, 18 000				
018A 159 300, 190 000 19 000, 23 600				
021A 187 600, 250 000 19 000, 23 600				
030A 278 750, 400 000 22 400, 23 600				
042A 398 250, 600 000 30 000, 31 500				
060A 557 500, 800 000 31 500, 35 500				
085A 796 450, 1 250 000 45 000, 50 000				

1) Radial loads valid for cylindrical output shaft (C ...) and splined output shaft (S ...), respectively.

2 – Design features



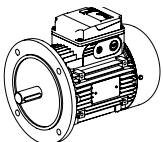
Designation example:

R 2EL 002A 45,2Y C042M1 F10a C30x58 B5 ,...

R 2EL 009A 25,9Y S070M1 P10c I55x400 B3 ,...

R 3EB 030A 68,3Y H120M1 A10e J38x58 B53 ,...

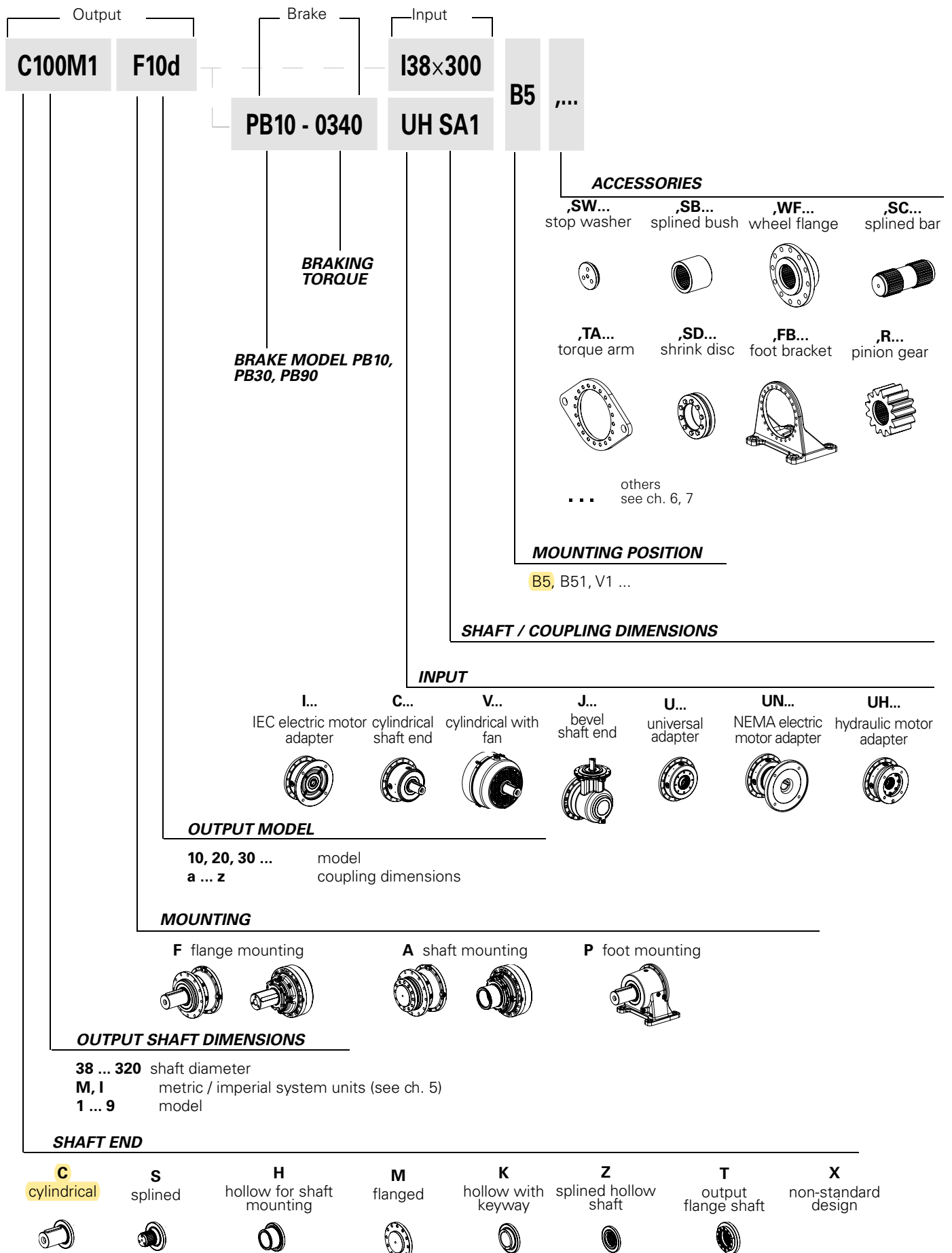
1) More stage compositions and ratios are available on request. Use selection software or consult us.



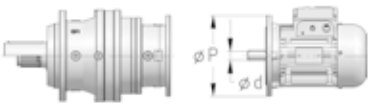
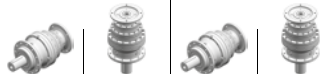
When gearmotor is supplied with a Rossi standard motor, please state motor designation according to catalog TX.

For terminal box position refer to ch. 6.

2 – Design features





3.1 - In line gearmotor selection tables

P ₁ hp	n ₂ rpm	T ₂ lb in	fs	i	 ∅d x ∅P	P _{TN} [hp]				 lb		
						t _{amb} = 68°F (20°C)		t _{amb} = 104°F (40°C)		HB	HBZ	
0,5	2,43	11 540	1,18	720	R 4EL 001 A 14 x 160	71 B 4	5,3	4,25	4	3,15	76	82
	2,43	11 540	1,6	720	R 4EL 002 A 14 x 160	71 B 4	5,3	4,25	4	3,15	78	84
	2,39	11 730	2,24	732	R 4EL 003 A 14 x 160	71 B 4	7,1	5,6	5,3	4,25	104	110
	2,39	11 730	3,15	732	R 4EL 004 A 14 x 160	71 B 4	7,5	6	5,6	4,5	113	119
	2,39	11 730	4,25	732	R 4EL 006 A 14 x 160	71 B 4	7,5	6	5,6	4,5	129	135
	2,81	9 971	1,32	622	R 4EL 001 A 14 x 160	71 B 4	5,3	4,25	4	3,15	76	82
	2,81	9 971	1,8	622	R 4EL 002 A 14 x 160	71 B 4	5,3	4,25	4	3,15	78	84
	2,79	10 060	2,5	628	R 4EL 003 A 14 x 160	71 B 4	7,1	5,6	5,3	4,25	104	110
	2,87	9 787	3,75	611	R 4EL 004 A 14 x 160	71 B 4	7,5	6	5,6	4,5	113	119
	3,20	8 751	1,5	546	R 4EL 001 A 14 x 160	71 B 4	5,3	4,25	4	3,15	76	82
	3,20	8 751	1,8	546	R 4EL 002 A 14 x 160	71 B 4	5,3	4,25	4	3,15	78	84
	3,23	8 672	2,12	356	R 4EL 002 A 19 x 200	80 A 6	8,5	6,7	6,3	5	86	94
	3,09	9 075	2,8	566	R 4EL 003 A 14 x 160	71 B 4	7,1	5,6	5,3	4,25	104	110
	3,09	9 075	4	566	R 4EL 004 A 14 x 160	71 B 4	7,5	6	5,6	4,5	113	119
	3,52	7 967	1,6	497	R 4EL 001 A 14 x 160	71 B 4	5,3	4,25	4	3,15	76	82
	3,52	7 967	2,24	497	R 4EL 002 A 14 x 160	71 B 4	5,3	4,25	4	3,15	78	84
	3,39	8 278	3	517	R 4EL 003 A 14 x 160	71 B 4	7,1	5,6	5,3	4,25	104	110
	3,39	8 278	4,25	517	R 4EL 004 A 14 x 160	71 B 4	7,5	6	5,6	4,5	113	119
	3,93	7 133	1,8	445	R 4EL 001 A 14 x 160	71 B 4	5,3	4,25	4	3,15	76	82
	3,93	7 133	2,5	445	R 4EL 002 A 14 x 160	71 B 4	5,3	4,25	4	3,15	78	84
	3,87	7 250	3,35	452	R 4EL 003 A 14 x 160	71 B 4	7,1	5,6	5,3	4,25	104	110
	4,16	6 738	1,9	420	R 4EL 001 A 14 x 160	71 B 4	5,3	4,25	4	3,15	76	82
	4,61	6 081	2	249	R 4EL 001 A 19 x 200	80 A 6	8,5	6,7	6,3	5	83	92
	4,16	6 738	2,5	420	R 4EL 002 A 14 x 160	71 B 4	5,3	4,25	4	3,15	78	84
	4,15	6 759	3,55	422	R 4EL 003 A 14 x 160	71 B 4	7,1	5,6	5,3	4,25	104	110
	4,92	5 699	2,12	356	R 4EL 001 A 14 x 160	71 B 4	5,3	4,25	4	3,15	76	82
	5,24	5 472	2,24	219	R 3EL 001 A 19 x 200	80 A 6	9,5	7,5	7,1	5,6	75	83
	4,92	5 699	3	356	R 4EL 002 A 14 x 160	71 B 4	5,3	4,25	4	3,15	78	84
	4,91	5 716	4	357	R 4EL 003 A 14 x 160	71 B 4	7,1	5,6	5,3	4,25	104	110
	5,72	4 903	2,36	306	R 4EL 001 A 14 x 160	71 B 4	5,3	4,25	4	3,15	76	82
	5,43	5 284	2,24	212	R 3EL 001 A 19 x 200	80 A 6	9,5	7,5	7,1	5,6	75	83
	5,72	4 903	3,35	306	R 4EL 002 A 14 x 160	71 B 4	5,3	4,25	4	3,15	78	84
	5,94	4 725	2,5	295	R 4EL 001 A 14 x 160	71 B 4	5,3	4,25	4	3,15	76	82
	6,28	4 567	2,5	183	R 3EL 001 A 19 x 200	80 A 6	9,5	7,5	7,1	5,6	75	83
	5,94	4 725	3,55	295	R 4EL 002 A 14 x 160	71 B 4	5,3	4,25	4	3,15	78	84
	7,02	3 996	2,8	249	R 4EL 001 A 14 x 160	71 B 4	5,3	4,25	4	3,15	76	82
	7,27	3 947	3	158	R 3EL 001 A 19 x 200	80 A 6	9,5	7,5	7,1	5,6	75	83
	7,02	3 996	4	249	R 4EL 002 A 14 x 160	71 B 4	5,3	4,25	4	3,15	78	84
	7,97	3 596	3,15	219	R 3EL 001 A 14 x 160	71 B 4	6	4,75	4,5	3,55	67	73
	7,97	3 596	4,25	219	R 3EL 002 A 14 x 160	71 B 4	6	4,75	4,5	3,55	69	75
	8,26	3 472	3,15	212	R 3EL 001 A 14 x 160	71 B 4	6	4,75	4,5	3,55	67	73
	8,47	3 313	3,35	207	R 4EL 001 A 14 x 160	71 B 4	5,3	4,25	4	3,15	76	82
	8,72	3 290	4	201	R 3EL 002 A 14 x 160	71 B 4	6	4,75	4,5	3,55	69	75
	9,56	3 001	3,75	183	R 3EL 001 A 14 x 160	71 B 4	6	4,75	4,5	3,55	67	73
	10,2	2 747	4	171	R 4EL 001 A 14 x 160	71 B 4	5,3	4,25	4	3,15	76	82
11,1	2 594	4,25	158	R 3EL 001 A 14 x 160	71 B 4	6	4,75	4,5	3,55	67	73	
12,0	2 398	4,5	146	R 3EL 001 A 14 x 160	71 B 4	6	4,75	4,5	3,55	67	73	
13,8	2 072	5,3	126	R 3EL 001 A 14 x 160	71 B 4	6	4,75	4,5	3,55	67	73	
16,4	1 753	6	107	R 3EL 001 A 14 x 160	71 B 4	6	4,75	4,5	3,55	67	73	
17,3	1 656	6,3	101	R 3EL 001 A 14 x 160	71 B 4	6	4,75	4,5	3,55	67	73	
19,2	1 494	7,1	59,9	R 3EL 001 A 19 x 200	80 A 6	9,5	7,5	7,1	5,6	75	83	
21,7	1 367	5	53,1	R 2EL 001 A 19 x 200	80 A 6	13,2	10,6	9,5	7,5	66	75	
0,75	0,436	96 430	1,12	2 636	R 4EL 015 A 19 x 200	80 B 6	19	15	14	11,2	239	248
	0,436	96 430	1,25	2 636	R 4EL 018 A 19 x 200	80 B 6	22,4	18	17	14	321	329
	0,484	86 960	1,5	2 377	R 4EL 021 A 19 x 200	80 B 6	22,4	18	17	14	327	336
	0,492	85 520	2,65	2 338	R 4EL 030 A 19 x 200	80 B 6	25	20	19	15	410	419
	0,536	78 470	1,18	2 145	R 4EL 012 A 19 x 200	80 B 6	19	15	14	11,2	230	239
	0,536	78 470	1,4	2 145	R 4EL 015 A 19 x 200	80 B 6	19	15	14	11,2	239	248
	0,536	78 470	1,7	2 145	R 4EL 018 A 19 x 200	80 B 6	22,4	18	17	14	321	329
	0,536	78 470	2	2 145	R 4EL 021 A 19 x 200	80 B 6	22,4	18	17	14	327	336
	0,605	69 540	1,18	1 901	R 4EL 012 A 19 x 200	80 B 6	19	15	14	11,2	230	239
	0,599	70 220	1,32	2 921	R 4EL 015 A 14 x 160	71 C 4	11,8	9,5	9	7,1	230	235
	0,599	70 220	1,32	2 921	R 4EL 015 A 19 x 200	80 A 4	11,8	9,5	9	7,1	235	243
	0,566	74 380	1,5	3 094	R 4EL 018 A 14 x 160	71 C 4	14	11,2	10,6	8,5	311	317
	0,566	74 380	1,5	3 094	R 4EL 018 A 19 x 200	80 A 4	14	11,2	10,6	8,5	316	325
	0,604	69 600	3,55	1 902	R 4EL 030 A 19 x 200	80 B 6	25	20	19	15	410	419
	0,629	66 850	1,4	1 827	R 4EL 012 A 19 x 200	80 B 6	19	15	14	11,2	230	239
	0,629	66 850	1,7	1 827	R 4EL 015 A 19 x 200	80 B 6	19	15	14	11,2	239	248
	0,642	65 480	2	1 790	R 4EL 018 A 19 x 200	80 B 6	22,4	18	17	14	321	329
	0,629	66 850	2,36	1 827	R 4EL 021 A 19 x 200	80 B 6	22,4	18	17	14	327	336
	0,688	61 180	5,6	1 673	R 4EL 042 A 19 x 200	80 B 6	31,5	25	23,6	19	538	547

2591-01.02

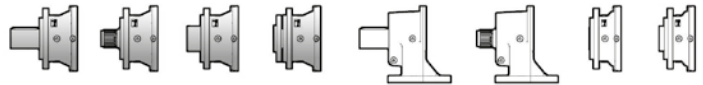
Data and performance summary

	$L_h = 10\ 000\ h$					T_{N2max} T_{2max} lb in	n_{1max} n_{1peak} rpm	$n_1 = 1\ 750\ rpm$			T_{N2max} T_{2max} lb in	n_{1max} n_{1peak} rpm	$L_h = 10\ 000\ h$					T_{N2max} T_{2max} lb in	n_{1max} n_{1peak} rpm	$n_1 = 1\ 750\ rpm$		
	i_N	i_{eff}	$n_1\ rpm$					$Pt\ hp$					i_N	i_{eff}	$n_1\ rpm$					$Pt\ hp$		
			$n_2\ rpm$	$T_{N2}\ lb\ in$	T_{2max}			68°F (20°C)	104°F (40°C)	$n_2\ rpm$					$T_{N2}\ lb\ in$	T_{2max}	68°F (20°C)			104°F (40°C)		
1EL	3.55	3.52	498 7 512	327 8 520	142 10 940	15 040 17 500	2 800 3 150	11.2 8.5	19 14.5	22.4 17		180	171	10.2 15 280	6.71 16 060	2.92 17 910	17 910 21 800	2 800 3 150	5.3 4	9 6.9	10.6 8	
	4.25	4.17	419 7 756	276 8 797	120 11 290	19 820 23 600	3 150 4 000					200	207	8.47 15 510	5.56 16 520	2.42 17 910	17 910 21 800	3 150 4 000				
	5	5.29	331 8 101	217 9 188	94.4 11 290	16 810 20 000	3 150 4 000					250	249	7.02 15 950	4.61 17 000	2.01 19 280	19 820 23 600	3 150 4 000				
	6	6.21	282 8 078	185 8 289	80.5 8 724	13 480 17 000	3 150 4 000					280	295	5.94 16 360	3.90 17 430	1.70 19 780	19 820 23 600	3 150 4 000				
	7.1	7.64	229 5 902	151 6 056	65.5 6 374	9 820 14 000	3 150 4 000					315	306	5.72 16 450	3.76 17 530	1.63 17 910	17 910 21 800	3 150 4 000				
	12.5	12.1	144 10 890	94.8 12 350	41.2 13 880	15 040 17 500	2 800 3 150	8 6	13.6 10.3	16 12.2		355	356	4.92 16 830	3.23 17 940	1.41 19 820	19 820 23 600	3 150 4 000				
	14	14.4	122 11 250	79.9 12 760	34.7 14 180	17 910 21 800	2 800 3 150					400	420	4.16 17 260	2.74 18 400	1.19 19 820	19 820 23 600	3 150 4 000				
	16	17.4	101 11 900	66.2 13 490	28.8 14 340	19 820 23 600	3 150 4 000					450	445	3.93 17 410	2.58 18 550	1.12 19 820	19 820 23 600	3 150 4 000				
	18	18.3	95.8 11 280	63.0 11 580	27.4 12 180	16 810 20 000	2 800 3 150					500	497	3.52 17 710	2.31 18 870	1.01 19 820	19 820 23 600	3 150 4 000				
	20	20.5	85.2 12 510	56.0 13 770	24.3 14 490	19 820 23 600	3 150 4 000					560	546	3.20 16 090	2.11 16 510	0.916 17 930	19 820 23 600	3 150 4 000				
2EL	22.4	22	79.4 11 410	52.2 11 710	22.7 12 330	16 810 20 000	3 150 4 000				630	622	2.81 18 320	1.85 19 520	0.804 19 820	19 820 23 600	3 150 4 000					
	25	25.7	68.1 13 340	44.7 13 690	19.5 14 410	19 820 23 600	3 150 4 000				710	720	2.43 18 730	1.60 19 820	0.695 19 820	19 820 23 600	3 150 4 000					
	28	29.7	58.8 10 520	38.7 10 790	16.8 11 360	17 520 21 800	3 150 4 000				800	779	2.25 18 950	1.48 19 820	0.642 19 820	19 820 23 600	3 150 4 000					
	31.5	32.6	53.7 11 690	35.3 12 000	15.3 12 630	16 810 20 000	3 150 4 000				900	901	1.94 19 370	1.28 19 820	0.555 19 820	19 820 23 600	3 150 4 000					
	35.5	35.6	49.1 7 840	32.3 8 045	14.0 8 466	13 030 18 000	3 150 4 000				1000	1043	1.68 19 810	1.10 19 820	0.480 19 820	19 820 23 600	3 150 4 000					
	40	37.7	46.4 11 800	30.5 12 100	13.3 12 740	16 810 20 000	3 150 4 000				1120	1128	1.55 16 830	1.02 17 640	0.443 19 820	19 820 23 600	3 150 4 000					
	45	45.2	38.7 9 944	25.4 10 200	11.1 10 740	16 520 20 000	3 150 4 000				1250	1249	1.40 19 820	0.921 19 820	0.400 19 820	19 820 23 600	3 150 4 000					
	50	53.1	33.0 9 214	21.7 9 455	9.42 9 950	14 160 17 000	3 150 4 000				1400	1351	1.29 17 020	0.851 18 130	0.370 19 820	19 820 23 600	3 150 4 000					
	3EL	50	49.7	35.2 14 160	23.1 14 530	10.1 15 300	17 910 21 800	2 800 3 150	6 4.5	10 7.75	11.8 9	1600	1564	1.12 17 390	0.735 18 530	0.320 19 820	19 820 23 600	3 150 4 000				
		56	59.9	29.2 14 330	19.2 14 700	8.34 15 540	17 910 21 800	3 150 4 000				1800	1874	0.934 17 870	0.614 19 040	0.267 19 820	19 820 23 600	3 150 4 000				
63		63	27.8 12 170	18.3 12 490	7.93 13 150	16 810 20 000	2 800 3 150				2240	2168	0.807 14 050	0.530 14 980	0.231 16 990	17 910 21 800	3 150 4 000					
71		70.8	24.7 14 480	16.2 14 850	7.06 15 940	17 910 21 800	3 150 4 000				2500	2377	0.736 16 810	0.484 16 810	0.210 16 810	16 810 20 000	3 150 4 000					
80		76	23.0 12 310	15.1 12 640	6.58 13 300	16 810 20 000	3 150 4 000				2800	2750	0.636 16 810	0.418 16 810	0.182 16 810	16 810 20 000	3 150 4 000					
90		88.7	19.7 14 680	13.0 15 060	5.64 16 490	17 910 21 800	3 150 4 000				3150	3296	0.531 13 260	0.349 14 130	0.152 16 020	16 810 20 000	3 150 4 000					
100		101	17.3 14 800	11.4 15 180	4.95 16 820	19 820 23 600	3 150 4 000				3550	3868	0.452 14 160	0.297 14 160	0.129 14 160	14 160 17 000	3 150 4 000					
112		107	16.4 14 850	10.8 15 230	4.67 16 960	19 820 23 600	3 150 4 000															
125		126	13.8 15 000	9.09 15 390	3.95 17 400	19 820 23 600	3 150 4 000															
140		146	12.0 15 130	7.86 15 680	3.42 17 790	19 820 23 600	3 150 4 000															
160		158	11.1 14 920	7.27 15 310	3.16 16 110	19 820 23 600	3 150 4 000															
180		183	9.56 15 050	6.28 15 440	2.73 16 250	19 820 23 600	3 150 4 000															
200		201	8.72 13 070	5.73 13 560	2.49 15 380	16 810 20 000	3 150 4 000															
224		219	7.97 15 220	5.24 15 620	2.28 16 440	19 820 23 600	3 150 4 000															
250		254	6.89 12 000	4.53 12 310	1.97 12 950	17 910 21 800	3 150 4 000															

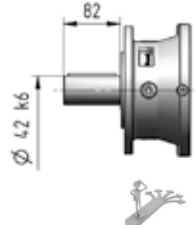


In case of alternative output design , refer to torque limits at page 4.35, if any.

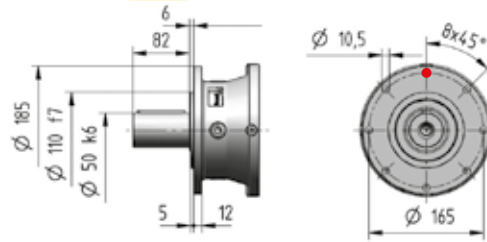
002A - Main Dimensions



C042M1 F10a



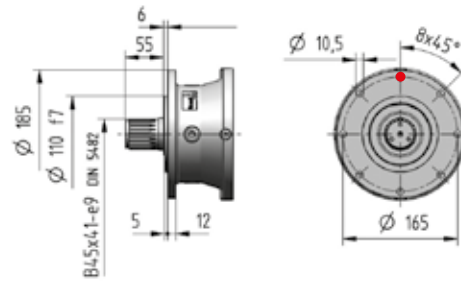
C050M1 F20a



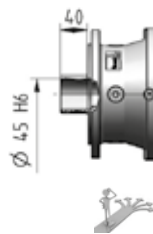
S040M1 F10a



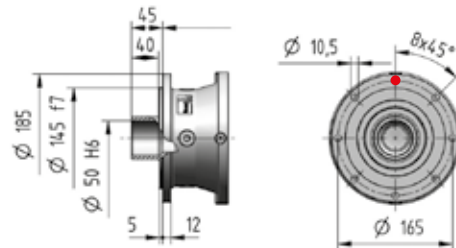
S045M1 F20a



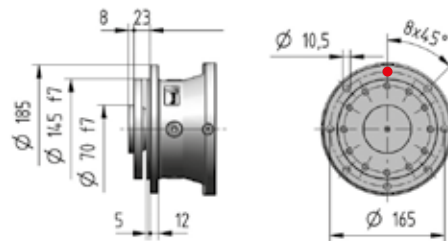
H045M1 A10a



H050M1 A20a

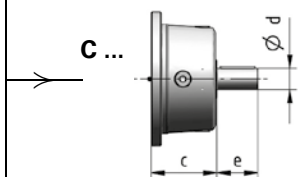
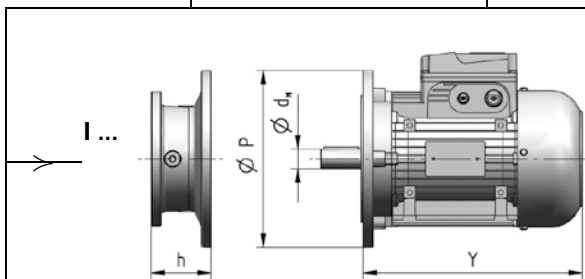
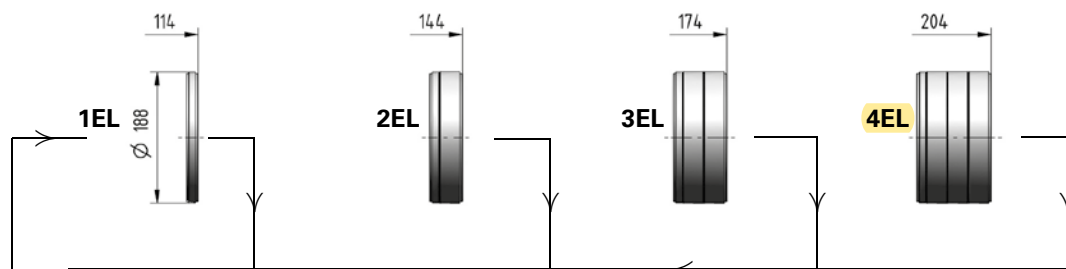


M070M1 A10a

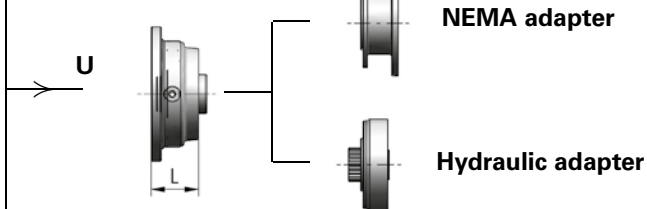


! see page 4.35

lb	Input Options Code										Output Options (Δ) Code	
	I14×160	I19×200	I24×200	I28×250	I38×300	I42×350	I48×350	C...	U...	J...	C...	K... Z...
1EL	37	42	42	46	55	66	66	48	41	-	+0	-4
2EL	46	50	50	55	61	74	74	57	50	-		
3EL	55	61	59	63	72	85	83	66	59	-		
4EL	66	70	70	74	81	94	94	74	68	-		
2EB	72	77	77	81	88	101	101	81	74	63		
3EB	81	88	88	90	99	112	110	92	85	74		
4EB	92	97	97	101	108	121	121	101	94	83		



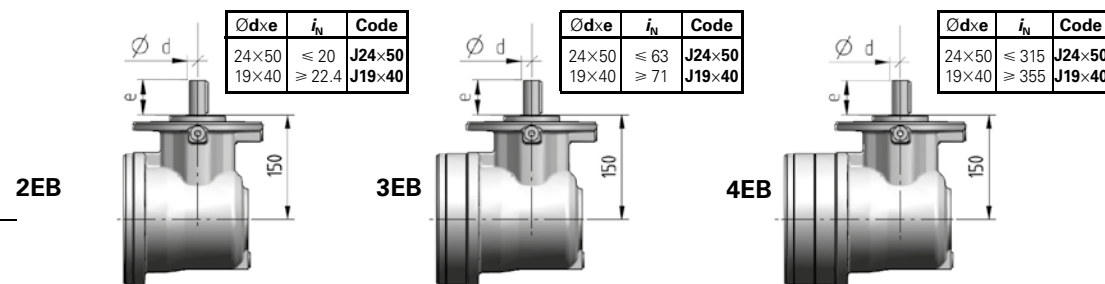
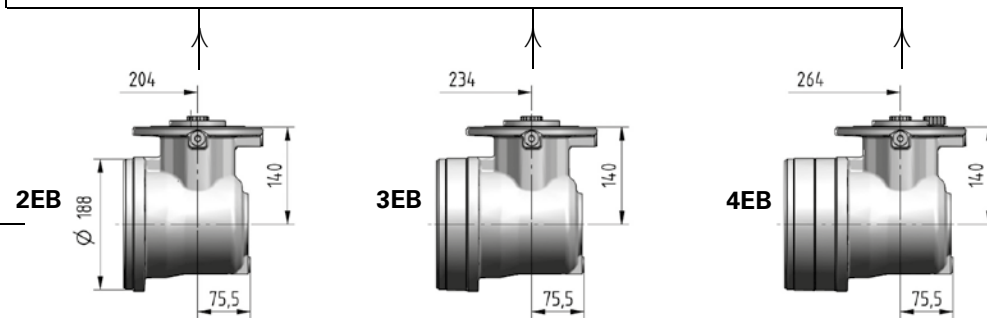
Train of gears	d	e	c	Code
1EL	38	58	90	C38×58
2EL ... 4EL	30	58	90	C30×58
2EB ... 4EB	38	58	90	C38×58



Train of gears	L	Code
1EL ... 4EL	64	ch.7
2EB ... 4EB	64	ch.7

Motor size IEC	d _M ×P	Y	Train of gears								Code	
			1EL	2EL	3EL	4EL	2EB	3EB	4EB	Dimension h		
71	14×160	216	278	52	52	52	52	52	52	52	52	I14×160
80	19×200	233	302	72	72	72	72	72	72	72	72	I19×200
90	24×200	287	366	72	72	72	72	72	72	72	72	I24×200
100	28×250	310	405	82	82	82	82	82	82	82	82	I28×250
112	28×250	336	435	82	82	82	82	82	82	82	82	I28×250
132	38×300	445	553	102	102	102	102	102	102	102	102	I38×300
160	42×350	573	640	135	135	135	135	135	135	135	135	I42×350
180	48×350	613	734	135	135	135	135	135	135	135	135	I48×350

1) Values valid for brake motor; for other dimensions see TX catalog.



Ød×e	i _N	Code
24×50	≤ 20	J24×50
19×40	≥ 22.4	J19×40

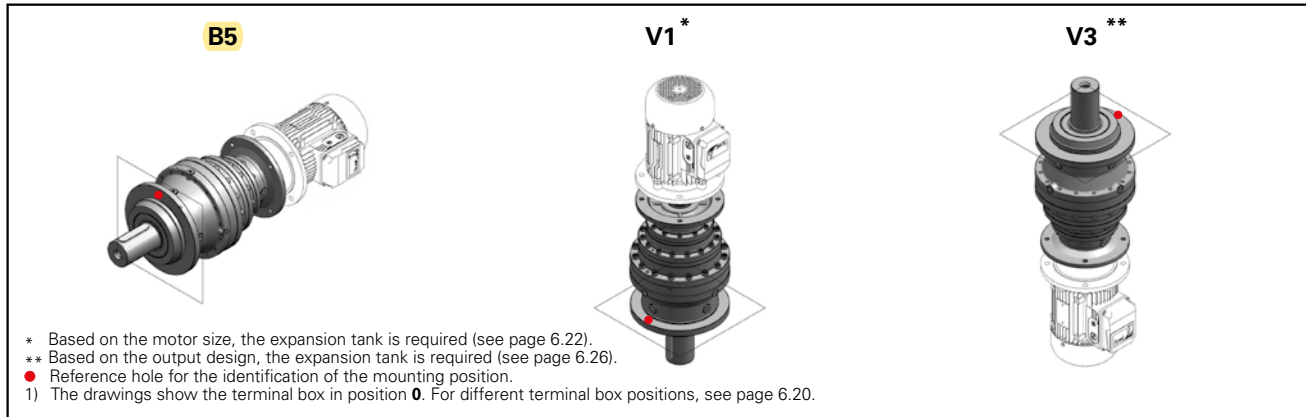
Ød×e	i _N	Code
24×50	≤ 63	J24×50
19×40	≥ 71	J19×40

Ød×e	i _N	Code
24×50	≤ 315	J24×50
19×40	≥ 355	J19×40

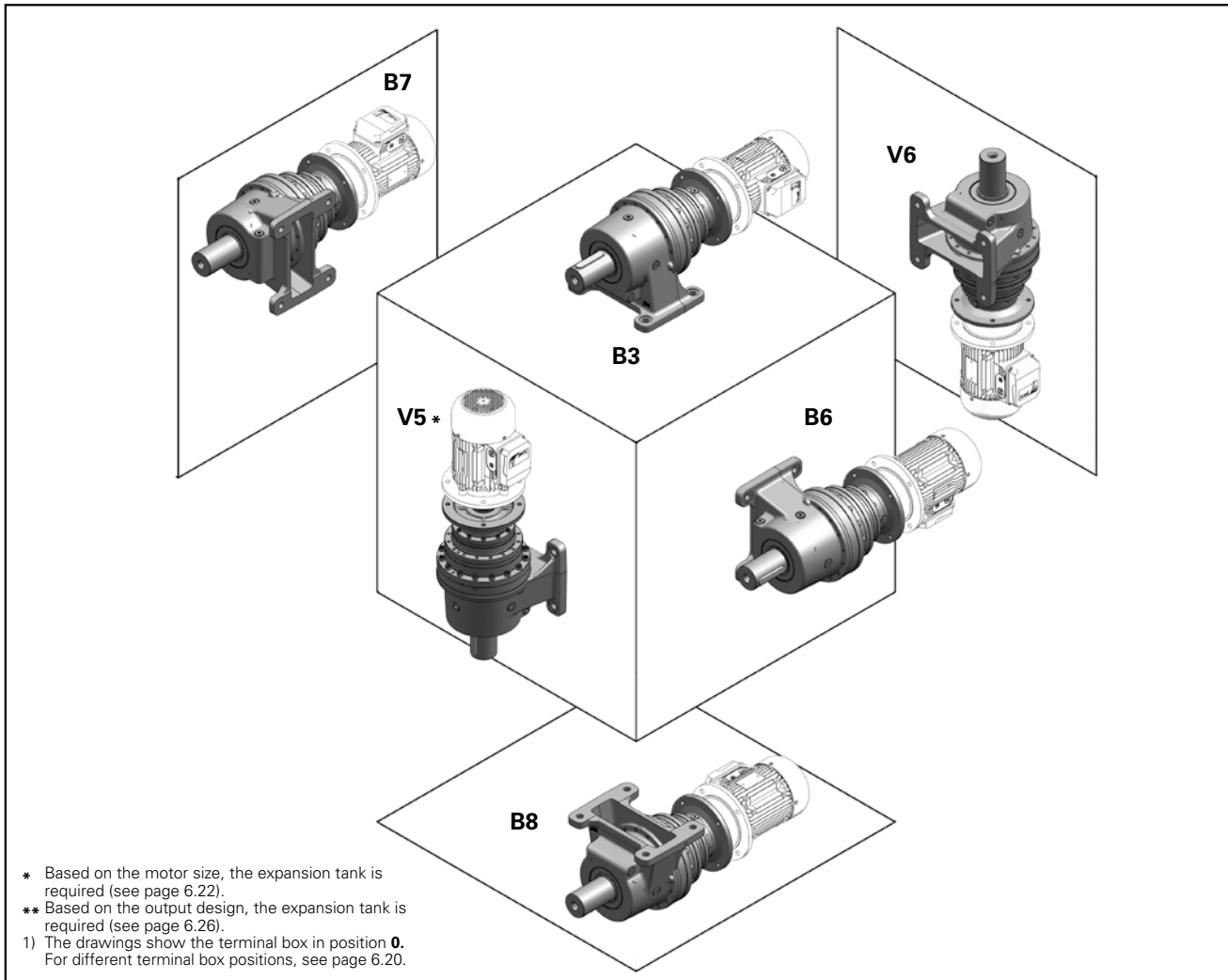
Mounting positions, oil quantities and expansion tanks

001A ... 021A

Mounting positions¹⁾ (Output mounting ... F..., ... A...)



Mounting positions¹⁾ (Output mounting ... P...)

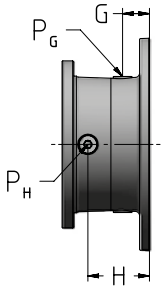


Oil quantities [gal]

Q _R	1EL										2EL										3EL										4EL									
	001A	002A	003A	004A	006A	009A	012A	015A	018A	021A	001A	002A	003A	004A	006A	009A	012A	015A	018A	021A	001A	002A	003A	004A	006A	009A	012A	015A	018A	021A	001A	002A	003A	004A	006A	009A	012A	015A	018A	021A
B3 ... B8	0.17	0.18	0.32	0.34	0.34	0.53	0.5	0.5	0.79	0.9	0.21	0.22	0.34	0.37	0.37	0.71	0.69	0.69	0.85	0.85	0.25	0.26	0.37	0.4	0.37	0.66	0.69	0.69	0.87	0.87	0.29	0.29	0.4	0.42	0.4	0.69	0.69	0.69	0.85	0.85
V1, V5	0.22	0.22	0.4	0.42	0.37	0.66	0.53	0.55	1	1.1	0.29	0.32	0.53	0.58	0.55	1	1	1	1.3	1.3	0.4	0.4	0.61	0.66	0.61	1.2	1.2	1.2	1.5	1.5	0.48	0.48	0.69	0.74	0.69	1.3	1.3	1.3	1.6	1.6
V3, V6	0.25	0.26	0.5	0.55	0.53	0.77	0.74	0.77	1.1	1.4	0.34	0.34	0.55	0.61	0.61	1.1	1.1	1.1	1.3	1.2	0.42	0.45	0.58	0.63	0.58	1	1.1	1.1	1.3	1.3	0.48	0.5	0.66	0.71	0.66	1.1	1.1	1.1	1.3	1.3

Stated oil quantities are approximate values. The exact quantity of oil the gear reducer needs to be filled with will be determined by the level plug.

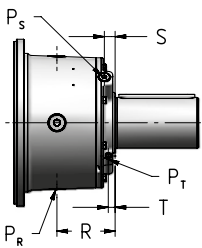
001A ... 710A - Input side details



I...

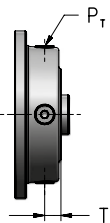
1EL	2EL	3EL	4EL	2EB	3EB	4EB	IEC	G	H	P _G (n.2)	P _H (n.2)
001A ... 002A	001A ... 006A	001A ... 022A	001A ... 061A	001A ... 006A	001A ... 022A	001A ... 061A	71	20	20	G3/8"	G3/8"
			80				27	46.5			
			90				27	46.5			
			100				36	54.5			
			112				36	54.5			
			132				37	74.5			
			160				63	107.5			
180	63	107.5									
003A ... 006A	009A ... 022A	030A ... 061A	085A ... 180A	009A ... 015A, 022A	030A ... 043A	085A ... 125A	100	40	70	G1/2"	G1/2"
							112	40	70		
							132	38	87		
							160	65.5	120		
							180	65.5	120		
200	69.5	120									
009A ... 015A	030A ... 043A	085A ... 125A	250A ... 355A	018A ... 021A, 030A	060A ... 085A	180A ... 250A	132	29.5	92.5	G1/2"	G1/2"
							160	50	118		
							180	50	118		
							200	50	118		
							225	76	148		
							250	76	148		
							280	76	148		
018A ... 021A	060A ... 061A	180A	500A	031A ... 061A	125A ... 180A	355A ... 500A	160	50	118	G1/2"	G1/2"
							180	50	118		
							200	50	118		
							225	76	148		
							250	76	148		
280	76	148									
030A ... 043A	085A ... 125A	250A ... 355A	710A	085A, 125A	250A ... 355A	710A	160	58	-	G1/2" (n.4)	-
							180	58	-		
							200	58	-		
							225	88	-		
							250	88	-		
							280	88	-		

6




C...

1EL	2EL	3EL	4EL	2EB	3EB	4EB	R	S	T	P _R (n.2)	P _S (n.2)	P _T (n.2)
001A ... 002A	001A ... 006A	001A ... 022A	001A ... 061A	001A ... 006A	001A ... 022A	001A ... 061A	48.5	21.5	-	G3/8"	G3/8"	-
003A ... 006A	009A ... 022A	030A ... 061A	085A ... 180A	009A ... 015A, 022A	030A ... 043A	085A ... 125A	67	28.5	-	G1/2"	G1/2"	-
009A ... 015A	030A ... 043A	085A ... 125A	250A ... 355A	018A ... 021A, 030A	060A ... 085A	180A ... 250A	81	29.5	-	G1/2"	G1/2"	-
018A ... 021A	060A ... 061A	180A	500A	031A ... 061A	125A ... 180A	355A ... 500A	84	29.5	-	G1/2"	G1/2"	-
030A ... 043A	085A ... 125A	250A ... 355A	710A	085A, 125A	250A ... 355A	710A	61	36	-	G3/4"	G3/4"	-
-	180A	500A	-	-	-	-	115	21	13.5	G3/4" (n.4)	G3/8"	M10x1
-	250A	710A	-	-	-	-	115	21	13.5	G3/4" (n.4)	G3/8"	M10x1
-	355A	-	-	-	-	-	137	24	13.5	G1" (n.4)	G3/8"	M10x1
-	500A	-	-	-	-	-	128	24	13	G1" (n.4)	G3/8"	M10x1
-	710A	-	-	-	-	-	137	30	17	G1" (n.4)	G3/8"	M10x1

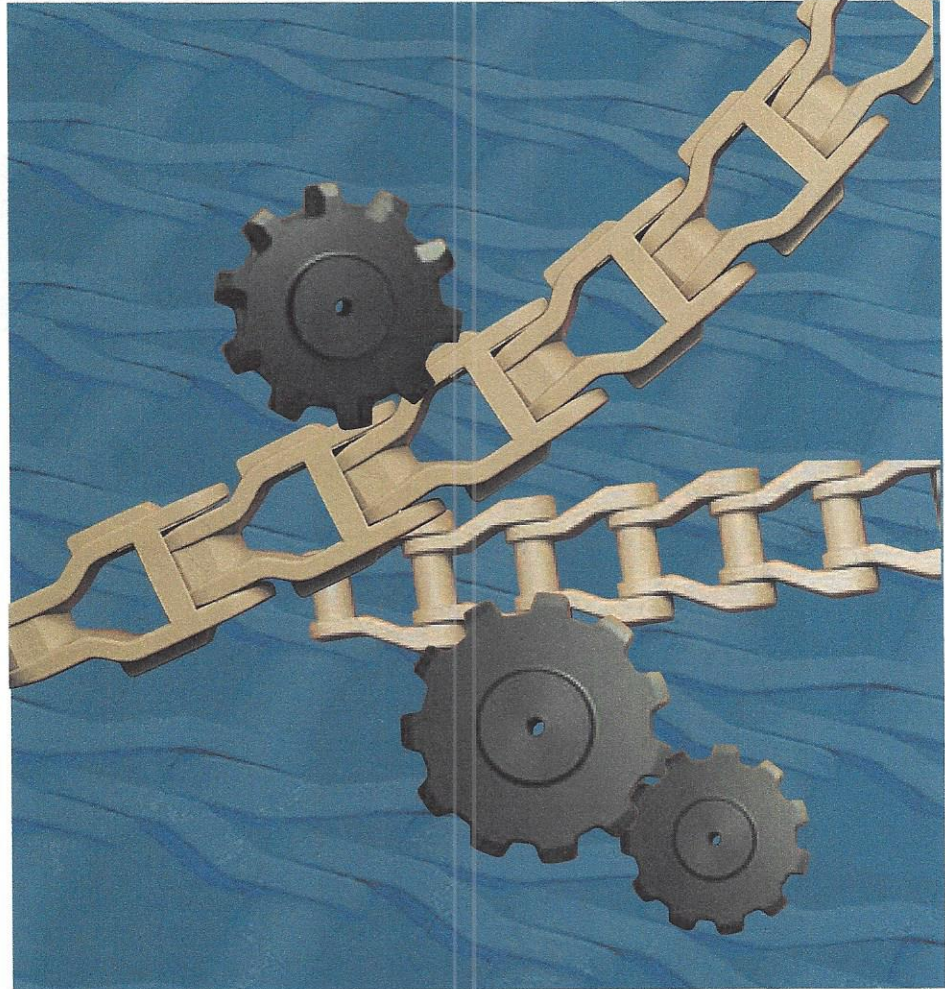


U...

1EL	2EL	3EL	4EL	2EB	3EB	4EB	T	P _T (n.4)
001A ... 002A	001A ... 006A	001A ... 022A	001A ... 061A	001A ... 006A	001A ... 022A	001A ... 061A	37	G3/8"
003A ... 006A	009A ... 022A	030A ... 061A	085A ... 180A	009A ... 015A, 022A	030A ... 043A	085A ... 125A	23	G1/2"

SICEI S.r.l. Electrical Machines Asynchronous Motors		Technical Data Sheet kW 0.55 - POLE 4 - V 575 Hz 60 - S2 20'			
Project A41184		Construction		Location	
Department/Author Technical dept		Customer's name MITA WATER TECHNOLOGIES		Customer's order Mr. BARBIERI	
Our ref.		Rev/Changed by		Dated	
		Date of issue		Customer's ref. Mr. BARBIERI	
				ISO 9001:2015 Serial number ****	
				SERIES	
				Pages 1	
No.	DEFINITION	Data	Unit		
1	Product	Asynchronous three-phase motor			
2	Product code	F110C2S141184			
3	Type/Frame	BTSC71L4			
4	Mounting	IM3001, B5+ OR			
5	Rated output P _N	0.55	kW		
6	Pole	4			
7	Duty	S2 20'			
8	Rated voltage U _N	575	V ± 5 % (IEC 60034-1)		
9	Rated frequency f _N	60	Hz ± 2 % (IEC 60034-1)		
10	Rated speed n _N	1690	r/min		
11	Rated current I _N	0.9	A		
12	Power factor	0.80	cos φ		
13	Efficiency	75.0	%		
14	Starting current I _s /I _n	5.0			
15	Nominal torque M _n	3.1	Nm		
16	Locked rotor torque M _s / M _n	2.3			
17	Insulation class / Temperature class	F			
18	Thermal switches	PTC 150°C			
19	Enclosure	IP 68	Shaft IP55		
20	Bearing DE/NDE	6302 2RS C3 - 6302 2RS C3			
21	Balancing	half key			
22	Number of power terminals	3	Marked U1-V1-W1		
23	Number of protections terminals	2	Marked T-T		
24	Type of grease	LGHP2 - SKF			
25	Direction of rotation	CW or CCW			
26	Total weight of motor	11	kg		
27	Painting	NO			
28	Dimensional drawing no.	A41359			
29	Plate	A2 66x44			
30	SPECIAL FEATURES				
31	Terminal box	NO			
32	Cable lenght	3	Mt		
33	Cable type	H07RN8-F 4G1.5	Power cable		
34	Cable type	H07RNF 2x1.5	Signal cable		
35	Thermal switches	PTC			
36	Winding encapsulated in epoxy-resin	CB1078 resin or similar			
37	Special construction	YES			
38					
39	DATE	Tech. Dept.		SICEI srl	
40					
41	18.10.2023	A.M.		Massimo Loi	
42					
43	version 01.2023				

Engineered Chain | Polymeric Chain & Accessories
(English-Inch)



■ POLYMERIC CHAINS

STRAIGHT RUNNING CHAINS

Design Features

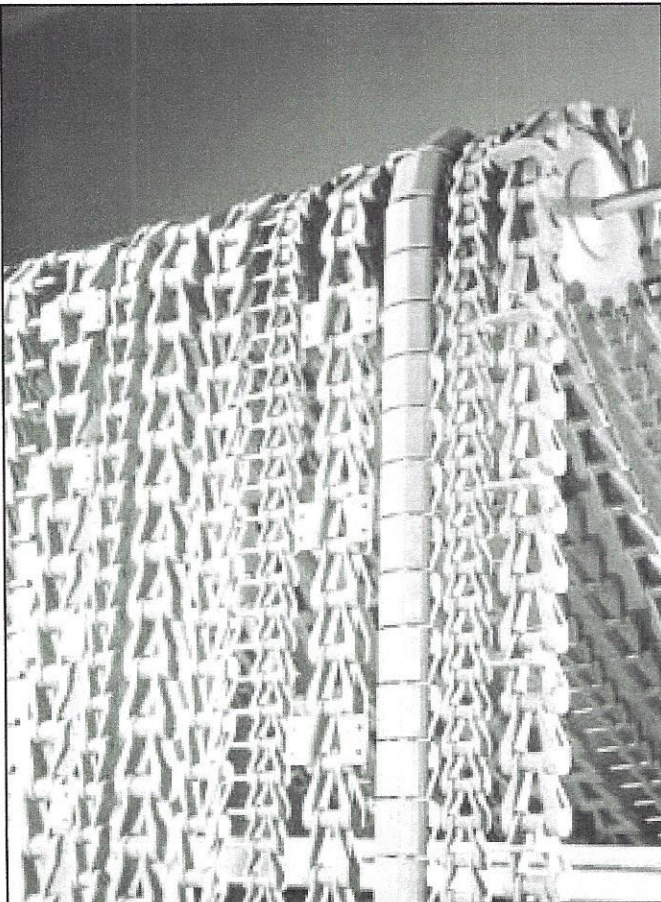
Rex® straight running polymeric chains are designed specifically for those applications requiring corrosion resistant chains that operate over standard metal or polymeric sprockets.

The link material is a low friction thermoplastic that has proven itself as a chain material for over a decade. This material resists most chemicals, and because of its low friction characteristics, reduces energy consumption and noise while increasing chain, sprocket and conveyor wear strip life. Wide wearing surfaces on top and bottom of the link offer extended sliding wear life.

Chain pins are manufactured from stainless steel. The latest technology in chain design has been used to provide the greatest chain strength and wear life at a reasonable cost. The use of stainless steel pins with the corrosion resistant thermoplastic material offers a chain capable of withstanding most corrosive applications. Non-metallic pins are also available, contact Rexnord for details.

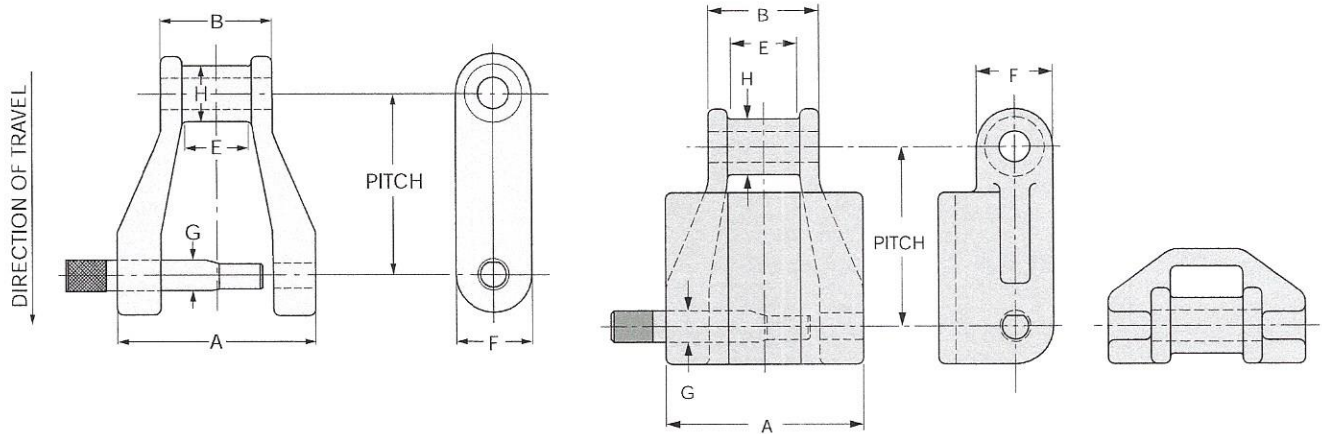
Design Benefits

- **Simple Two Piece Construction** – Pins are easily assembled into links – yet pins will not “work out” or rotate in service. No extra spring pins or cotters to fall out or snag conveyor apparatus. Every link is a “Master Link.”
- **Lightweight** – Less “dead weight” in your conveyor system will extend conveyor component life – longer chain life – longer conveyor “way” life – longer sprocket life – longer bearing life – longer reducer life – longer motor life!
- **Clean** – In normal service, Rex Polymeric Chain will not corrode and contaminate the product. It is easily washed with water during operation, saving both time and money.
- **Completely Interchangeable** – As a replacement for metal chains, Rex Polymeric Chain will run on existing carrying and return “ways,” The chains will not intercouple with metal chains.
- **Low Coefficient of Friction** – Rex chain materials have a very low coefficient of friction – this means less chain load and less energy consumption to convey the same tonnage.
- **Brute Strength** – Rex Polymeric Chain has the highest possible working load. This is accomplished through “Balanced Design” of the link and pin. For a comparison to your current chain or for chain recommendations consult Rexnord.
- **Operating Range** – Allowable temperature range of Rex Polymeric Chain is enough to handle most applications: -40°F to +180°F.
- **Quiet Running** – Because of its unique design, the Rex Polymeric Chain is an ideal chain for reducing noise in many applications. Make your own test to prove if the noise level is adequate for your needs.



■ POLYMERIC CHAINS

STRAIGHT RUNNING CHAINS



NHT78

Dimensions are in inches. Strengths, loads and weights are in pounds.

Rex Chain No.	Average Pitch	Overall Width	Length of Bearing	Max. Allowable Sprocket Face	Height of Sidebar	Link Thickness	Pins	Average Weight	Sprocket Unit No.	Bottom Sliding Area Sq. Inches Per Foot
		A	B	E	F	J	G			
NH45	1.630	2.19	1.31	.75	.88	.31	.63	0.9	N45	8.8
NH77	2.308	2.19	1.31	.75	1.10	.38	.91	1.1	N77	10.4
NH78	2.609	2.91	1.63	.94	1.13	.44	.88	1.4	N78	11.5
NHT78	2.609	2.91	1.63	.94	1.69	.44	.88	2.0	N78	11.5
NH82	3.075	3.29	2.00	1.13	1.50	.50	1.25	2.2	N82	13.7

Chains are normally stocked. Chains are patented: #4682687

CAUTION: ANY UNUSUAL burrs, ridges or protrusions on sprocket teeth or in conveyor system which would cut into polymeric chains must be removed.

POLYMERIC CHAINS

Specifications

FDA and USDA – Chain materials used are in compliance with FDA regulations and guidelines for use in direct food contact. Also, the chain materials have been found chemically acceptable for direct food contact with meat or poultry products by the Product Safety Branch of USDA. Also, the chain designs have been found acceptable for direct contact with meat or poultry products by the Equipment Branch of the Facilities, Equipment and Sanitation Division of USDA.

See pages 130-132 for important application information.

NOTE: The purpose of the table below is to account for cycles of load. This is an important consideration relating to fatigue and is critical to the successful application of chains made from any nonmetallic material.

Ratio of Chain Speed (FPM) to Sprocket Centers (FT)	Rated Working Load – Pounds*			
	NH45	NH77	NH78 & NHT78	NH82
0.1	800	1100	1750	2400
0.1	750	1050	1650	2250
0.5	700	950	1350	2100
1.0	600	800	1100	1700
2.0	500	680	925	1400
5.0	400	540	750	1200
10.0	330	450	650	950

*Working load ratings for Polymeric Chains are established according to chain speed (FPM) and sprocket centers (FT).



SHOP DRAWING TRANSMITTAL

Project Name:	Project #:
Submitted to:	
Submittal #:	Date:
Description:	

General Comments:

Arcadis Inc

The review of this Shop Drawing is for the sole purpose of ascertaining conformance with the general design concept and general arrangement only. This review does not constitute approval or verification of the design inherent in the Shop Drawings, and any omissions or errors therein remain the responsibility of the Contractor. The Contractor remains entirely responsible for complying with the Contract Documents, confirming all field dimensions and site conditions, for information that pertains to fabrication, techniques of construction and installation, and coordination of the Work.

Reviewed	Reviewed As Noted	Revise & Resubmit	Not Reviewed
X			
Reviewed By:	JGC	Date:	09/18/2024

No Comments

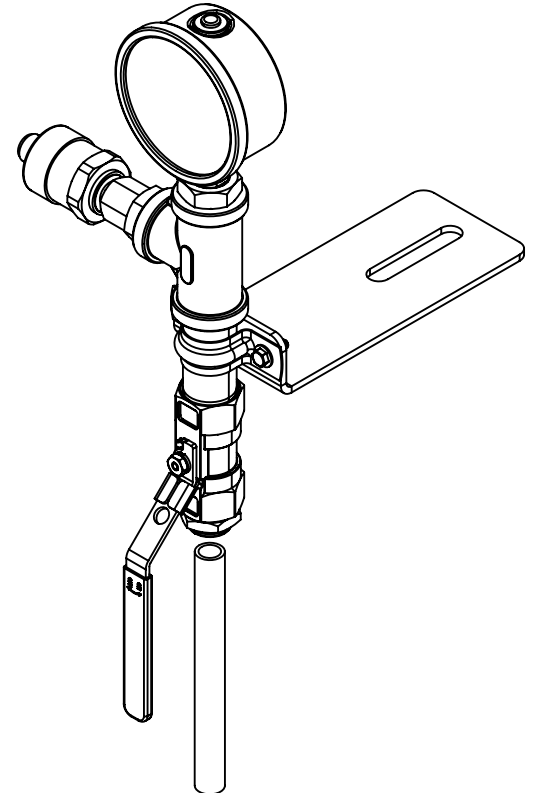
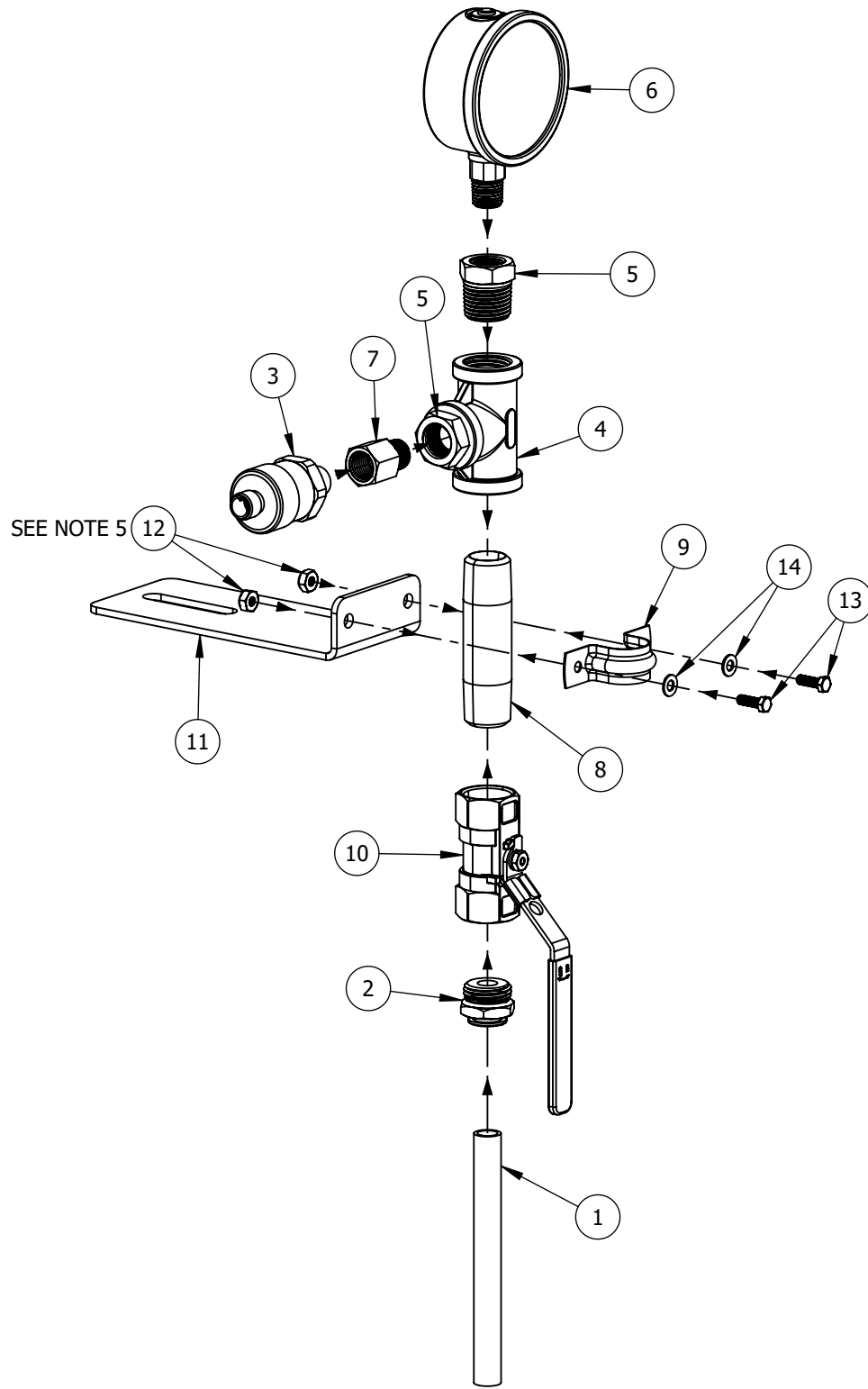
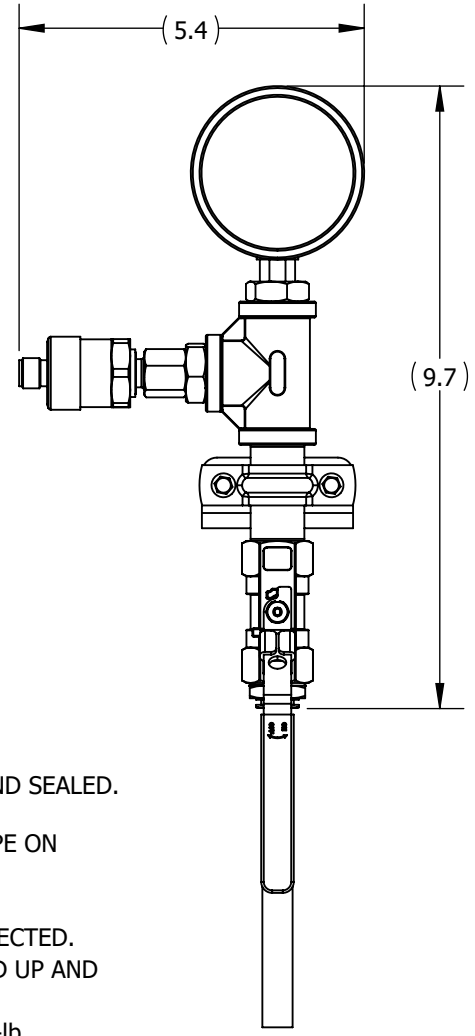
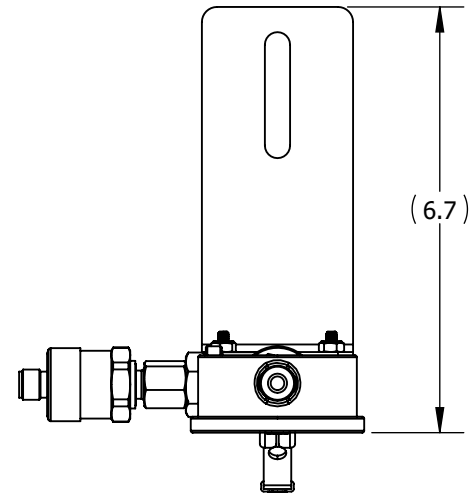
Instrumentation

Revision 00

This Document Contains:

- Radar Transmitter
- Level Switch
- Vacuum Pressure Transmitter
- Pressure Gauge
- Turbidimeter
- Turbidimeter Controller

Equipment Data					
Item	Installed	Loose Contractor Install	Loose Nexom Install	Signal Type	Manufacturer
Radar Transmitter		x		4-20 mA	Vega
Level Switch		x		12VDC	Vega
Vacuum Pressure Transmitter		x		4-20 mA	IFM
Pressure Gauge		x		N/A	ReoTemp
Turbidimeter		x		12VDC	Hach
Turbidimeter Controller		x		4-20mA	Hach



- NOTES:
1. ALL PIPE FITTINGS MUST BE TIGHT AND SEALED. DO NOT OVERTIGHTEN.
 2. USE THREAD SEALANT OR TEFLON TAPE ON ALL PIPE THREAD CONNECTIONS.
 3. USE ANTI SIEZE ON FASTENERS.
 4. TUBING DOES NOT NEED TO BE CONNECTED. ENSURE IT IS CUT TO LENGTH, COILED UP AND INCLUDED IN ASSEMBLY.
 5. TORQUE BOLT CONNECTIONS TO 20in-lb.

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	30128	TUBING, 12 MM X 9 MM X 72" LG, PE PLASTIC	1
2	30174	COUPLING, 1/2" NPTM X 12 MM TUBE, QUICK CONNECT	1
3	30406	TRANSMITTER, PRESSURE, 1/4" G, 0 TO 4 BAR, IFM, PT0505	1
4	30413	TEE, 1/2" NPTF, 304 SS	1
5	30415	ADAPTER, 1/4" NPTF TO 1/2" NPTM, 304 SS	2
6	30416	GAUGE, PRESSURE, 1/4" NPTM, -1 TO 2 BAR, REOTEMP, PM25C1A4B02-S-P	1
7	30417	ADAPTER, G1/4 BSPFF TO 1/4" NPTM, 304 SS	1
8	30467	NIPPLE, PIPE, 1/2" NPTM X 3" LG, 304 SS	1
9	30468	CLAMP, PIPE, 1/2", 304 SS	1
10	30469	VALVE, SHUT OFF, 1/2" NPTF, 304 SS	1
11	30470	SUPPORT, PRESSURE TRANSMITTER, 304 SS	1
12	30471	THIN NYLON-INSERT LOCKNUT, 8-32, 18-8 STAINLESS STEEL	2
13	30472	HEAD HEX BOLT, 8-32 x 1/2", 18-8 STAINLESS STEEL	2
14	30473	WASHER, 3/16", 18-8 STAINLESS STEEL	2



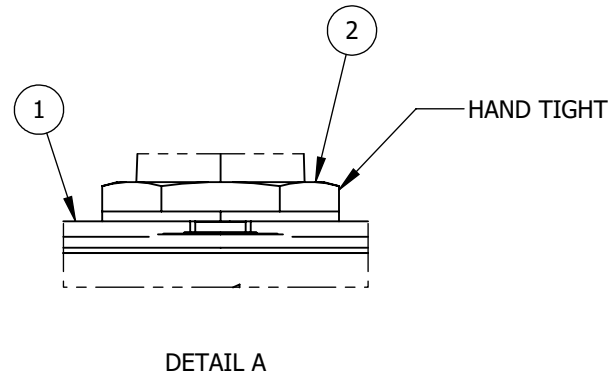
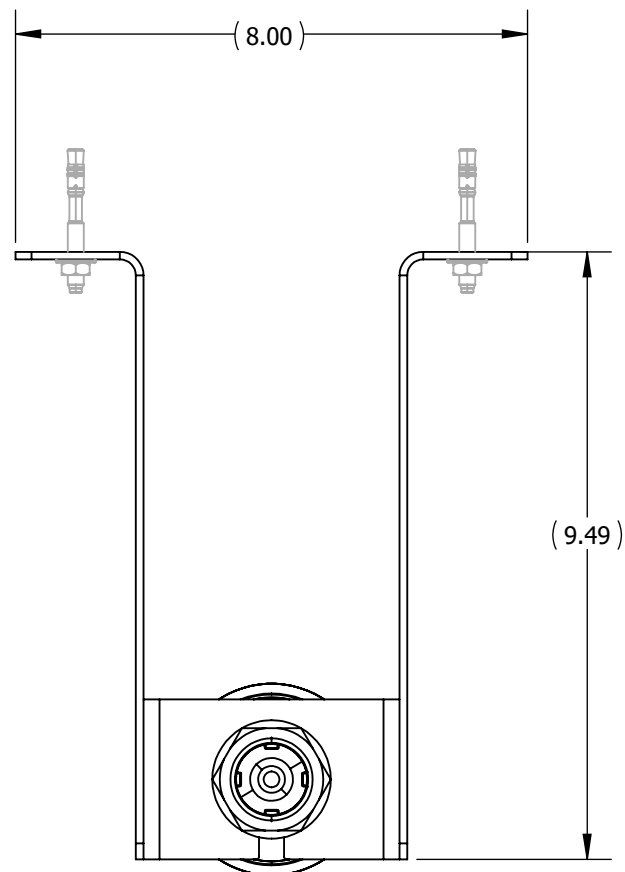
REV.	DESCRIPTION	ENGINEER	DATE
01	ISSUED	GS	2024-06-17

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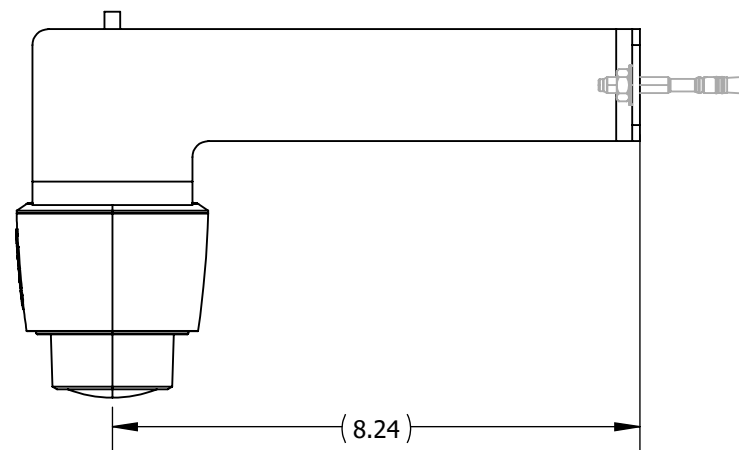
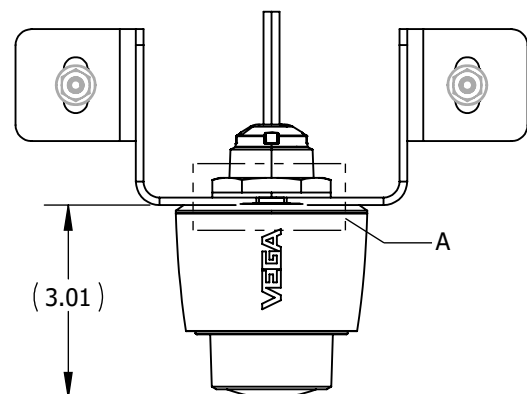
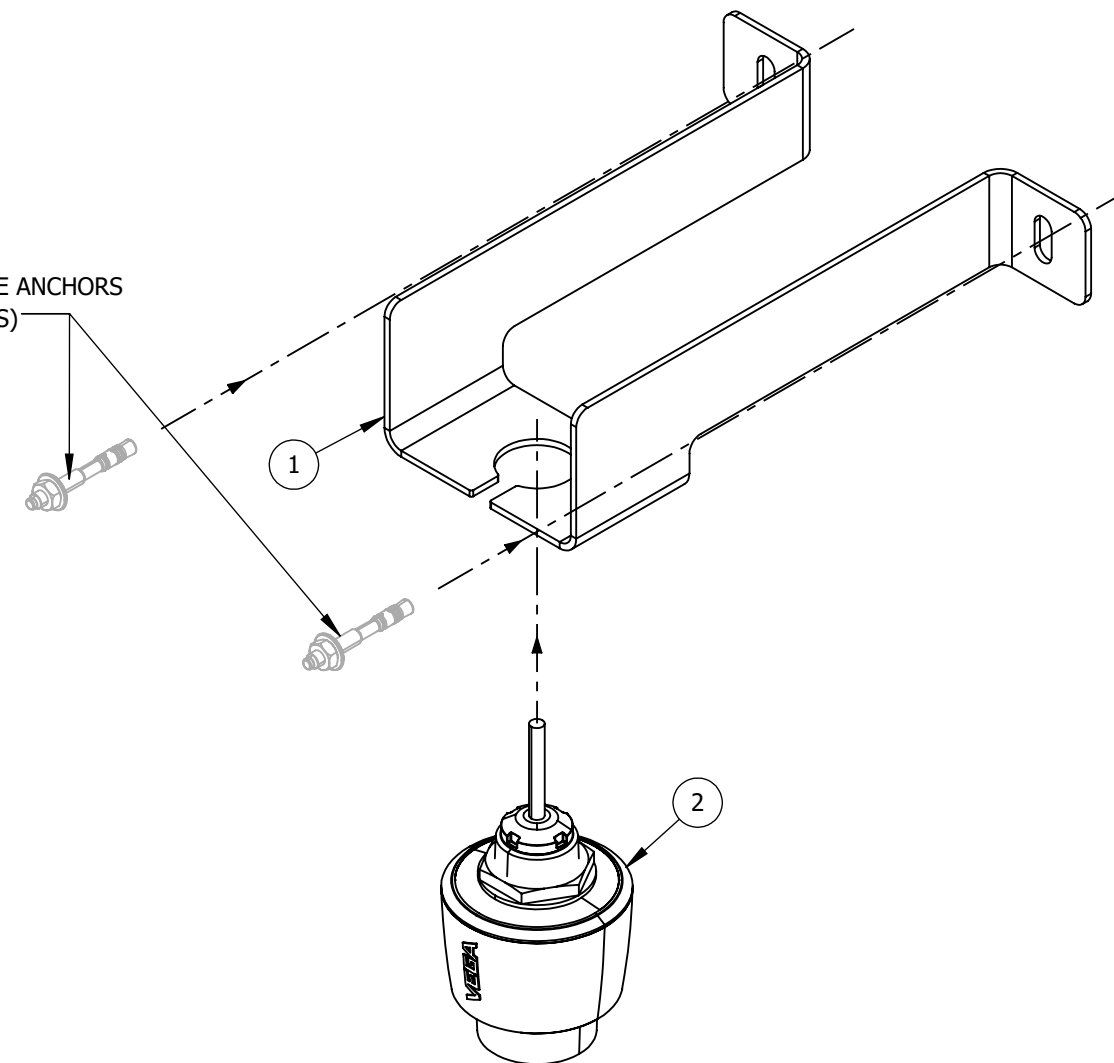
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 DIMENSIONS ARE IN INCHES
 TOLERANCES:
 00.000 ± .039"
 00.00 ± .08"
 00.0 ± .2"
 00.0° ± 1.0°
 THIRD ANGLE PROJECTION

DESCRIPTION: TRANSMITTER, VACUUM PRESSURE, IFM, ASSEMBLY, 304 SS		SCALE: NTS	
AUTH.	GS, 2024-06-17	CHKD.	DK, 2024-06-17
NUMBER: 30407		REV. 01	PAGE 1/1

TEMPLATE LAST MODIFIED: 08.05.19



1/4" WEDGE ANCHORS
(BY OTHERS)



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	30398	SUPPORT, LEVEL TRANSMITTER, VEGA, 304 SS	1
2	30399	TRANSMITTER, LEVEL, VEGAPULS C11	1



REVISIONS			
REV.	DESCRIPTION	ENGINEER	DATE
01	ISSUED	GS	2024-06-17

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 00.0 ± .2"
 00.0° ± 1.0°
 THIRD ANGLE PROJECTION

SCALE: NTS	
DESCRIPTION: LEVEL TRANSMITTER, VEGA, ASSEMBLY, 304 SS	
AUTH. GS, 2024-06-17	CHKD. DK, 2024-06-17
NUMBER: 30408	REV. 01 PAGE 1/1

D

C

B

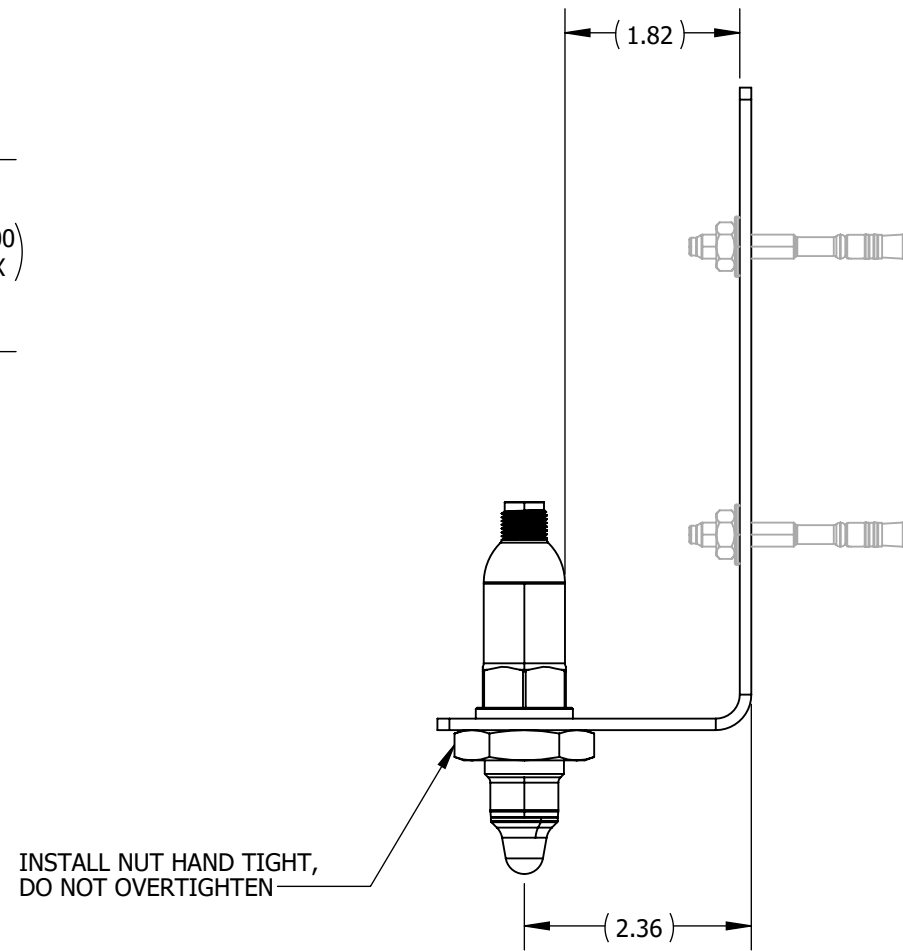
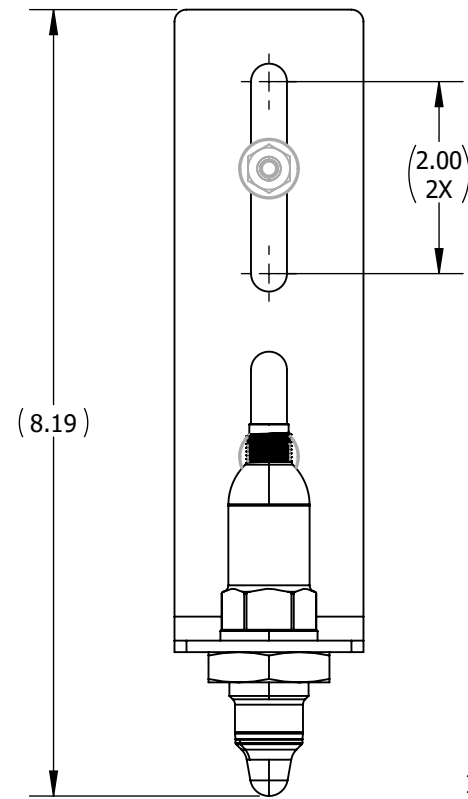
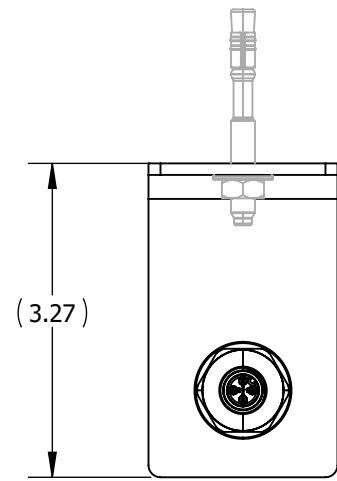
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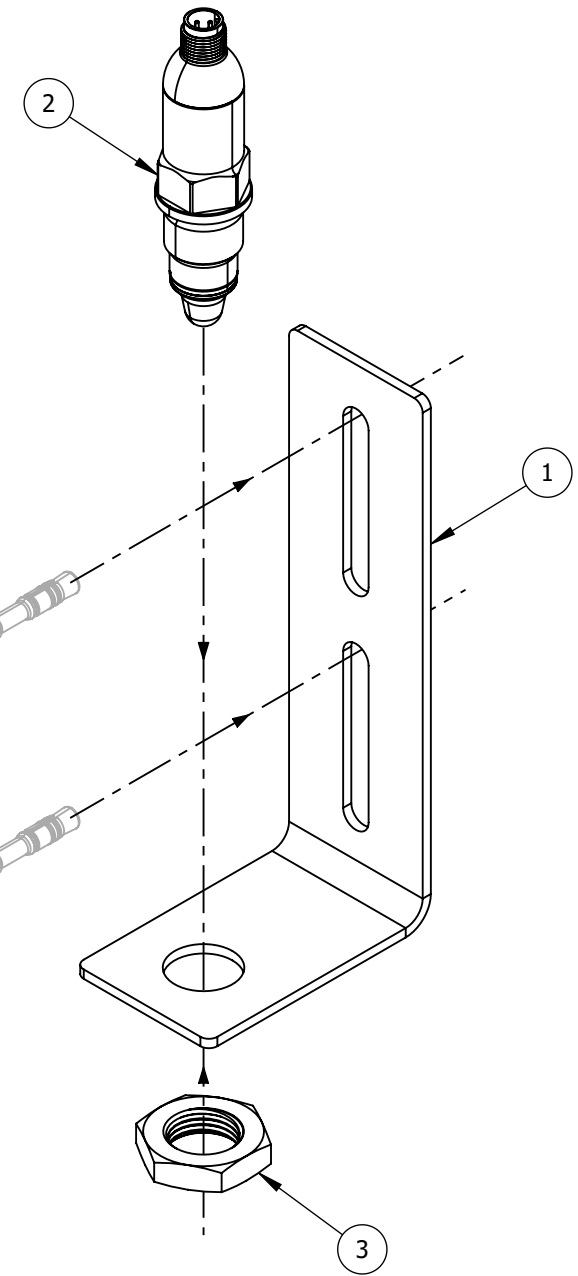
C

B

A



1/4" WEDGE ANCHORS
(BY OTHERS)



NOTE:
APPLY ANTI-SIEZE ON FASTENER



REVISIONS			
REV.	DESCRIPTION	ENGINEER	DATE
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 00.0° ± 1.0°
 THIRD ANGLE PROJECTION

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	30401	SUPPORT, LEVEL SWITCH, 304 SS	1
2	30411	LEVEL SWITCH, CAPACITANCE, VEGAPOINT 11	1
3	30412	HEX NUT, BSPP G1/2, 304 SS	1

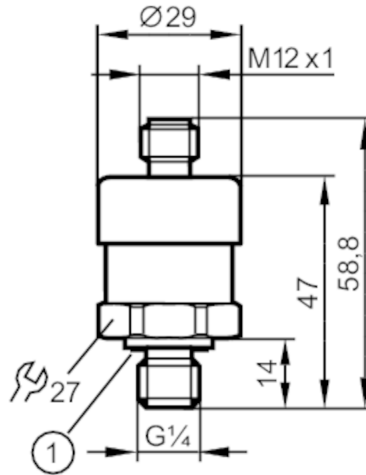
SCALE: NTS			
DESCRIPTION: LEVEL SWITCH, CAPACITANCE, VEGA, ASSEMBLY, 304 SS			
AUTH.	GS, 2024-06-17	CHKD.	DK, 2024-06-17
NUMBER: 30409		REV. 01	PAGE 1/1

PT0505



Pressure transmitter

PT-004-AFG14-A-ZVG/US



1 Sealing



Product characteristics

Number of inputs and outputs	Number of analogue outputs: 1		
Measuring range	0...4 bar	0...58 psi	0...400 kPa
Process connection	threaded connection G 1/4 external thread (DIN EN ISO 1179-2)		

Application

Application	for industrial applications		
Media	liquids and gases		
Medium temperature [°C]	0...80		
Min. bursting pressure	25 bar	360 psi	2500 kPa
Pressure rating	8 bar	116 psi	800 kPa
Type of pressure	absolute pressure		

Electrical data

Operating voltage [V]	8...30 DC		
Min. insulation resistance [MΩ]	100; (500 V DC)		
Protection class	III		
Reverse polarity protection	yes		

Inputs / outputs

Number of inputs and outputs	Number of analogue outputs: 1		
------------------------------	-------------------------------	--	--

Outputs

Total number of outputs	1		
Output signal	analogue signal		
Number of analogue outputs	1		
Analogue current output [mA]	4...20		
Max. load [Ω]	800; (U _b = 24 V; (U _b - 8 V) / 20 mA)		
Short-circuit proof	yes		

Measuring/setting range

Measuring range	0...4 bar	0...58 psi	0...400 kPa
-----------------	-----------	------------	-------------

PT0505



Pressure transmitter

PT-004-AFG14-A-ZVG/US

Accuracy / deviations		
Repeatability	[% of the span]	$< \pm 0,1$; (with temperature fluctuations < 10 K)
Characteristics deviation	[% of the span]	$< \pm 1,0$; (incl. zero point and span error, non-linearity, hysteresis)
Linearity deviation	[% of the span]	$< \pm 0,5$ (BFSL) / $< \pm 1,0$ (LS)
Long-term stability	[% of the span]	$< \pm 0,1$; (per year)
Temperature coefficient zero point	[% of the span / 10 K]	$< \pm 0,2$; (0...80 °C)
Temperature coefficient span	[% of the span / 10 K]	$< \pm 0,2$; (0...80 °C)
Response times		
Step response time analogue output	[ms]	4
Operating conditions		
Ambient temperature	[°C]	0...80
Storage temperature	[°C]	-20...80
Protection		IP 67
Tests / approvals		
EMC	DIN EN 61326-1	
Shock resistance	DIN EN 60068-2-27	500 g (1 ms)
Vibration resistance	DIN EN 60068-2-6	10 g (10...2000 Hz)
MTTF	[years]	815
Pressure Equipment Directive		Sound engineering practice; can be used for group 2 fluids; group 1 fluids on request
Mechanical data		
Weight	[g]	118.65
Materials		stainless steel (1.4404 / 316L); HNBR; PA
Materials (wetted parts)		stainless steel (1.4404 / 316L)
Min. pressure cycles		10 million
Tightening torque	[Nm]	25...35; (recommended tightening torque; depends on lubrication, seal and pressure rating)
Process connection		threaded connection G 1/4 external thread (DIN EN ISO 1179-2)
Process connection sealing		NBR (DIN EN ISO 1179-2)
Fill fluid for pressure transfer		synthetic oil
Restrictor element integrated		no
Remarks		
Remarks		BFSL = Best Fit Straight Line LS = limit value setting
Pack quantity		1 pcs.

PT0505



Pressure transmitter

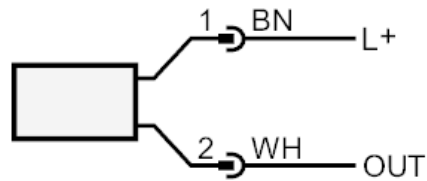
PT-004-AFG14-A-ZVG/US

Electrical connection

Connector: 1 x M12; coding: A



Connection



OUT analogue output
 colours to DIN EN 60947-5-2
 Core colours :
BN = brown
WH = white



Part Number:	PM25C1A4B02-S-P
Gauge Series:	Industrial Stainless Gauge, Series PM
Size & Case:	2.5" Dial, 304SS Case, Crimped Bezel
Tube & Socket:	316 SS Tube & Socket
Connection:	1/4 NPT
Mount:	Bottom Connect (Stem Mount)
Range:	-1 bar to 2 bar
Case Fill:	Silicone
Lens:	Plastic (acrylic)

For more detailed technical information on this product see the full product datasheet here:

<https://reotemp.com/pressure-gauges/industrial-gauges/industrial-stainless-steel-gauge-pm25/>

The Reotemp Live Gauge Preview is intended to give a general idea of what a gauge will look like when ordered with selected options. Because product specifications are subject to change, the gauge you receive may differ in appearance from the picture generated in this preview. Please consult with Reotemp sales to confirm critical specifications.

REOTEMP

10656 Roselle Street
San Diego, CA 92121

858-784-0710
sales@reotemp.com
reotemp.com

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HEAVY-DUTY CRIMPED STAINLESS GAUGE

PRESSURE GAUGES

Reotemp's Series PM25 features a stainless steel case, tube and socket, making the gauges resistant to corrosion from both environment and media. Liquid filling is recommended for severe service. The economical and attractive crimp ring design, along with a variety of convenient panel mounting adapters, make this popular gauge the right choice for many applications.



PM25



Fillable



Custom Logo



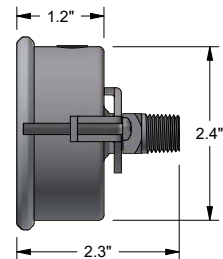
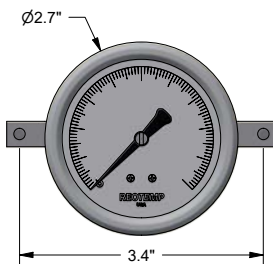
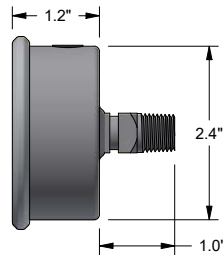
Dials



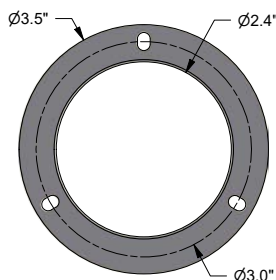
Diaphragm Seal
Compatible

FEATURES / BENEFITS

- All-Welded Stainless Steel Construction
- Field Fillable Case, Nema 4X/IP65
- Economical Crimped Gauge with Heavy Duty Case Design
- Ideal for Both Indoor and Outdoor Applications



U-clamp



Mounting Flange

SPECIFICATIONS

Accuracy	±1.6% ASME Grade B+, EN 837-1
Ambient Limits	-40°F/150°F
Process Limits	-40°F/250°F
Process Limits with Diaphragm Seal	Available with diaphragm seal, call to inquire.
Wetted Materials	Tube: 316SS Socket: 316SS
Lens	Polycarbonate (Standard), Tempered Glass, Laminated Safety Glass
Other Materials	Case: 304SS Ring: 304SS Dial: White Aluminum, Black Letters Case-to-Socket: Laser Welded
Fillable	Yes
Maximum Working Pressure	Stable = 100% Momentary = 130% of scale
Environmental Protection	NEMA 4X/IP65
Weight	2.5" = 0.35 lbs (0.5 lbs filled)

*dimensions in inches

HEAVY-DUTY CRIMPED STAINLESS GAUGE



Visit reotemp.com

- ✓ Check Stock
- ✓ Get Price
- ✓ Configure Part #
- ✓ Download PDF Data Sheets

HOW TO ORDER: Choose options to build a part number. For example: **PM25C1A4P18-G-P-TS**

PM25	C	1	A	4	P18	-G	-P	-TS
DIAL SIZE	CASE TYPE	TUBE & SOCKET	MOUNT TYPE	CONNECTION	RANGE CODE	CASE FILL	LENS	OPTIONS
PM25 = 2.5"	C = 304SS Case w/ Crimped Ring	1 = 316SS	A = Bottom B = Bottom/Rear Flange 1C = Center Back 1D = Center Back "U" Clamp 1E = Center Back/Front Flange	4 = 1/4" NPT 2 = 1/2" NPT	<i>Common Ranges</i> P16 = 0-30 psi P17 = 0-60 psi P18 = 0-100 psi P19 = 0-160 psi P20 = 0-200 psi P21 = 0-300 psi P23 = 0-600 psi P25 = 0-1,000 psi <i>Available Ranges</i> ■ Gauge Pressure, Vacuum, or Compound ■ Vac to 10,000 psi <i>For Additional Range Codes See Page 61</i>	-D = Dry -G = Glycerin -W = Glycerin/Water (65/35)	-P = Plastic -G = Glass	-TS = Stainless Steel Tag -HV = HiVis Dial -C3 = 3pt. Calibration -PM = Positive Material Identification

*Non-standard configuration

VEGAPULS C 11

Two-wire 4 ... 20 mA

Radar sensor for continuous level measurement



Application area

The VEGAPULS C 11 is the ideal radar sensor for non-contact level measurement in all standard applications where a high degree of protection is required. It is particularly suitable for level measurement in water treatment, pumping stations and rain overflow basins, for flow measurement in open channels and level monitoring and for many other industrial applications.

The sensor is suitable both for measuring liquids and for maintenance-free use on small bulk silos or bulk solids containers.

Your benefit

- Maintenance-free operation due to non-contact 80 GHz radar technology
- Exact measuring results independent of product, process and ambient conditions
- Low-cost sensor for simple measuring tasks

Function

The sensor emits a continuous radar signal through the antenna. The emitted signal is reflected by the medium and received as an echo by the antenna.

The frequency difference between the emitted and received signal is proportional to the distance and depends on the filling height. The determined filling height is converted into a respective output signal and output as measured value.

Technical data

Measuring range up to	8 m (26.25 ft)
Deviation	≤ 5 mm
Beam angle	8°
Measuring frequency	W-band (80 GHz technology)
Output signal	4 ... 20 mA
Process fitting	Thread G1½, 1½ NPT, R1½
Mounting connection	Thread G1, 1 NPT, R1
Process pressure	-1 ... 3 bar (-100 ... 200 kPa/-14.5 ... 43.51 psig)
Process temperature	-40 ... +60 °C (-40 ... +140 °F)
Ambient temperature	-40 ... +60 °C (-40 ... +140 °F)
Bluetooth standard	Bluetooth 5.0
Bluetooth range	typically 25 m (82 ft)
Operating voltage	12 ... 35 V DC
Protection rating	IP66/IP68 (3 bar, 24 h) acc. to IEC 60529, Type 4X/6P acc. to UL 50

Materials

The wetted parts of the instrument are made of PVDF. The process seal is made of FKM. The connection cable is PVC insulated.

A complete overview of the available materials and seals can be found on our homepage under "Products" and "Configure & Order".

Housing versions

The housing is optimized for applications in the water/waste water industry and manufactured of PVDF. Due to the encapsulated cable gland, protection rating IP66/IP68 (3 bar) is achieved.

Electronics versions

The devices are constructed with two-wire electronics 4 ... 20 mA.

Approvals

Worldwide approvals are available for VEGA instruments, e.g. for use in hazardous areas, on ships or in hygienic applications.

For approved devices (e.g. with Ex approval) the technical data in the respective safety instructions are applicable.

You can find detailed information in the available approvals on our homepage under "Downloads".

Adjustment

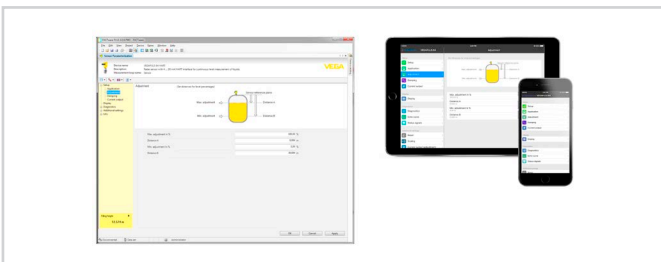
Wireless adjustment via Bluetooth

The Bluetooth version of the device enables wireless connection to smartphones/tablets (iOS/Android) or Windows PCs.



Wireless connection to standard operating devices

Operation is via a free app from the "Apple App Store", the "Google Play Store" or the "Baidu Store". Alternatively, adjustment can also be carried out via PACTware/DTM and a Windows PC.



Adjustment via PACTware or app

Electrical connection

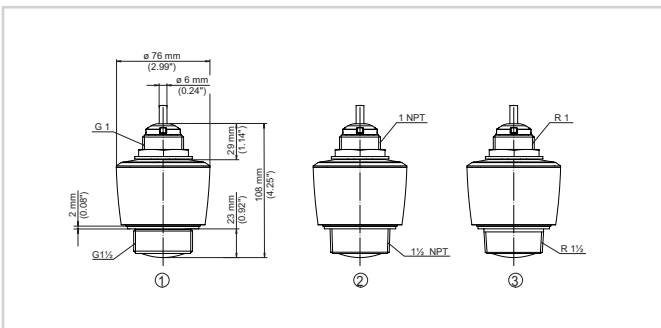


Wire assignment in permanently connected connection cable

- 1 Brown (+) to voltage supply or to the processing system
- 2 Blue (-) to voltage supply or to the processing system

You can find details on electrical connection in the instrument operating instructions at www.vega.com/downloads.

Dimensions

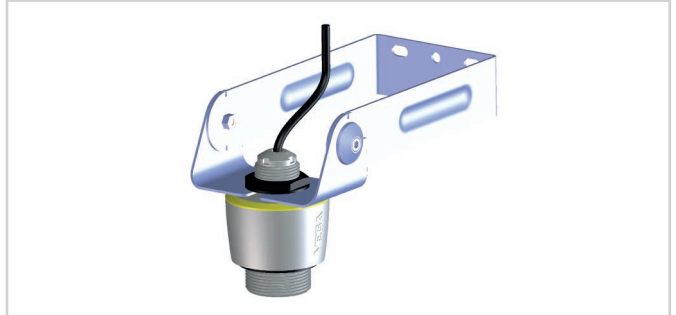


Dimensions VEGAPULS C 11

- 1 Thread G1½
- 2 Thread 1½ NPT
- 3 Thread R1½

Mounting accessories

For the VEGAPULS C 11 the suitable mounting accessories for ceiling or wall mounting is available.



Example mounting strap - wall mounting with adjustable sensor holder

You can find further information on the mounting accessory on our homepage.

Information

You can find further information on the VEGA product line on our homepage.

In the download section of our homepage you'll find operating instructions, product information, industry brochures and approval documents as well as device and adjustment software.

Instrument selection

On our homepage under "Products" you can select the suitable measuring principle and instrument for your application.

There you will also find detailed information on the available device versions.

Contact

You can find your personal contact person at VEGA on our homepage under "Contact".

VEGAPOINT 11

Transistor with IO-Link

Capacitive level switch



Application area

The VEGAPOINT 11 is a capacitive level sensor for level detection of water-based liquids.

Typical applications are overflow and dry run protection. The small sensor can also be used in thin pipelines.

Your benefit

- Low time and cost expenditure due to simple commissioning
- High plant availability, because wear and maintenance free
- Exact switching function independent of process condition

Function

An alternating electric field is generated at the tip of the measuring electrode. If the sensor is covered with medium, the capacitance of the sensor changes. This change is detected by the electronics and converted into a switching command.

Any buildup is ignored to a certain degree and therefore has no influence on the measurement.

Technical data

Output signal	Transistor output PNP/NPN with IO-Link
Process fitting	Thread G $\frac{1}{2}$, G $\frac{3}{4}$, G1, M24 x 1.5 Thread $\frac{1}{2}$ NPT, $\frac{3}{4}$ NPT, 1 NPT Clamp 1", 1 $\frac{1}{2}$ ", 2" Further hygienic fittings
Process pressure	-1 ... 25 bar (-100 ... 2500 kPa/ 14.5 ... 363 psig)
Process temperature	-20 ... +100 °C (-4 ... +212 °F)
Ambient temperature	-40 ... +70 °C (-40 ... +158 °F)
Operating voltage	12 ... 35 V DC

Materials

The wetted parts of the instrument are made of PEEK and stainless steel 316L. The process seal is made of FKM.

You will find a complete overview of the available materials and seals in the "Configurator" at www.vega.com and "Products".

Housing versions

The housing is made of stainless steel 316L or Valox and is available in protection classes IP66/IP67 and up to IP69.

Electronics versions

The device is available in transistor version with IO-Link output.

Approvals

Worldwide approvals are available for VEGA instruments, e.g. for use in hazardous areas, on ships or in hygienic applications.

The technical data in the respective safety instructions are valid for approved instruments (e.g. with Ex approval). In some cases, these data can differ from the data listed herein.

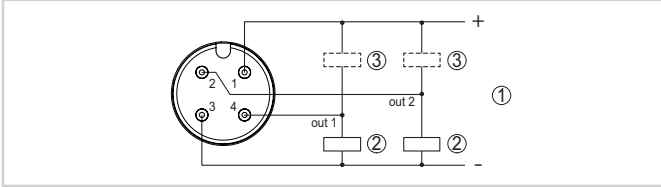
You can find detailed information on the existing approvals with the appropriate product on our homepage.

Adjustment

No adjustments on the instrument are necessary. The switching function is determined by the electrical connection.

Electrical connection

M12 x 1 plug



Wiring plan M12 x 1 plug - Transistor output, three-wire

- 1 Voltage supply
- 2 PNP switching
- 3 NPN switching

Details on the electrical connection can be found in the operating instructions of the device in the download area on our homepage.

Instrument selection

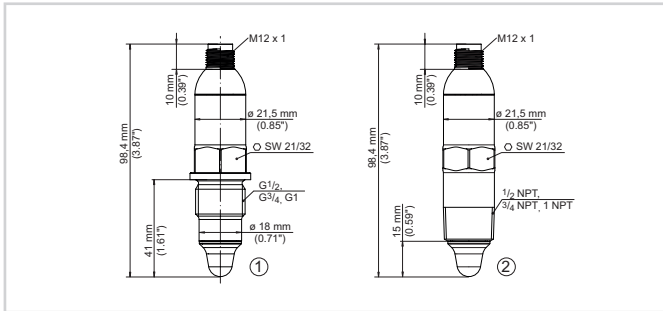
On our homepage under "Products" you can select the suitable measuring principle and instrument for your application.

There you will also find detailed information on the available device versions.

Contact

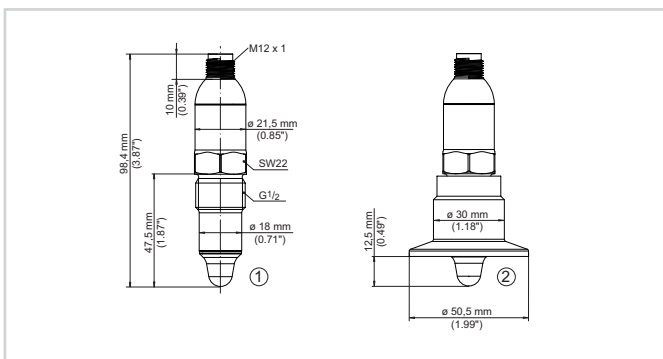
You can find your personal contact person at VEGA on our homepage under "Contact".

Dimensions



VEGAPOINT 11, standard version - thread

- 1 Thread G $\frac{1}{2}$, G $\frac{3}{4}$, G1 (DIN ISO 228/1) with M12 x 1 plug connection
- 2 Thread $\frac{1}{2}$ NPT, $\frac{3}{4}$ NPT, 1 NPT with M12 x 1 plug connection



VEGAPOINT 11, hygienic version - Thread

- 1 Thread G $\frac{1}{2}$ for hygienic threaded adapter (DIN ISO 228/1) with M12 x 1 plug connection
- 2 VEGAPOINT 11, hygienic version in threaded adapter, Clamp

Information

You can find further information on the VEGA product line on our homepage.

In the download section of our homepage you'll find operating instructions, product information, industry brochures and approval documents as well as device and adjustment software.

TU5 Series Turbidimeters

Applications

- Drinking Water
- Power
- Beverage
- Pharmaceutical



The next standard in the evolution of turbidity

Only the new TU5 Series[®] Lab & Process Turbidimeters with 360° x 90° Detection[®] deliver unprecedented confidence that a change in your reading is a change in your water.

Groundbreaking 360° x 90° Detection Technology

The TU5 Series employs a patented optical design that sees more of your sample than any other turbidimeter, delivering the best low level precision and sensitivity while minimizing variability from test to test.

Matching lab and online results

For the first time you will be able to remove the uncertainty of which measurement to trust, thanks to identical 360° x 90° Detection Technology in both instruments.

Everything about turbidity – faster

The TU5 Series dramatically reduces the time needed to get a turbidity measurement you can rely on, with 98% less online sample surface area to clean, sealed vials for calibration, and the elimination of the need for indexing and silicone oil in the lab. Not to mention, a smaller online sample volume means you will detect events almost immediately.

No surprises

Prognosys[™] monitors your TU5 Series online instrument, proactively alerting you to maintenance needs before your measurement becomes questionable. And a Hach Service Agreement protects your investment and helps ensure that you stay in compliance and on budget.

USEPA and ISO 7027 reporting: The TU5 Series Turbidimeters apply the instrument design and meet performance criteria established by EPA Approved Hach Method 10258 and ISO 7027-1:2016, making them suitable for regulatory reporting.



Be Right[™]

Technical Data***TU5200**

Light Source	Class 2 laser product, with embedded 650 nm (EPA 0.43 mW) or Class 1 laser product, with embedded 850 nm (ISO), max. 0.55 mW (complies with IEC/EN 60825-1 and to 21 CFR 1040.10 in accordance with Laser Notice No. 50)
Range	EPA: 0 - 700 NTU / FNU / TE/F / FTU 0 - 100 mg/L 0 - 175 EBC ISO: 0 - 1000 NTU / FNU / TE/F / FTU 0 - 100 mg/L 0 - 250 EBC
Accuracy	±2 % plus 0.01 NTU from 0 - 40 NTU; ±10 % of reading from 40 - 1000 NTU based on Formazin primary standard (at 25 °C)
Resolution	0.0001 NTU / FNU / TE/F / FTU / EBC / mg/L
Repeatability	<40 NTU: Better than 1% of reading or ±0.002 NTU on Formazin at 25 °C, whichever is greater >40 NTU: Better than 3.5% of reading on Formazin at 25 °C
Stray Light	<10 mNTU
Units	NTU, FNU, TE/F, FTU, EBC; mg/L if calibrated with Degrees calibration curve
Operating Temperature Range	10 - 40 °C (50 - 104 °F)
Operating Humidity	80% at 30 °C (non condensing)
Sample Temperature	4 - 70 °C (39 - 158 °F)
Storage Conditions	-30 - 60 °C (-22 - 140 °F)
Power Requirements (Voltage)	100 - 240 VAC
Power Requirements (Hz)	50/60 Hz
Certifications	CE compliant US FDA accession number: 1420493-000 EPA version, 1420492-000 ISO version Complies with IEC/EN 60825-1 and to 21 CFR 1040.10 in accordance with Laser Notice No. 50) Australian ACMA Marking
Dimensions (H x W x D)	195 mm x 409 mm x 278 mm
Weight	2.4 kg (5.29 lbs.)
Warranty	1 year

TU5300sc / TU5400sc

Light Source	Class 2 laser product, with embedded 650 nm (EPA 0.43 mW) or Class 1 laser product, with embedded 850 nm (ISO), max. 0.55 mW (complies with IEC/EN 60825-1 and to 21 CFR 1040.10 in accordance with Laser Notice No. 50)
Range	EPA: 0 - 700 NTU / FNU / TE/F / FTU 0 - 100 mg/L 0 - 175 EBC ISO: 0 - 1000 NTU / FNU / TE/F / FTU 0 - 100 mg/L 0 - 250 EBC
Accuracy	±2% or 0.01 NTU from 0 - 40 NTU ±10% of reading from 40 - 1000 NTU based on Formazin primary standard
Resolution	0.0001 NTU / FNU / TE/F / FTU / EBC
Repeatability	Better than 1% of reading or ±0.002 NTU (TU5300) or ±0.0006 NTU (TU5400) on Formazin at 25 °C (77 °F), whichever is greater
Stray Light	<10 mNTU
Units	NTU, FNU, TE/F, FTU, EBC
Signal Average Time	TU5300sc: 30 - 90 seconds TU5400sc: 1 - 90 seconds
Response Time	TU5300sc: T90 <45 seconds at 100 mL/min TU5400sc: T90 <30 seconds at 100 mL/min
Sample Temperature	2 - 60 °C (35 - 140 °F)
Sample Pressure	6 bar (87 psi) maximum, compared to air at sample temperature range from 2 - 40 °C (35.6 - 104 °F)
Sample Flow Rate	100 - 1000 mL/min; optimal flow rate: 200 - 500 mL/min
Operating Temperature Range	0 - 50 °C (32 - 122 °F)
Operating Humidity	Relative humidity: 5 - 95% at different temperatures, non-condensing
Storage Conditions	-40 - 60 °C (-40 - 140 °F)
Enclosure Rating	Electronic compartment IP55; all other functional units IP65 with process head/ACM attached to the TU5300sc/TU5400sc instrument
Certifications	CE compliant US FDA accession number: 1420493-000 EPA version, 1420492-000 ISO version Australian ACMA Marking
Dimensions (H x W x D)	249 mm x 268 mm x 190 mm
Weight	5.95 lbs. (2.7 kg); 11 lbs. (5.0 kg) with all accessories
Warranty	1 year

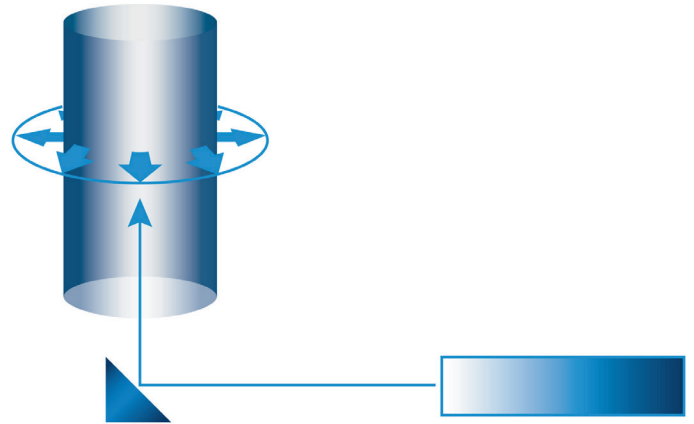
*Subject to change without notice.

Principle of Operation

The TU5 Series turbidimeters measure turbidity by directing a laser into a sample to scatter off suspended particles. The light that is scattered at a 90° angle from the incident beam is reflected through a conical mirror in a 360° ring around the sample before it is captured by a detector.

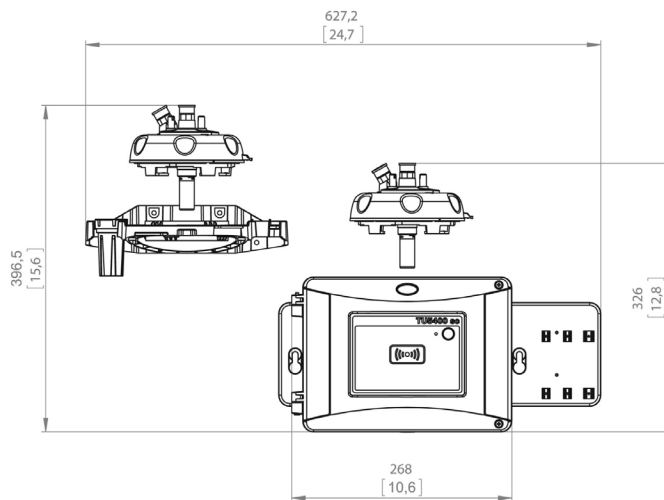
The amount of light scattered is proportional to the turbidity of the sample. If the turbidity of the sample is negligible, little light will be scattered and detected by the photocell and the turbidity reading will be low. High turbidity, on the other hand, will cause a high level of light scattering and result in a high reading.

The 360° x 90° optics of the TU5 series were optimized for high accuracy at low turbidity ranges and therefore the TU5 does not include ratio technology. Ratio technology is only applicable for high turbidity applications which have interference from color and large particles.

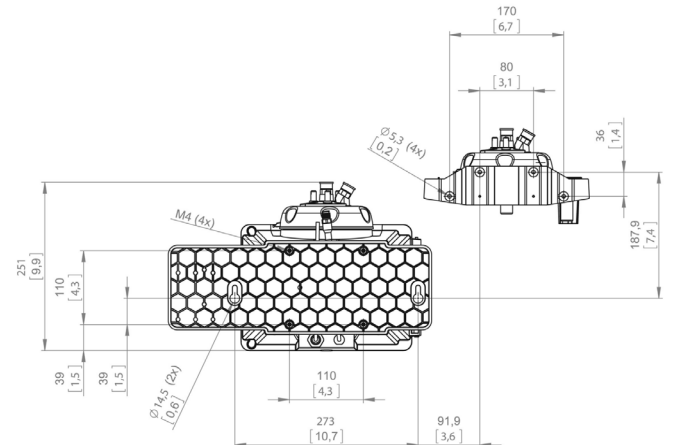


Dimensions

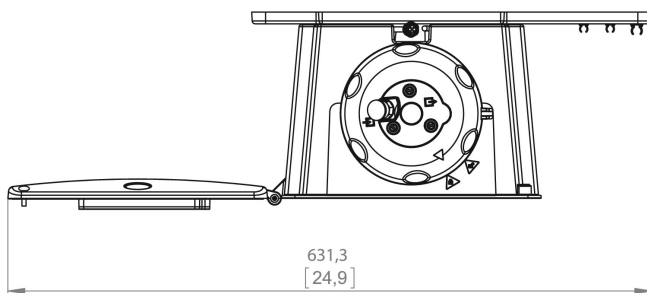
TU5300sc and TU5400sc front view



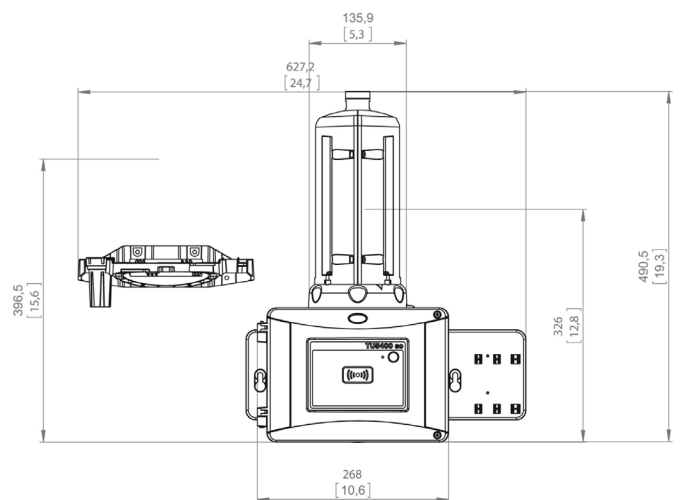
TU5300sc and TU5400sc rear view



TU5300sc and TU5400sc top view



TU5300sc and TU5400sc with automatic cleaning module



Order Information

TU5200 Benchtop Laser Turbidimeters

LPV442.99.03012	TU5200 Benchtop Laser Turbidimeter with RFID, EPA Version
LPV442.99.01012	TU5200 Benchtop Laser Turbidimeter without RFID, EPA Version
LPV442.99.03022	TU5200 Benchtop Laser Turbidimeter with RFID, ISO Version
LPV442.99.01022	TU5200 Benchtop Laser Turbidimeter without RFID, ISO Version

TU5300sc/TU5400sc Online Laser Turbidimeters

LXV445.99.10112	TU5300sc Low Range Laser Turbidimeter, EPA Version
LXV445.99.10212	TU5400sc Ultra-High Precision Low Range Laser Turbidimeter, EPA Version
LXV445.99.53112	TU5300sc with Flow Sensor, Automatic Cleaning, RFID, and System Check, EPA Version
LXV445.99.53212	TU5400sc with Flow Sensor, Automatic Cleaning, RFID, and System Check, EPA Version

Please note: Other turbidimeter configurations are available and RFID may not be available in all areas. Please contact your local Hach representative.

Please note: An SC controller is required for operation of the TU5300sc or TU5400sc.

Calibration and Verification

LZY835	Stabcal [®] Calibration Set with RFID
LZY898	Stabcal [®] Calibration Set without RFID
LZY901	Glass Rod Secondary Turbidity Standard <0.1 NTU/FNU
LZY834	Replacement Vial for TU5300sc and TU5400sc
LZV946	Sample Vials for TU5200

TU5 Series Accessories

LQV159.97.00002	Automatic Cleaning Module for TU5300sc and TU5400sc
LQV160.99.00002	Flow Sensor for TU5300sc and TU5400sc
LZY876	Desiccant Cartridge for TU5300sc and TU5400sc
LZY907.97.00002	Maintenance Kit for TU5300sc and TU5400sc
LQV157.99.50002	SIP10 Sipper Unit for TU5200
LZY903	Manual Vial Wiper for TU5200, TU5300sc, and TU5400sc



With Hach Service, you have a global partner who understands your needs and cares about delivering timely, high-quality service you can trust. Our Service Team brings unique expertise to help you maximise instrument uptime, ensure data integrity, maintain operational stability, and reduce compliance risk.

HACH COMPANY World Headquarters: Loveland, Colorado USA

United States: 800-227-4224 tel 970-669-2932 fax orders@hach.com
 Outside United States: 970-669-3050 tel 970-461-3939 fax int@hach.com
hach.com

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In the interest of improving and updating its equipment, Hach Company reserves the right to alter specifications to equipment at any time.



Be Right™



TU5300sc/TU5400sc

Online Laser Turbidimeters

The TU5300sc/TU5400sc is an essential part of your turbidity monitoring program. Let Hach Service help ensure that your instrument operates at peak performance to deliver the accurate, low-level measurements that you require for regulatory reporting and process management.

Benefits of Service

- Ensures critical turbidity measurements are accurate and reliable
- Provides documentation to support regulatory compliance
- Detects and prevents issues that can degrade performance or reduce instrument life
- Eliminates time and hassle of performing service and managing maintenance schedules
- Technical support hotline provides rapid and direct resolution and field support when an immediate fix is not possible

Annual Average Maintenance Time: Up to 1.5 hours
Recommended Maintenance Frequency: 1x / year

Essential Maintenance Tasks Performed

Routine:

- Perform visual inspection of housing for signs of damage or contamination
- Examine and clean vial and vial compartment
- Replace desiccant cartridge to prevent condensation that can impact measurements
- Replace vial as needed to prevent measurement errors
- Update firmware to latest version
- Calibrate with certified StablCal standards

Advanced:

- Perform hardware check to verify functionality of critical components and detect potential issues that may impact system performance
- Perform advanced troubleshooting to resolve any error conditions
- Test flow and pressure to ensure proper sample delivery to analyzer
- Produce service report and performance certificate to support regulatory compliance

Parts Replaced During Maintenance			
Part #	Description	Qty.	Frequency
LZY876	Desiccant Cartridge	1	12 months
LZY834	Vial	1	As needed

These parts and replacement labor are included with a Hach Service Plan at the recommended frequency. Coverage is available for repairs on site or at the Hach Service Center.

For more information, visit: www.hach.com/service

Establish - Extend - Elevate - Performance



Digital Controller SC4500

Applications

- Wastewater
- Drinking Water
- Industrial
- Other



Ready for Now. Ready for the Future.

Technologies are advancing rapidly, providing new levels of convenience, accuracy, and efficiency. Which is exactly why the SC4500 Controller from Hach® is designed to integrate easily into your current system while allowing you to upgrade as your capabilities advance, without having to replace inventory. With a wide range of analog and digital connectivity options and the availability of intelligent instrument and data management features, the SC4500 unlocks the future, today.

Easy Adoption

The familiar experience of a modern touchscreen, the ability to use your current Hach sensors, and the same footprint as the SC200, make installation and integration of the SC4500 Controller seamless.

No Time for Downtime

The SC4500's built-in predictive diagnostic software ensures measurement confidence and reduces the risk of unexpected equipment downtime by enabling proactive maintenance planning via MSM, including step-by-step instructions.

The Connectivity Options You Need

The Controller provides local communication to SCADA or a PLC, as well as remote access through a secure, cloud-based connectivity option to integrate with Claros, the Water Intelligence System from Hach. From analog and advanced digital protocols to Wi-Fi, cellular or LAN, the SC4500 gives you the flexibility to adapt in a rapidly changing world.

The power of Hach's real time controls (RTC) software is now hosted on the SC4500 controller. Take advantage of the potential energy, chemical and labor savings, from a simple and environmentally friendly solution.

Technical Data*

Description	Microprocessor-controlled and menu-driven controller that operates the sensor
Dimensions	½ DIN - 144 x 144 x 192 mm (5.7 x 5.7 x 7.6 in.)
Weight	3.7 lb (controller only, w/o modules)
Display	3.5-inch TFT colour display with capacitive touchpad
Enclosure Rating	UL50E type 4X, IEC/EN 60529-IP 66, NEMA 250 type 4X Metal enclosure with a corrosion-resistant finish
Operating Temperature Range	-20 to 60 °C (-4 to 140 °F) (8 W (AC)/9 W (DC) sensor load) -20 to 45 °C (-4 to 113 °F) (28 W (AC)/20 W (DC) sensor load) Linear derating between 45 and 60 °C (-1.33 W/°C)
Storage Conditions	-20 - 70 °C (-4 - 158 °F), 0 - 95% relative humidity, non-condensing
Altitude	3000 m (9842 ft) maximum
Installation Category	Category II
Indoor/Outdoor	Outdoor installation in direct sunlight or UV radiation requires UV protection screen and/or sunroof
Pollution Degree	4
Protection Class	I, connected to protective earth
Power requirements	AC controller: 100-240 VAC ±10%, 50/60 Hz; 1 A (28 W sensor load) DC controller: 24 VDC +15% -20%; 2.5 A (20 W sensor load)
Measurements	Two device digital SC connectors
Relays	Two relays (SPDT); Wire gauge: 0.75 to 1.5 mm ² (18 to 16 AWG) AC controller Maximum switching voltage: 100 - 240 VAC Maximum switching current: 5 A Resistive/1 A Pilot Duty Maximum switching power: 1200 VA Resistive/360 VA Pilot Duty DC controller Maximum switching voltage: 30 VAC or 42 VDC Maximum switching current: 4 A Resistive/1 A Pilot Duty Maximum switching power: 125 W Resistive/28 W Pilot Duty
Communication (optional)	Analog: Five 0-20 mA or 4-20 mA analog outputs on each analog output module Up to two analog Input modules (0-20 mA or 4-20 mA). Each input module replaces a digital sensor input. Digital: Profibus DPV1 module Modbus TCP Profinet IO module Ethernet IP module
Network Connectivity	LAN: Two Ethernet connectors (10/100 Mbps) Cellular: External 4G Wi-Fi
USB Port	Used for data download and software upload. The controller records approximately 20,000 data points for each connected sensor.
Compliance Certifications	CE, ETL certified to UL and CSA safety standards (with all sensor types), FCC, ISED, KC, RCM, EAC, UKCA, SABS, C (Morocco)
Warranty	12 months
Compatible Network Technologies	GSM 3G/4G (e.g. AT&T, T-Mobile, Rogers, Vodafone etc.) CDMA (e.g. Verizon)

*Subject to change without notice.

4-20mA analog output provided

Compatible Instruments / Software Version (Release Year)

Compatible Sensors and Analysers /
Software Version (Release Year)

Amtax sc / V2.30 (2018) or higher

A-ISE sc / V1.02 or higher

AN-ISE sc / V1.08 (2013) or higher

N-ISE sc / V1.02 or higher

Nitratax clear sc, Nitratax eco sc,
Nitratax plus sc / V3.13 (2013) or higher

NT3100sc/NT3200sc

Phosphax sc / V2.30 (2018) or higher

Phosphax sc LR/MR/HR / V1.01 (2018)
or higher

TSS sc / V41.73 (2013) or higher

Solitax sc / V2.20 (2013) or higher

TU5300sc, TU5400sc / V1.34 (2017)
or higher

SS7 sc (in Bypass) / V1.01 (2006) or higher

Ultraturb sc / V3.06 (2017) or higher

1720E / V2.10 (2006) or higher

Sonatax sc / V1.15 (2016) or higher

CL17sc / V2.7 (2019) or higher

CL10sc / V1.14 (2013) or higher

9184sc, 9185sc, 9187sc* / V2.03 (2013)
or higher

Uvas plus sc / V3.01 (2017) or higher

LDO 2 sc* / V1.22 (2013) or higher

3798sc* / V2.03 (2013) or higher

3700sc + Inductive Conductive Digital
6120800 / V3.00 (2017) or higher

3422sc + Contacting Conductive Digital
6120700 / V3.00 or higher

3700 analog + Conductivity Module
LXZ525.99.D0004

3400 analog + Conductivity Module
LXZ525.99.D0004

pHD sc*, pHD-S sc / V3.10 (2016) or higher

1200-S sc* / V2.04 (2013) or higher

pHD analog + Digital Gateway 6120500 /
V3.00 (2017) or higher

pHD analog + pH/ORP Module
LXZ525.99.D0003

RC and PC analog sensor + Digital Gateway
for conventional analog pH and ORP
sensors 6120600 / V3.00 (2017) or higher

RC and PC analog + pH/ORP Module
LXZ525.99.D0003

8362sc* / V3.00 (2017) or higher

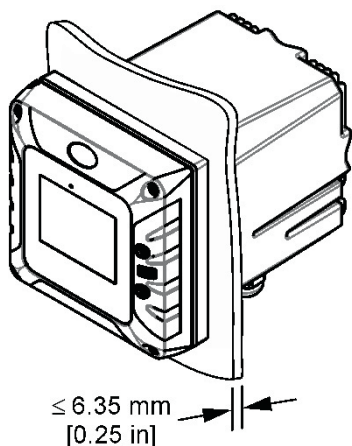
Polymetron pH/ORP analog + Ultrapure
pH/ORP Module LXZ525.99.D0007

Polymetron Conductivity analog +
Ultrapure Conductivity Module
LXZ525.99.D0006

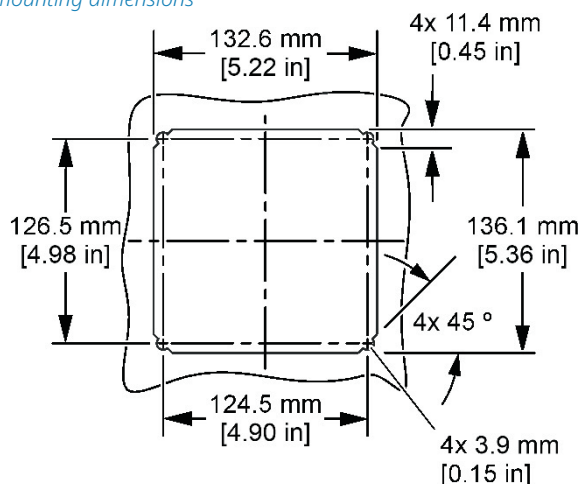
GS1440 and GS2440EX Sensors H₂S
FP360 sc / V1 or higher

**Hardware Version 1 of instrument is not supported*

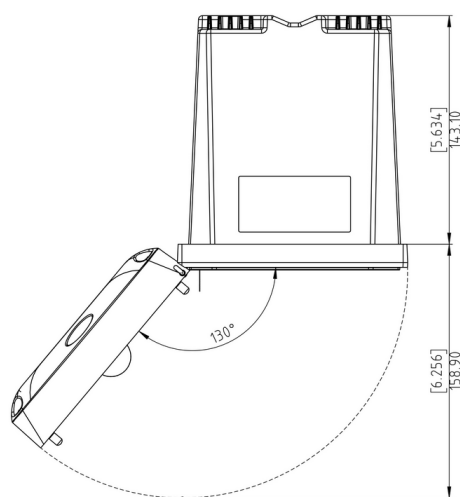
Dimensions



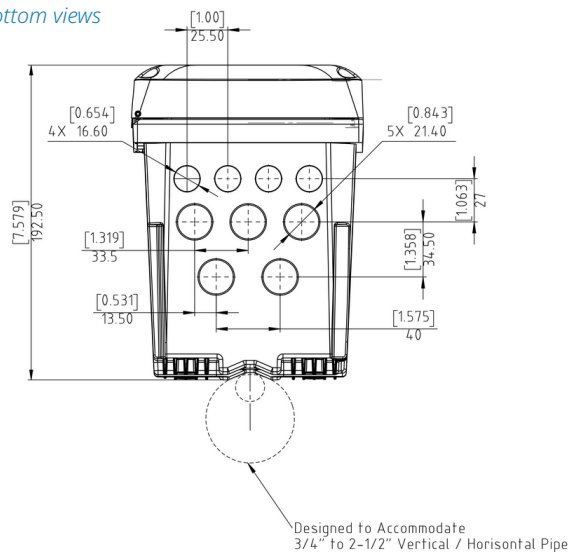
Panel mounting dimensions



Top and bottom views



Door Opening Details



Order Information

Controller

LXV525.99A11551	SC4500 Controller, Prognosys, 5x mA Output, 2 digital Sensors, without plug
LXV525.99E11551	SC4500 Controller, Prognosys, 5x mA Output, 2 digital Sensors, US plug
LXV525.99A11541	SC4500 Controller, Prognosys, 5x mA Output, 1 digital Sensor, 1 mA Input, without plug
LXV525.99E11541	SC4500 Controller, Prognosys, 5x mA Output, 1 digital Sensor, 1 mA Input, US plug
LXV525.99AA1551	SC4500 Controller, Claros-enabled, 5x mA Output, 2 digital Sensors, without plug
LXV525.99EA1551	SC4500 Controller, Claros-enabled, 5x mA Output, 2 digital Sensors, US plug
LXV525.99AA1541	SC4500 Controller, Claros-enabled, 5x mA Output, 1 digital Sensor, 1 mA Input, without plug
LXV525.99EA1541	SC4500 Controller, Claros-enabled, 5x mA Output, 1 digital Sensor, 1 mA Input, US plug

Additional configurations are available. Please contact Hach Technical Support or your Hach representative.

Accessories

LXZ524.97.00042	SC4x00 Input Module
LXZ525.99.D0002	SC4x00 mA Output Module (5 Outputs)
LXZ525.99.C0002	SC4500 Ethernet IP Upgrade Kit
LXZ525.99.C0003	SC4500 Modbus TCP/IP Upgrade Kit
LXZ525.99.00026	SC4500 Ethernet Cable M12 to M12 / C1D2, 10 m
LXZ525.99.00017	SC4500 USB Stick
LXZ524.99.00004	SC4x00 UV Protection Screen
LXZ524.99.00005	SC4x00 UV Protection Screen with Sunroof
LXZ524.99.00033	SC4x00 Sunroof Visor
LXZ524.99.00036	SC4x00 Mounting Hardware Sunroof with Visor
LXZ524.99.00037	SC4x00 Sunroof with Visor
LXZ525.99.D0003	SC4500 pH/ORP module
LXZ525.99.D0004	SC4500 Conductivity module
LXZ525.99.D0006	SC4500 Ultrapure pH/ORP module
LXZ525.99.D0007	SC4500 Ultrapure Conductivity module



This instrument connects to Claros, Hach's innovative Water Intelligence System. Claros allows you to seamlessly connect and manage instruments, data, and process – anywhere, anytime. The result is greater confidence in your data and improved efficiencies in your operations. To unlock the full potential of Claros, insist on Claros Enabled instruments.



With Hach Service, you have a global partner who understands your needs and cares about delivering timely, high-quality service you can trust. Our Service Team brings unique expertise to help you maximize instrument uptime, ensure data integrity, maintain operational stability, and reduce compliance risk.



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In the interest of improving and updating its equipment, Hach Company reserves the right to alter specifications to equipment at any time.

DOC053.53.35316.Sep23



SC4500 Controller

The SC4500 is a critical component of your analytical measurement system, providing a user interface and power to your sensor, storing and transmitting your data accurately, and keeping you connected to Claros. Hach Service can help you maximize your controller's uptime to ensure you have the data and connectivity you need to keep your process running smoothly.

Benefits of Service

- Ensures data integrity and continuous communication to your operational control system
- Maximizes uptime, enabling continuous Claros connectivity
- Detects and prevents potential issues that can degrade instrument performance or result in failure
- Relieves the burden of managing maintenance schedules
- Technical support hotline provides rapid and direct resolution to many issues

*Annual Average Maintenance Time: Up to 1 hour
Recommended Maintenance Frequency: 1x / year*

Essential Maintenance Tasks Performed

Routine:

- Clean instrument exterior
- Inspect housing and cables for visible damage
- Verify output signal is scaled correctly to ensure data accuracy
- Verify proper communication with network and attached sensors
- Update firmware to latest version

Advanced:

- Perform in-depth diagnostic test to verify proper operation of controller, power supply, main board, inputs, and outputs
- Perform advanced troubleshooting using diagnostic logs to resolve any warning or error messages
- Produce service report and performance certificate to support quality management and compliance

Coverage is available for repairs on site or at the Hach Service Center. Coverage for attached sensors is sold separately.

For more information, visit: www.hach.com/service

Establish - Extend - Elevate - Performance

INSTALLATION AND OPERATING INSTRUCTIONS FOR REOTEMP PRESSURE GAUGES

I. MANUAL CONTENT

This manual contains installation, operation, maintenance, calibration instructions for REOTEMP pressure gauges. American National Standard ANSI B40.1 Gauges, Pressure and Pressure Indicating Dial Type - Elastic Element, contains valuable information including installation, operation, calibration and safe usage. It is recommended that anyone using, installing or calibrating pressure gauges be familiar with this industry standard.

II. GENERAL

These gauges are available in vacuum, compound and pressure ranges. (Refer to applicable data sheets.) A general outline of construction is listed below:

(A) CASE: Available in Stainless, ABS, or Phenolic, with back, front or no flange design.

(B) RING: Available with threaded or crimped.

(C) WINDOW: Available with glass, clear plastic or shatter-resistant glass. (Refer to applicable data sheet.)

(D) CONNECTION: Bottom male or lower back male 2-14"NPT, 3-18"NPT.

(E) DIAL: Available in 2 1/2", 3 1/2" 4", 4 1/2" or 6" dial sizes.

(F) POINTER: Adjustable or plain pointer. (Refer to applicable data sheet.)

III. INSTALLATION

A. STEM OR PIPE MOUNTING: Gauges mounted directly on piping should be assembled with reasonable care, always using the wrench grip provided on the pressure connection to secure it to the threaded fitting. Do not use the gauge case as a means of tightening the connection.

In order to extend the service life and continued accuracy, the gauge should be protected as far as possible from effects of mechanical vibration. It is desirable to isolate it from severely vibrating machinery. The gauge may be rigidly mounted to a non-vibrating surface and connected to the pressure source using flexible tubing.

B. PANEL OR SURFACE MOUNTING: Gauges should be free of piping strains when mounted. If mounting surface is uneven, insert washers under flange of the gauge case to obtain a three point suspension.

Refer to applicable data sheet for panel openings and mounting dimensions for various types, sizes, and case construction. When surface mounting a gauge, with a blow-out back, a clearance behind the gauge equal to the area of the pressure relieving back must be provided. This can be obtained by cutting a hole in the mounting surface equal to the diameter of the pressure relieving back or by spacing the gauge away from the mounting surface so as to provide an annular area equal to the area of the pressure relieving back.

C. LOCATION: Gauges should be located where they will not be subjected to abnormally high or low temperatures. A slight error in indication will exist when the gauge is exposed to a temperature above or below 70 deg. Fahrenheit, the temperature at which it was calibrated. Error due to temperature is approximately 0.2% of indicated reading for a 10 deg. Fahrenheit change, plus a small zero shift. The gauge will generally read high under elevated temperatures and low at low temperatures.

D. PROTECTORS: If gauges are to be used for steam service, a siphon filled with water must be installed between gauge and line to prevent live steam from entering the Bourdon tube.

A gauge cock should be installed in the pressure line. This might be the standard shut-off valve or a needle valve for throttling pressure pulses. Should severe pulsation exist, the gauge should be protected by adding a throttling orifice screw in the gauge socket or by addition of a pulsation damper, such as a snubber.

A diaphragm seal should be used in applications where process media should not come in contact with gauge.

IV. OPERATION

A. Admit pressure slowly by throttling gauge cock. The maximum, pressure at which a pressure gauge is continuously operated shall not exceed 75% of full scale pressure. The gauge selected should have a full scale pressure of approximately twice the intended operating pressure.

B. If it is desirable to compensate the indication for head effect in the piping leg it can be accomplished by removing bezel ring and window and resetting pointer using the pointer adjusting screw. (This applies only to models with resetting pointers.)

C. Relieving Case Pressure: Filled cases or other sealed cases must be vented to avoid internal pressure, which can affect accuracy. After installation, cut or pierce fill plug at top of case for best accuracy.

V. MAINTENANCE

A. Replace broken gauge window promptly to keep dirt out of the mechanism.

B. For gauges with safety blow-out back, check that pressure relieving back is properly seated, free to operate and that adequate clearance is provided behind the gauge. (See Section 3.B)

C. Do not apply oil to movement or linkage since this may result in sluggish operation.

D. Dependent upon the severity of the service, gauges should be removed at intervals and compared with a suitable master test gauge or dead weight tester. Minor corrections may be accomplished by resetting the pointer if applicable. Should movement appear sluggish or lack sensitivity, it should then be disassembled for cleaning, overhaul or replacement.

PRESSURE GAUGE RANGES AND CODES

PRESSURE GAUGES

VACUUM/COMPOUND RANGES

psi		Dual Scale & psi & Metric						Single Scale-Metric					
"Hg/0/psi		psi & bar		psi & kg/cm ²		psi & kPa		bar		kg/cm ²		kPa	
Code	Range	Code	Range	Code	Range	Code	Range	Code	Range	Code	Range	Code	Range
P01	-30"Hg/0	D01	"Hg & -1/0 bar	G01	"Hg & -1/0 kg/cm ²	L01	"Hg & -100/0 kPa	B00	-1/0 bar	K00	-1/0 kg/cm ²	A00	-100/0 kPa
P02	-30/0/15	D02	psi & -1/0/1	G02	psi & -1/0/1	L02	psi & -100/0/100	B01	-1/0/1	K01	-1/0/1	A01	-100/0/100
P03	-30/0/30	D03	psi & -1/0/2	G03	psi & -1/0/2	L03	psi & -100/0/200	B02	-1/0/2	K02	-1/0/2	A02	-100/0/200
P04	-30/0/60	D04	psi & -1/0/4	G04	psi & -1/0/4	L04	psi & -100/0/400	B04	-1/0/4	K04	-1/0/4	A04	-100/0/400
P05	-30/0/100	D05	psi & -1/0/7	G05	psi & -1/0/7	L05	psi & -100/0/700	B07	-1/0/7	K07	-1/0/7	A07	-100/0/700
P06	-30/0/160	D06	psi & -1/0/11	G06	psi & -1/0/11	L06	psi & -100/0/1,100	B011	-1/0/11	K011	-1/0/11	A011	-100/0/1,100
P07	-30/0/200	D07	psi & -1/0/14	G07	psi & -1/0/14	L07	psi & -100/0/1,400	B014	-1/0/14	K014	-1/0/14	A014	-100/0/1,400
P08	-30/0/300	D08	psi & -1/0/20	G08	psi & -1/0/20	L08	psi & -100/0/2,000	B020	-1/0/20	K020	-1/0/20	A020	-100/0/2,000

PRESSURE RANGES

psi		Dual Scale & psi & Metric						Single Scale-Metric					
psi		psi & bar		psi & kg/cm ²		psi & kPa		bar		kg/cm ²		kPa	
Code	Range	Code	Range	Code	Range	Code	Range	Code	Range	Code	Range	Code	Range
P14	0-10 psi	D14	psi & .7 bar	G14	psi & .7 kg/cm ²	L14	psi & 70 kPa						
P15	0-15	D15	psi & 0-1	G15	psi & 0-1	L15	psi & 0-100	B1	0-1 bar	K1	0-1 kg/cm ²	A1	0-100 kPa
P16	0-30	D16	psi & 0-2	G16	psi & 0-2	L16	psi & 0-200	B2	0-2	K2	0-2	A2	0-200
P17	0-60	D17	psi & 0-4	G17	psi & 0-4	L17	psi & 0-400	B4	0-4	K4	0-4	A4	0-400
P18	0-100	D18	psi & 0-7	G18	psi & 0-7	L18	psi & 0-700	B7	0-7	K7	0-7	A7	0-700
P19	0-160	D19	psi & 0-11	G19	psi & 0-11	L19	psi & 0-1,100	B11	0-11	K11	0-11	A11	0-1,100
P20	0-200	D20	psi & 0-14	G20	psi & 0-14	L20	psi & 0-1,400	B14	0-14	K14	0-14	A14	0-1,400
P21	0-300	D21	psi & 0-20	G21	psi & 0-20	L21	psi & 0-2,000	B20	0-20	K20	0-20	A20	0-2,000
P22	0-400	D22	psi & 0-28	G22	psi & 0-28	L22	psi & 0-2,800	B28	0-28	K28	0-28	A28	0-2,800
P23	0-600	D23	psi & 0-40	G23	psi & 0-40	L23	psi & 0-4,000	B40	0-40	K40	0-40	A40	0-4,000
P24	0-800	D24	psi & 0-55	G24	psi & 0-55	L24	psi & 0-5,500	B55	0-55	K55	0-55	A55	0-5,500
P25	0-1,000	D25	psi & 0-70	G25	psi & 0-70	L25	psi & 0-7,000	B70	0-70	K70	0-70	A70	0-7,000
P30	0-1,500	D30	psi & 0-100	G30	psi & 0-100	L30	psi & 0-10,000	B100	0-100	K100	0-100	A100	0-10,000
P31	0-2,000	D31	psi & 0-140	G31	psi & 0-140	L31	psi & 0-14,000	B140	0-140	K140	0-140	A140	0-14,000
P32	0-3,000	D32	psi & 0-200	G32	psi & 0-200	L32	psi & 0-20,000	B200	0-200	K200	0-200	A200	0-20,000
P33	0-4,000	D33	psi & 0-280	G33	psi & 0-280	L33	psi & 0-28,000	B280	0-280	K280	0-280	A280	0-28,000
P34	0-5,000	D34	psi & 0-350	G34	psi & 0-350	L34	psi & 0-35,000	B350	0-350	K350	0-350	A350	0-35,000
P35	0-6,000	D35	psi & 0-400	G35	psi & 0-400	L35	psi & 0-40,000	B400	0-400	K400	0-400	A400	0-40,000
P36	0-8,000	D36	psi & 0-550	G36	psi & 0-550	L36	psi & 0-55,000	B550	0-550	K550	0-550	A550	0-55,000
P37	0-10,000	D37	psi & 0-700	G37	psi & 0-700	L37	psi & 0-70,000	B700	0-700	K700	0-700	A700	0-70,000
P38	0-15,000	D38	psi & 0-1,000	G38	psi & 0-1,000	L38	psi & 0-100,000	B1K	0-1,000	K1K	0-1,000	A1K	0-100,000
P39	0-20,000	D39	psi & 0-1,400	G39	psi & 0-1,400	L39	psi & 0-140,000						
P40	0-30,000	D40	psi & 0-2,000	G40	psi & 0-2,000	L40	psi & 0-200,000						
P41	0-40,000	D41	psi & 0-2,800	G41	psi & 0-2,800	L41	psi & 0-280,000						
P42	0-50,000	D42	psi & 0-3,500	G42	psi & 0-3,500	L42	psi & 0-350,000						



Don't See The Range You Need? Reotemp has thousands of specialty dial ranges available and will work with you to create a custom range, just contact Reotemp customer service.

PRESSURE GAUGE OPTIONS

Part #	Description	Heavy-Duty Industrial Gauges				Process Gauges			Stainless Steel Case Industrial Gauges			Commercial Gauges		Low Pressure Capsule Gauges			Test Gauges
		PR25	PR35	PR40	PR60	PT45P	PT45T	PI45	PM	PG**C	PG**S	PD15/20/25	PD35/40	PC25N	PC25S	PC40/45/60	PL60/45
CASE FILL OPTIONS																	
-G	Glycerin Filled Case	✓	✓	✓	✓	✓	✓	N/A	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
-W	Glycerin Water Filled Case (65/35)	✓	✓	✓	✓	✓	✓	N/A	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A
-S	Silicone Filled Case	✓	✓	✓	✓	✓	✓	N/A	✓	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A
-T	Teflon-coated Movement (No case fill)	✓	✓	✓	✓	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A	✓	✓	✓
-I	Inert Case Fill	✓	✓	✓	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
LENS OPTIONS																	
-P	Plastic Lens	STD	✓	✓	✓	✓	✓	STD	STD	STD	✓	✓	MQ	✓	✓	✓	✓
-T	Tempered Safety Glass Lens	✓	STD	STD	STD	STD	STD	N/A	N/A	N/A	STD	N/A	N/A	N/A	STD	STD	STD
-S	Laminated Safety Glass Lens	✓	✓	✓	✓	✓	✓	N/A	N/A	N/A	✓	N/A	N/A	N/A	✓	✓	✓
-G	Plain Glass	N/A	N/A	N/A	N/A	N/A	N/A	N/A	MQ	MQ	N/A	MQ	STD	N/A	N/A	N/A	N/A
POINTER OPTIONS																	
-RP	Red Pointer	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	N/A	✓	✓	✓	✓
-MP	Min/Max Pointer (Drag Hand)†	✓	N/A	✓	✓	✓	N/A	N/A	N/A	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A
-MQ	Min/Max Pointer (Tamper-proof)†	✓	N/A	✓	✓	✓	N/A	N/A	N/A	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A
-RH	Red Set Hand (Manual Adjustment)	N/A	N/A	N/A	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-EC	Electrical Contacts	N/A	N/A	✓	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DIAL OPTIONS																	
-CL	Custom Logo Dial	✓	✓	✓	✓	✓	✓	MQ	MQ	✓	MQ	MQ	MQ	✓	✓	✓	✓
-HV	Hi-Vis Dial	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	N/A	✓	✓	✓	N/A
-CB	Color Band	✓	✓	✓	✓	✓	✓	MQ	MQ	✓	MQ	MQ	MQ	✓	✓	✓	N/A
-CP	Color Pie	✓	✓	✓	✓	✓	✓	MQ	MQ	✓	MQ	MQ	MQ	✓	✓	✓	N/A
-DM	Dial Marking	✓	✓	✓	✓	✓	✓	MQ	MQ	✓	MQ	MQ	✓	✓	✓	✓	✓
-LP	Removable Lens Protector	N/A	N/A	N/A	N/A	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CALIBRATION OPTIONS																	
-R1	Upgrade to 1% FS Accuracy	✓	✓	STD	STD	N/A	N/A	N/A	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-R2	Upgrade to 0.5% FS Accuracy	N/A	N/A	✓	✓	STD	STD	STD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
-R5	Upgrade to 1.5% FS Accuracy	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	✓	✓	✓	N/A
-C1	1pt. NIST Calibration Cert	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A
-C3	3pt. NIST Calibration Cert	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A
-C5	5pt. NIST Calibration Cert	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A
-CX	10pt. NIST Calibration Cert	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	STD
-CS	Calibration Sticker (No logged pts.)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	N/A
TAG OPTION																	
-TS	Stainless Steel Tag (1-10 Characters)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-TM	Stainless Steel Tag (11-80 characters)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-TP	Paper Tag	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CERTIFICATION OPTIONS																	
-CM	General Material Conformance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-NC	Certificate of NACE Compliance	✓	✓	✓	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A	✓	✓	✓	✓
-PM	Positive Material Identification Certificate (PMI)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-HT	Hydrostatic Test per ASME B31.3 (5 min)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
-LC	Argon Leak Check Certificate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CLEANING OPTIONS																	
-DG	Degreased - Wiped Clean of Oils, Shipped in Sealed Bag	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	✓	✓	✓	✓	✓
-OX	Cleaned for Oxygen Service per ASME B40.1	✓	✓	✓	✓	✓	✓	MQ	MQ	✓	MQ	MQ	✓	✓	✓	✓	✓
-OY	Cleaned for Oxygen Service per MIL-STD-1330D	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	N/A	N/A	✓	✓	✓	✓	✓
OTHER OPTIONS																	
-NR	No Restrictor Screw	✓	✓	✓	✓	✓	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	✓	N/A
-FI	Dry Gauge Shipped with Fill Plug Installed	N/A	N/A	N/A	N/A	✓	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

PRESSURE GAUGES

✓	Indicates that the option is available with the model.	N/A	Indicates the option is not available with this model.
STD	Indicates standard options with no additional cost.	MQ	Minimum order quantity applies.

†This option is only available with a plastic lens.

Operating Instructions

Radar sensor for continuous level measurement

VEGAPULS C 11

Two-wire 4 ... 20 mA



Document ID: 58340



VEGA

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Safety instructions for Ex areas:

Take note of the Ex specific safety instructions for Ex applications. These instructions are attached as documents to each instrument with Ex approval and are part of the operating instructions.

Editing status: 2022-10-26

1 About this document

1.1 Function

This instruction provides all the information you need for mounting, connection and setup as well as important instructions for maintenance, fault rectification, the exchange of parts and the safety of the user. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

This operating instructions manual is directed to trained personnel. The contents of this manual must be made available to the qualified personnel and implemented.

1.3 Symbols used



Document ID

This symbol on the front page of this instruction refers to the Document ID. By entering the Document ID on www.vega.com you will reach the document download.



Information, note, tip: This symbol indicates helpful additional information and tips for successful work.



Note: This symbol indicates notes to prevent failures, malfunctions, damage to devices or plants.



Caution: Non-observance of the information marked with this symbol may result in personal injury.



Warning: Non-observance of the information marked with this symbol may result in serious or fatal personal injury.



Danger: Non-observance of the information marked with this symbol results in serious or fatal personal injury.



Ex applications

This symbol indicates special instructions for Ex applications.



List

The dot set in front indicates a list with no implied sequence.



Sequence of actions

Numbers set in front indicate successive steps in a procedure.



Disposal

This symbol indicates special instructions for disposal.

2 For your safety

2.1 Authorised personnel

All operations described in this documentation must be carried out only by trained, qualified personnel authorised by the plant operator.

During work on and with the device, the required personal protective equipment must always be worn.

2.2 Appropriate use

VEGAPULS C 11 is a sensor for continuous level measurement.

You can find detailed information about the area of application in chapter " *Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

2.3 Warning about incorrect use

Inappropriate or incorrect use of this product can give rise to application-specific hazards, e.g. vessel overflow through incorrect mounting or adjustment. Damage to property and persons or environmental contamination can result. Also, the protective characteristics of the instrument can be impaired.

2.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and directives. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument. When measuring aggressive or corrosive media that can cause a dangerous situation if the instrument malfunctions, the operator has to implement suitable measures to make sure the instrument is functioning properly.

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed by the user.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden. For safety reasons, only the accessory specified by the manufacturer must be used.

To avoid any danger, the safety approval markings and safety tips on the device must also be observed.

The low transmitting power of the radar sensor is far below the internationally approved limits. No health impairments are to be expected with intended use. The band range of the measuring frequency can be found in chapter " *Technical data*".

2.5 Mode of operation - Radar signal

Country specific settings for the radar signals are determined via the mode. The operating mode must be set in the operating menu via the respective operating tool at the beginning of the setup.



Caution:

Operating the device without selecting the relevant mode constitutes a violation of the regulations of the radio approvals of the respective country.

2.6 Installation and operation in the USA and Canada

This information is only valid for USA and Canada. Hence the following text is only available in the English language.

Installations in the US shall comply with the relevant requirements of the National Electrical Code (ANSI/NFPA 70).

Installations in Canada shall comply with the relevant requirements of the Canadian Electrical Code.

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- Radar sensor
- Counter nut G1 ¹⁾
- Information sheet "*Documents and software*" with:
 - Instrument serial number
 - QR code with link for direct scanning
- Information sheet "*PINs and Codes*" (with Bluetooth versions) with:
 - Bluetooth access code
- Information sheet "*Access protection*" (with Bluetooth versions) with:
 - Bluetooth access code
 - Emergency Bluetooth unlock code
 - Emergency device code

The further scope of delivery encompasses:

- Documentation
 - Ex-specific "*Safety instructions*" (with Ex versions)
 - Radio licenses
 - If necessary, further certificates



Information:

Optional instrument features are also described in this operating instructions manual. The respective scope of delivery results from the order specification.

Scope of this operating instructions

This operating instructions manual applies to the following instrument versions:

- Hardware version from 1.4.1
- Software version from 1.2.2

¹⁾ With G thread

Constituent parts

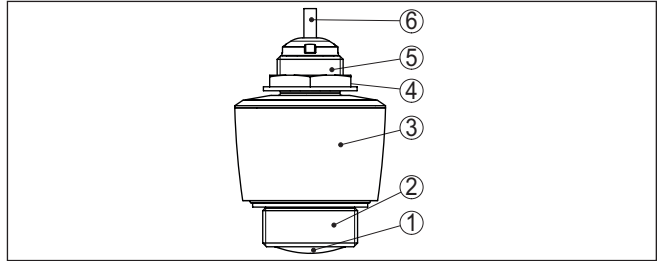


Fig. 1: Components of VEGAPULS C 11

- 1 Radar antenna
- 2 Process fitting
- 3 Electronics housing
- 4 Counter nut
- 5 Mounting thread
- 6 Connection cable

Type label

The type label contains the most important data for identification and use of the instrument.

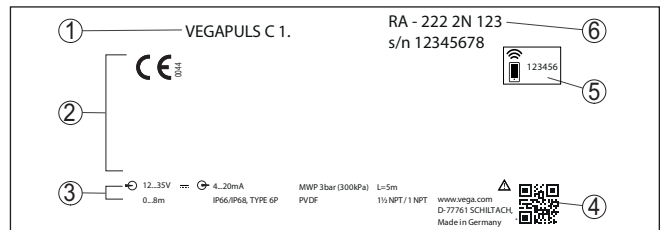


Fig. 2: Layout of the type label (example)

- 1 Instrument type
- 2 Field for approvals
- 3 Technical data
- 4 QR code for device documentation
- 5 Bluetooth access code
- 6 Order number

Documents and software

Move to "www.vega.com" and enter in the search field the serial number of your instrument.

There you can find the following information about the instrument:

- Order data
- Documentation
- Software

Alternatively, you can find all via your smartphone:

- Scan the QR-code on the type label of the device or
- Enter serial number manually in the VEGA Tools app (available free of charge in the respective stores)

Application area

3.2 Principle of operation

VEGAPULS C 11 is a radar sensor for non-contact, continuous level measurement. It is suitable for liquids and solids in practically all industries.

Functional principle

The instrument emits a continuous, frequency-modulated radar signal through its antenna. The emitted signal is reflected by the medium and received by the antenna as an echo with modified frequency. The frequency change is proportional to the distance and is converted into the level.

Wireless adjustment

3.3 Adjustment

Devices with integrated Bluetooth module can be adjusted wirelessly via standard adjustment tools:

- Smartphone/tablet (iOS or Android operating system)
- PC/notebook with Bluetooth USB adapter (Windows operating system)

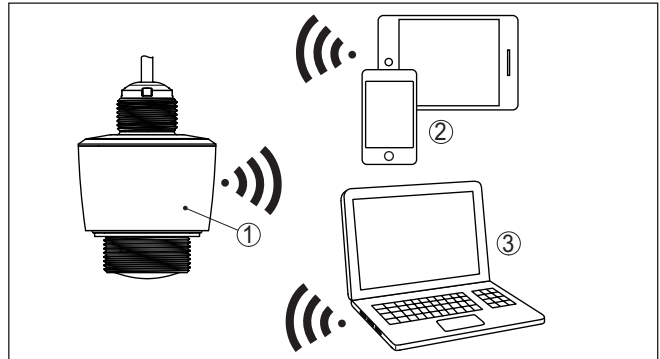


Fig. 3: Wireless connection to standard operating devices with integrated Bluetooth LE

- 1 Sensor
- 2 Smartphone/Tablet
- 3 PC/Notebook

Packaging

3.4 Packaging, transport and storage

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test based on ISO 4180.

The packaging consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

Transport

Transport must be carried out in due consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

Transport inspection	The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.
Storage	<p>Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.</p> <p>Unless otherwise indicated, the packages must be stored only under the following conditions:</p> <ul style="list-style-type: none"> ● Not in the open ● Dry and dust free ● Not exposed to corrosive media ● Protected against solar radiation ● Avoiding mechanical shock and vibration
Storage and transport temperature	<ul style="list-style-type: none"> ● Storage and transport temperature see chapter " <i>Supplement - Technical data - Ambient conditions</i> " ● Relative moisture 20 ... 85 %
3.5 Accessories	
Flanges	Screwed flanges are available in different versions according to the following standards: DIN 2501, EN 1092-1, BS 10, ASME B 16.5, JIS B 2210-1984, GOST 12821-80.
Welded socket, threaded and hygienic adapter	<p>Welded sockets are used to connect the devices to the process.</p> <p>Threaded and hygienic adapters enable simple adaptation of devices with standard threaded fittings to process-side hygiene connections.</p>
Mounting strap	The mounting accessories are used for stable mounting of the device at the measuring point. The parts are available in various versions and sizes.

4 Mounting

4.1 General instructions

Ambient conditions

The instrument is suitable for standard and extended ambient conditions acc. to DIN/EN/IEC/ANSI/ISA/UL/CSA 61010-1. It can be used indoors as well as outdoors.

Process conditions



Note:

For safety reasons, the instrument must only be operated within the permissible process conditions. You can find detailed information on the process conditions in chapter " *Technical data*" of the operating instructions or on the type label.

Hence make sure before mounting that all parts of the instrument exposed to the process are suitable for the existing process conditions.

These are mainly:

- Active measuring component
- Process fitting
- Process seal

Process conditions in particular are:

- Process pressure
- Process temperature
- Chemical properties of the medium
- Abrasion and mechanical influences

4.2 Mounting versions

Mounting bracket

For a rigid mounting, a mounting bracket with opening for thread G1 is recommended. The mounting of the device in the bracket is carried out via the supplied G1 counter nut of plastic. Take note of chapter " *Mounting instructions*" for the recommended distance to the wall.

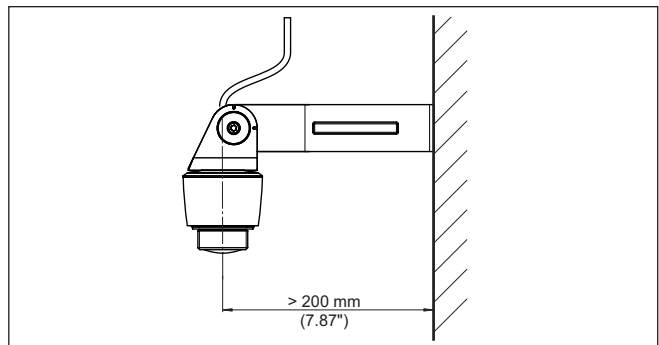


Fig. 4: Mounting via a mounting bracket

4.3 Mounting instructions

Polarisation

Radar sensors for level measurement emit electromagnetic waves. The polarization is the direction of the electrical component of these waves.

The position of the polarisation is in the middle of the type label on the instrument.

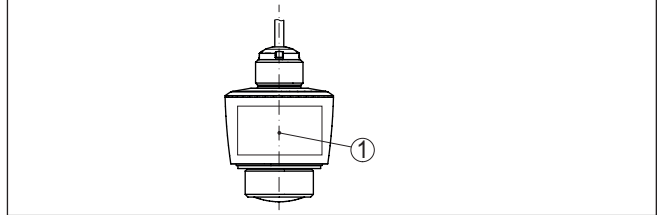


Fig. 5: Position of the polarisation

1 Middle of the type label



Note:

When the device is rotated, the direction of polarization changes and hence the influence of the false echo on the measured value. Please keep this in mind when mounting or making changes later.

Installation position

When mounting the device, keep a distance of at least 200 mm (7.874 in) from the vessel wall. If the device is installed in the center of dished or round vessel tops, multiple echoes can arise. However, these can be suppressed by an appropriate adjustment (see chapter "Setup").

If you cannot maintain this distance, you should carry out a false signal suppression during setup. This applies particularly if buildup on the vessel wall is expected. In such cases, we recommend repeating the false signal suppression at a later date with existing buildup.

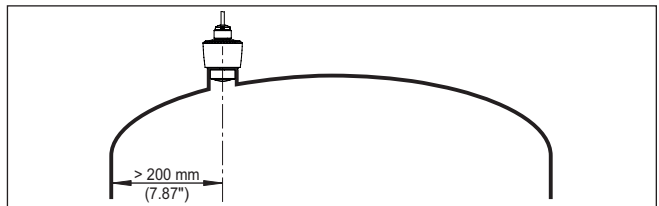


Fig. 6: Mounting of the radar sensor on round vessel tops

In vessels with conical bottom it can be advantageous to mount the device in the centre of the vessel, as measurement is then possible down to the bottom.

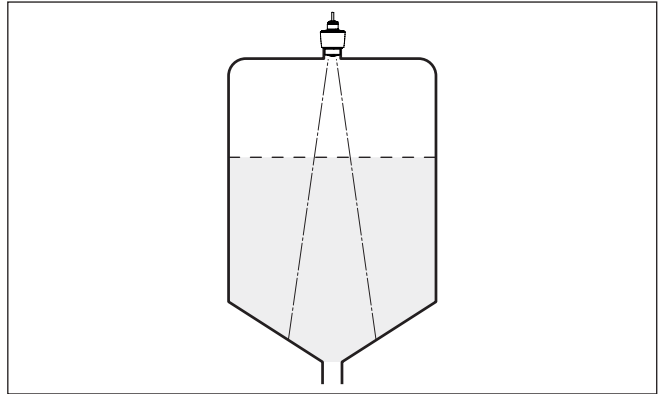


Fig. 7: Mounting of the radar sensor on vessels with conical bottom

Reference plane

The centre of the antenna lens is the beginning of the measuring range and at the same time the reference plane for the min./max. adjustment, see following diagram:

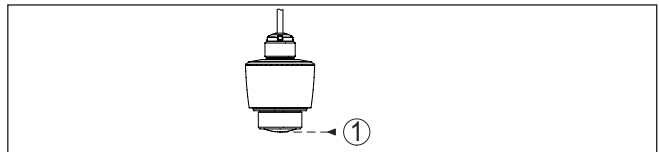


Fig. 8: Reference plane

1 Reference plane

Inflowing medium

Do not mount the instruments in or above the filling stream. Make sure that you detect the medium surface, not the inflowing product.

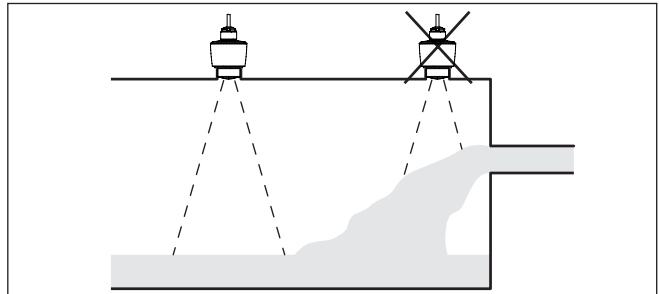


Fig. 9: Mounting of the radar sensor with inflowing medium

Nozzle

For nozzle mounting, the nozzle should be as short as possible and its end rounded. This reduces false reflections from the nozzle.

With threaded socket, the antenna end should protrude at least 5 mm (0.2 in) out of the socket.

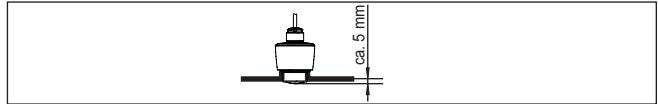


Fig. 10: Recommended threaded socket mounting of VEGAPULS C 11

If the reflective properties of the medium are good, you can mount VEGAPULS C 11 on sockets longer than the antenna. The socket end should be smooth and burr-free, if possible also rounded.



Note:

When mounting on longer nozzles, we recommend carrying out a false signal suppression (see chapter "Parameter adjustment").

You will find recommended values for socket heights in the following illustration or the table. The values come from typical applications. Deviating from the proposed dimensions, also longer sockets are possible, however the local conditions must be taken into account.

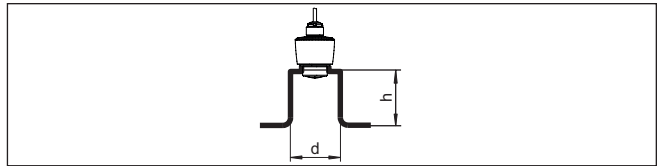


Fig. 11: Socket mounting with deviating socket dimensions

Socket diameter d		Socket length h	
40 mm	1½"	≤ 150 mm	≤ 5.9 in
50 mm	2"	≤ 200 mm	≤ 7.9 in
80 mm	3"	≤ 300 mm	≤ 11.8 in
100 mm	4"	≤ 400 mm	≤ 15.8 in
150 mm	6"	≤ 600 mm	≤ 23.6 in

Vessel installations

The mounting location of the radar sensor should be a place where no other equipment or fixtures cross the path of the radar signals.

Vessel installations, such as e.g. ladders, limit switches, heating spirals, struts, etc., can cause false echoes and impair the useful echo. Make sure when planning your measuring point that the radar sensor has a "clear view" to the measured product.

In case of existing vessel installations, a false signal suppression should be carried out during setup.

If large vessel installations such as struts or supports cause false echoes, these can be attenuated through supplementary measures. Small, inclined sheet metal baffles above the installations "scatter" the radar signals and prevent direct interfering reflections.

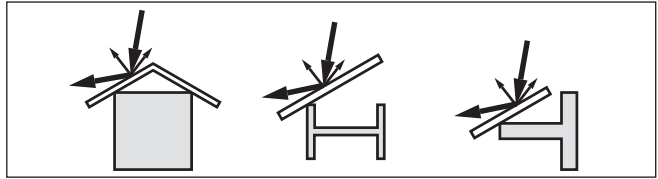


Fig. 12: Cover flat, large-area profiles with deflectors

Alignment - Liquids

In liquids, direct the device as perpendicular as possible to the medium surface to achieve optimum measurement results.

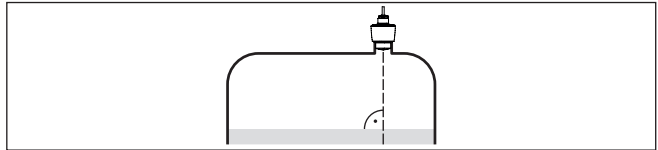


Fig. 13: Alignment in liquids

Orientation - Bulk solids

In order to measure as much of the vessel volume as possible, the device should be aligned so that the radar signal reaches the lowest level in the vessel. In a cylindrical silo with conical outlet, the sensor is mounted anywhere from one third to one half of the vessel radius from the outside wall (see following drawing).

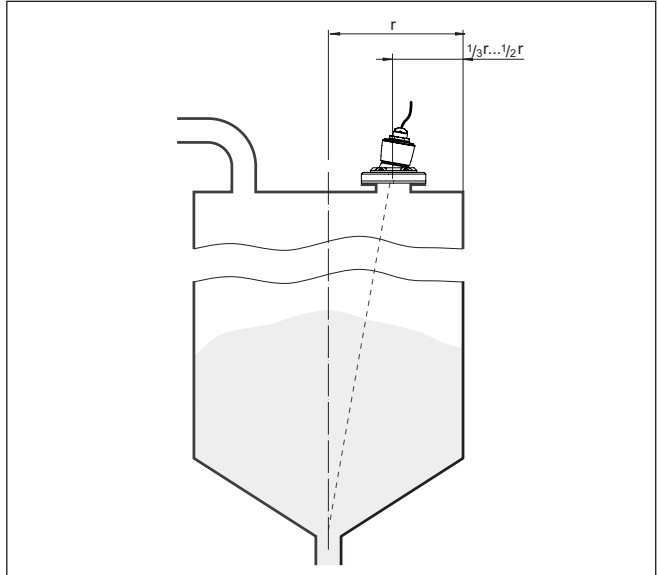


Fig. 14: Mounting position and orientation

Orientation

Due to respective socket design or with an alignment device, the device can be easily aligned to the vessel centre. The necessary angle of inclination depends on the vessel dimensions. It can be easily checked with a suitable bubble tube or mechanic's level on the sensor.

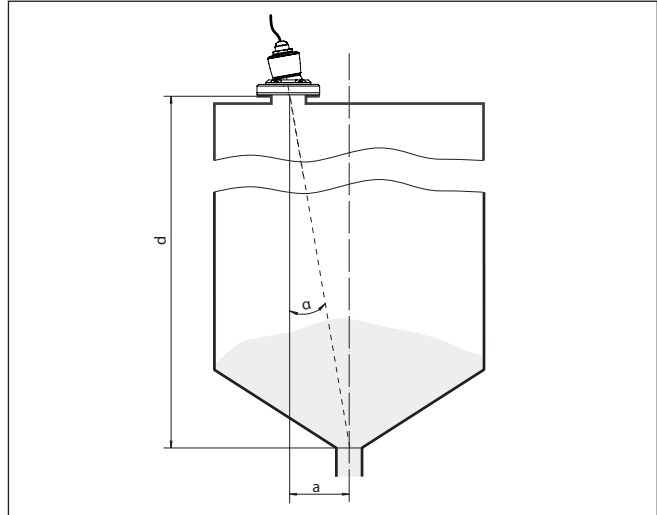


Fig. 15: Proposal for installation after orientation VEGAPULS C 11

The following table shows the necessary angle of inclination. It depends on the measuring distance and the distance "a" between vessel centre and installation position.

Distance d (m)	2°	4°	6°	8°	10°
2	0.1	0.1	0.2	0.3	0.4
4	0.1	0.3	0.4	0.6	0.7
6	0.2	0.4	0.6	0.8	1.1
8	0.3	0.6	0.8	1.1	1.4

Example:

In a vessel 8 m high, the installation position of the sensor is 0.6 m from the vessel centre.

The necessary angle of inclination of 4° can be read out from this table.

Agitators

If there are agitators in the vessel, a false signal suppression should be carried out with the agitators in motion. This ensures that the interfering reflections from the agitators are saved with the blades in different positions.

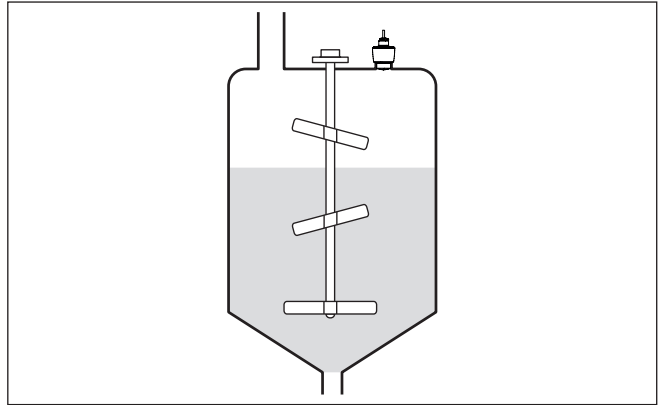


Fig. 16: Agitators

Foam generation

Through the action of filling, stirring and other processes in the vessel, compact foams which considerably damp the emitted signals may form on the medium surface.



Note:

If foams lead to measurement errors, you should use the biggest possible radar antennas or as an alternative, sensors with guided radar.

4.4 Measurement setup - Flow

Mounting

In general, the following must be observed while mounting the device:

- Mounting the sensor on the upstream or inlet side
- Installation in the centre of the flume and vertical to the liquid surface
- Distance to the overfall orifice or Venturi flume
- Distance to the max. height of the orifice or flume for optimum accuracy: > 250 mm (9.843 in)¹⁾
- Requirements from approvals for flow measurement, e.g. MCERTS

Flume

Predefined curves:

A flow measurement with these standard curves is very easy to set up, as no dimensional information of the flume is required.

- Palmer-Bowlus flume ($Q = k \times h^{1.86}$)
- Venturi, trapezoidal weir, rectangular flume ($Q = k \times h^{1.5}$)
- V-Notch, triangular overfall ($Q = k \times h^{2.5}$)

Channel with dimensions according to ISO standard:

When selecting these curves, the dimensions of the flume must be known and entered via the assistant. As a result, the accuracy of the flow measurement is higher than with the specified curves.

²⁾ The value given takes into account the block distance. At smaller distances, the measuring accuracy is reduced, see " Technical data".

- Rectangular flume (ISO 4359)
- Trapezoidal flume (ISO 4359)
- U-shaped flume (ISO 4359)
- Triangular overflow thin-walled (ISO 1438)
- Rectangular flume thin-walled (ISO 1438)
- Rectangular weir broad crown (ISO 3846)

Flow formula:

If the flow formula of your flume is known, you should select this option, as the accuracy of the flow measurement is highest here.

- Flow formula: $Q = k \times h^{\text{exp}}$

Manufacturer definition:

If you use a Parshall flume from the manufacturer ISCO, this option must be selected. This gives you a high accuracy of flow measurement with easy configuration.

Alternatively, you can also take over Q/h table values provided by the manufacturer here.

- ISCO-Parshall-Flume
- Q/h table (assignment of height with corresponding flow in a table)

**Tip:**

Detailed project planning data can be found at the channel manufacturers and in the technical literature.

The following examples serve as an overview for flow measurement.

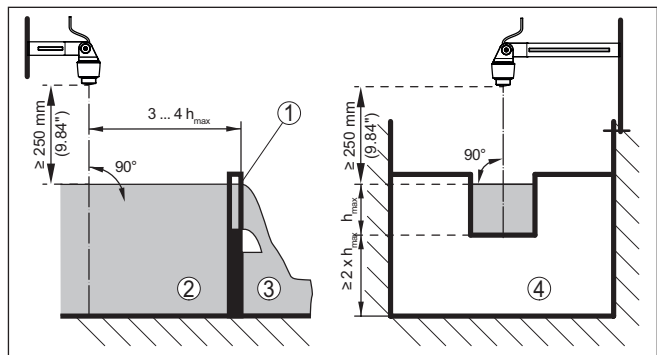
Rectangular overflow

Fig. 17: Flow measurement with rectangular flume: $h_{\text{max.}} = \text{max. filling of the rectangular flume}$

- 1 Overfall orifice (side view)
- 2 Upstream water
- 3 Tailwater
- 4 Overfall orifice (view from tailwater)

Khafagi-Venturi flume

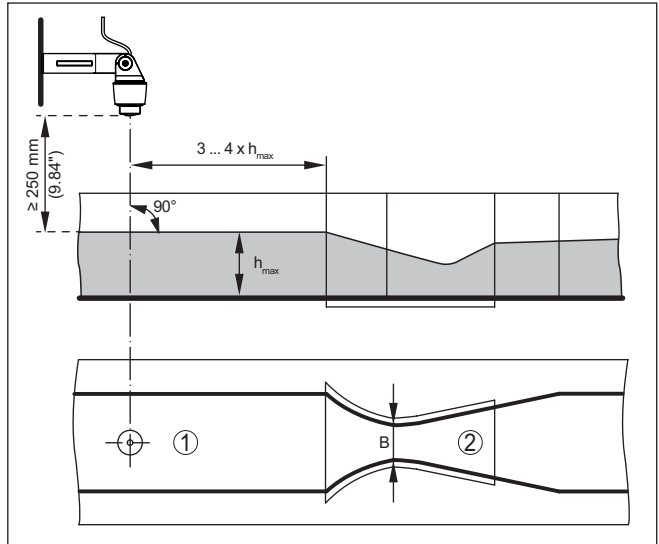


Fig. 18: Flow measurement with Khafagi-Venturi flume: h_{max} = max. filling of the flume; B = tightest constriction in the flume

- 1 Position sensor
- 2 Venturi flume

5 Connecting to power supply

5.1 Preparing the connection

Safety instructions

Always keep in mind the following safety instructions:

- Carry out electrical connection by trained, qualified personnel authorised by the plant operator



Warning:

Only connect or disconnect in de-energized state.

Voltage supply

The data for power supply are specified in chapter " *Technical data*".



Note:

Power the instrument via an energy-limited circuit (power max. 100 W) acc. to IEC 61010-1, e.g.

- Class 2 power supply unit (acc. to UL1310)
- SELV power supply unit (safety extra-low voltage) with suitable internal or external limitation of the output current

Keep in mind the following additional factors that influence the operating voltage:

- Lower output voltage of the power supply unit under nominal load (e.g. with a sensor current of 20.5 mA or 22 mA in case of fault signal)
- Influence of additional instruments in the circuit (see load values in chapter " *Technical data*")

Connection cable

The device is supplied with a fixed connected cable. If an extension is required, a standard two-wire cable can be used.

Wire assignment, connection cable

5.2 Wiring plan



Fig. 19: Wire assignment in permanently connected connection cable

	Wire colour	Function	Polarity
1	Brown	Voltage supply, signal output	Plus (+)
2	Blue	Voltage supply, signal output	Minus (-)

5.3 Switch-on phase

After connection to the power supply, the device carries out a self-test:

- Internal check of the electronics
- Output signal is set to failure

The current measured value is then output on the signal cable.

6 Access protection

6.1 Bluetooth radio interface

Devices with a Bluetooth radio interface are protected against unwanted access from outside. This means that only authorized persons can receive measured and status values and change device settings via this interface.

Bluetooth access code

A Bluetooth access code is required to establish Bluetooth communication via the adjustment tool (smartphone/tablet/notebook). This code must be entered once when Bluetooth communication is established for the first time in the adjustment tool. It is then stored in the adjustment tool and does not have to be entered again.

The Bluetooth access code is individual for each device. It is printed on the device housing with Bluetooth. In addition, it is supplied with the device in the information sheet "*PINs and Codes*". In addition, the Bluetooth access code can be read out via the display and adjustment unit, depending on the device version.

The Bluetooth access code can be changed by the user after the first connection is established. If the Bluetooth access code is entered incorrectly, the new entry is only possible after a waiting period has elapsed. The waiting time increases with each further incorrect entry.

Emergency Bluetooth unlock code

The emergency Bluetooth access code enables Bluetooth communication to be established in the event that the Bluetooth access code is no longer known. It can't be changed. The emergency Bluetooth access code can be found in information sheet "*Access protection*". If this document is lost, the emergency Bluetooth access code can be retrieved from your personal contact person after legitimation. The storage and transmission of Bluetooth access codes is always encrypted (SHA 256 algorithm).

6.2 Protection of the parameterization

The settings (parameters) of the device can be protected against unwanted changes. The parameter protection is deactivated on delivery, all settings can be made.

Device code

To protect the parameterization, the device can be locked by the user with the aid of a freely selectable device code. The settings (parameters) can then only be read out, but not changed. The device code is also stored in the adjustment tool. However, unlike the Bluetooth access code, it must be re-entered for each unlock. When using the adjustment app or DTM, the stored device code is then suggested to the user for unlocking.

Emergency device code

The emergency device code allows unlocking the device in case the device code is no longer known. It can't be changed. The emergency device code can also be found on the supplied information sheet "*Access protection*". If this document is lost, the emergency device code can be retrieved from your personal contact person after legitimation.

The storage and transmission of the device codes is always encrypted (SHA 256 algorithm).

6.3 Storing the codes in myVEGA

If the user has a "myVEGA" account, then the Bluetooth access code as well as the device code are additionally stored in his account under "*PINs and Codes*". This greatly simplifies the use of additional adjustment tools, as all Bluetooth access and device codes are automatically synchronized when connected to the "myVEGA" account

7 Setup with smartphone/tablet (Bluetooth)

7.1 Preparations

System requirements

Make sure that your smartphone/tablet meets the following system requirements:

- Operating system: iOS 8 or newer
- Operating system: Android 5.1 or newer
- Bluetooth 4.0 LE or newer

Download the VEGA Tools app from the "Apple App Store", "Google Play Store" or "Baidu Store" to your smartphone or tablet.

7.2 Connecting

Connecting

Start the adjustment app and select the function "Setup". The smartphone/tablet searches automatically for Bluetooth-capable instruments in the area.

The message "Connecting ..." is displayed.

The devices found are listed and the search is automatically continued.

Select the requested instrument in the device list.

Authenticate

When establishing the connection for the first time, the operating tool and the sensor must authenticate each other. After the first correct authentication, each subsequent connection is made without a new authentication query.

Enter Bluetooth access code

For authentication, enter the 6-digit Bluetooth access code in the next menu window. You can find the code on the outside of the device housing and on the information sheet "Pins and Codes" in the device packaging.

For the very first connection, the adjustment unit and the sensor must authenticate each other.

Bluetooth access code OK

Enter the 6 digit Bluetooth access code of your Bluetooth instrument.

Fig. 20: Enter Bluetooth access code



Note:

If an incorrect code is entered, the code can only be entered again after a delay time. This time gets longer after each incorrect entry.

The message "Waiting for authentication" is displayed on the smartphone/tablet.

Connected

After connection, the sensor adjustment menu is displayed on the respective adjustment tool.

If the Bluetooth connection is interrupted, e.g. due to a too large distance between the two devices, this is displayed on the adjustment tool. The message disappears when the connection is restored.

Change device code

Parameter adjustment of the device is only possible if the parameter protection is deactivated. When delivered, parameter protection is deactivated by default and can be activated at any time.

It is recommended to enter a personal 6-digit device code. To do this, go to menu " *Extended functions*", " *Access protection*", menu item " *Protection of the parameter adjustment*".

7.3 Parameter adjustment

Enter parameters

The sensor adjustment menu is divided into two areas, which are arranged next to each other or one below the other, depending on the adjustment tool.

- Navigation section
- Menu item display

The selected menu item can be recognized by the colour change.

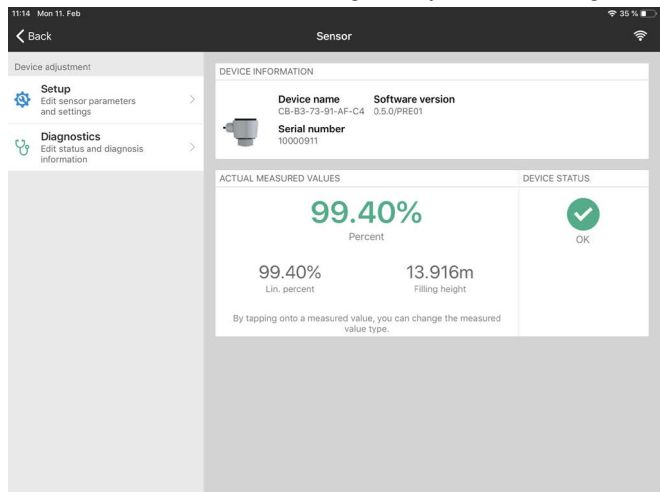


Fig. 21: Example of an app view - Setup measured values

Enter the requested parameters and confirm via the keyboard or the editing field. The settings are then active in the sensor.

Close the app to terminate connection.

8 Setup with PC/notebook (Bluetooth)

8.1 Preparations

System requirements

Make sure that your PC/notebook meets the following system requirements:

- Operating system Windows 10
- DTM Collection 10/2020 or newer
- Bluetooth 4.0 LE or newer

Activate Bluetooth connection

Activate the Bluetooth connection via the project assistant.



Note:

Older systems do not always have an integrated Bluetooth LE. In these cases, a Bluetooth USB adapter is required. Activate the Bluetooth USB adapter using the Project Wizard.

After activating the integrated Bluetooth or the Bluetooth USB adapter, devices with Bluetooth are found and created in the project tree.

8.2 Connecting

Connecting

Select the requested device for the online parameter adjustment in the project tree.

Authenticate

When establishing the connection for the first time, the operating tool and the device must authenticate each other. After the first correct authentication, each subsequent connection is made without a new authentication query.

Enter Bluetooth access code

For authentication, enter in the next menu window the 6-digit Bluetooth access code:

Fig. 22: Enter Bluetooth access code

You can find the code on the outside of the device housing and on the information sheet "PINs and Codes" in the device packaging.



Note:

If an incorrect code is entered, the code can only be entered again after a delay time. This time gets longer after each incorrect entry.

The message "Waiting for authentication" is displayed on the PC/notebook.

Connected

After connection, the device DTM appears.

If the connection is interrupted, e.g. due to a too large distance between device and adjustment tool, this is displayed on the adjustment tool. The message disappears when the connection is restored.

Change device code

Parameter adjustment of the device is only possible if the parameter protection is deactivated. When delivered, parameter protection is deactivated by default and can be activated at any time.

It is recommended to enter a personal 6-digit device code. To do this, go to menu "Extended functions", "Access protection", menu item "Protection of the parameter adjustment".

Prerequisites

8.3 Parameter adjustment

For parameter adjustment of the instrument via a Windows PC, the configuration software PACTware and a suitable instrument driver (DTM) according to FDT standard are required. The latest PACTware version as well as all available DTMs are compiled in a DTM Collection. The DTMs can also be integrated into other frame applications according to FDT standard.

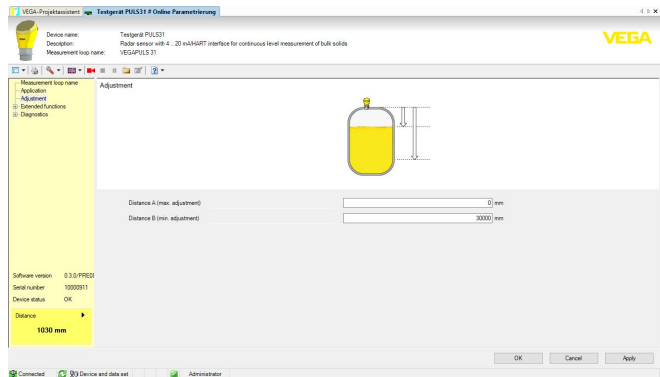


Fig. 23: Example of a DTM view - Setup, sensor adjustment

9 Adjustment menu

9.1 Menu overview

Start image

Device information	Actual measured values	Device status
Device name, software version, serial number	Percent, filling height, distance, measurement reliability, electronics temperature, meas. rate etc.	OK, error indication

Basic functions

Menu item	Selection	Basic settings
Measurement loop name	Alphanumeric characters	Sensor
Medium	Liquid Bulk solid	Liquid
Application liquid	Storage tank, agitator tank, dosing tank, pumping station/pump shaft, rain overflow basin, tank/collection basin, plastic tank (measurement through tank top), mobile plastic tank (IBC), level measurement in waters, flow measurement flume/overflow, demonstration	Storage tank
Application bulk solid	Silo (slim and high), bunker (large volume), stockpile (point measurement/profile detection), crusher, demonstration	Silo (slender and high)
Units	Distance unit of the device Temperature unit of the instrument	Distance in m Temperature in °C
Adjustment	Max. adjustment (distance A) Min. adjustment (distance B)	Max. adjustment 0,000 m Min. adjustment 8,000 m

Extended functions

Menu item	Selection	Basic settings
Damping	Integration time	0 s
Current output	Output characteristics	0 ... 100 % correspond to 4 ... 20 mA
	Current range	3.8 ... 20.5 mA
	Reaction when malfunctions occur	< 3.6 mA
Linearisation	Linearization type	Linear
	Intermediate height	
Scaling	Scaling size	Volume
	Scaling unit	l
	Scaling format	
	100 % correspond to 0 % correspond to	100 l 0 l

Menu item	Selection	Basic settings
Display	Menu language Displayed value Backlight	- Distance On
Access protection	Bluetooth access code	-
	Protection of the parameterization	Deactivated
False signal suppression	Create new, extend, delete, manual entry	-
	Sounded distance to the medium	0 m
Interference behaviour	Last measured value, maintenance message, fault signal	Last measured value
	Time until fault signal	15 s
Reset	Delivery status, basic settings	-
Mode	Mode 1: EU, Albania, Andorra, Azerbaijan, Australia, Belarus, Bosnia and Herzegovina, Canada, Liechtenstein, Moldavia, Monaco, Montenegro, New Zealand, Northern Macedonia, Norway, San Marino, Saudi Arabia, Serbia, Switzerland, Turkey, Ukraine, United Kingdom, USA Mode 2: South Korea, Taiwan, Thailand Mode of operation 3: India, Malaysia, South Africa Mode of operation 4: Russia, Kazakhstan	Mode 1
Status signals	Function check Maintenance required Out of specification	On Off Off

Diagnostics

Menu item	Selection	Basic settings
Status	Device status Parameter modification counter Measured value status Status output Status additional measured values	-
Echo curve	Indication of echo curve	-
Peak indicator	Peak indicator distance, measurement reliability, meas. rate, electronic temperature	-
Measured values	Measured values Additional measured values Outputs	-
Sensor information	Device name, serial number, hardware/software version, device revision, factory calibration date	-
Sensor characteristics	Sensor features from order text	-
Simulation	Measured value Simulation value	-
Measured value memory (DTM)	Indication measured value memory from DTM	

Application

9.2 Description of the applications

This menu item enables you to optimally adapt the sensor to the application, the place of use and the measuring conditions. The adjustment possibilities depend on the selection made under " *Medium*", " *Liquid*" or " *Bulk solid*".

The vessels as well as the measuring and process conditions are described in the following as an overview.

Application - liquid

With " *Liquid*", the applications are based on the following features, to which the measuring characteristic of the sensor is adjusted in particular:

Storage tank

- Vessel:
 - Large volume
 - Upright cylindrical, horizontal round
- Process/measurement conditions:
 - Slow filling and emptying
 - Smooth medium surface
 - Multiple reflections from dished vessel ceiling
 - Condensation

Stirrer vessel

- Vessel:
 - Large agitator blades of metal
 - Installations like flow breakers, heating spirals
 - Nozzle
- Process/measurement conditions:
 - Frequent, fast to slow filling and emptying
 - Strongly agitated surface, foam and strong vortex generation
 - Multiple reflections through dished vessel ceiling
 - Condensation, buildup on the sensor
- Further recommendations
 - False signal suppression when the agitator is running via the operating tool

Dosing vessel

- Vessel:
 - Small vessels
- Process/measurement conditions:
 - Frequent and fast filling/emptying
 - Tight installation situation
 - Multiple reflections through dished vessel ceiling
 - Product buildup, condensate and foam generation

Pumping station/Pump shaft

- Process/measurement conditions:
 - Partly strongly agitated surface
 - Installations such as pumps and ladders
 - Multiple reflections through flat vessel ceiling
 - Dirt and grease deposits on shaft wall and sensor
 - Condensation on the sensor

- Further recommendations
 - False signal suppression via the operating tool

Overflow basin

- Vessel
 - Large volume
 - Partly installed underground
- Process/measurement conditions:
 - Partly strongly agitated surface
 - Multiple reflections through flat vessel ceiling
 - Condensation, dirt deposits on the sensor
 - Flooding of the sensor antenna

Vessel/Collecting basin

- Vessel:
 - Large volume
 - Upright cylindrical or rectangular
- Process/measurement conditions:
 - Slow filling and emptying
 - Smooth medium surface
 - Condensation

Plastic tank (measurement through the vessel top)

- Process/measurement conditions:
 - Measurement through the tank top, if appropriate to the application
 - Condensation on the plastic ceiling
 - In outdoor facilities, water and snow on vessel top possible
- Further recommendations
 - When measuring through the tank ceiling, false signal suppression via the operating tool
 - When measuring through the tank top in outdoor areas protective roof for the measuring point

Transportable plastic tank (IBC)

- Process/measurement conditions:
 - Material and thickness different
 - Measurement through the vessel top, if appropriate to the application
 - Changed reflection conditions as well as jumps in measured values when changing vessels
- Further recommendations
 - When measuring through the tank ceiling, false signal suppression via the operating tool
 - When measuring through the tank top in outdoor areas protective roof for the measuring point

Gauge measurement in waters

- Process/measurement conditions:
 - Slow gauge change
 - Extreme damping of output signal in case of wave generation
 - Ice and condensation on the antenna possible
 - Floating debris sporadically on the water surface

Flow measurement flume/Overfall

- Process/measurement conditions:
 - Slow gauge change
 - Smooth to agitated water surface
 - Measurement often from a short distance with the demand for accurate measurement results
 - Ice and condensation on the antenna possible

Demonstration

- Applications that are not typical level measurements, e.g. device tests
 - Instrument demonstration
 - Object recognition/monitoring
 - Fast position changes of a measuring plate during functional test

Application - bulk solid

With "*Bulk solid*", the applications are based on the following features, to which the measuring characteristic of the sensor is adjusted in particular:

Silo (slender and high)

- Process/measurement conditions:
 - Interfering reflections due to weld seams on the vessel
 - Multiple echoes/diffuse reflections due to unfavourable pouring positions with fine grain
 - Varying pouring positions due to outlet funnel and filling cone
- Further recommendations
 - False signal suppression via the operating tool
 - Alignment of the measurement to the silo outlet

Bunker (large-volume)

- Process/measurement conditions:
 - Large distance to the medium
 - Steep angles of repose, unfavourable pouring positions due to outlet funnel and filling cone
 - Diffuse reflections due to structured vessel walls or internals
 - Multiple echoes/diffuse reflections due to unfavourable pouring positions with fine grain
 - Changing signal conditions when large amounts of material slip off
- Further recommendations
 - False signal suppression via the operating tool

Heap (point measurement/profile detection)

- Process/measurement conditions:
 - Measured value jumps, e.g. through heap profile and traverses
 - Large angles of repose, varying pouring positions
 - Measurement near the filling stream
 - Sensor mounting on movable conveyor belts

Crusher

- Process/measurement conditions:

- Measured value jumps and varying pouring positions, e.g. due to truck filling
- Fast reaction time
- Large distance to the medium
- Interfering reflections from fixtures or protective devices
- Further recommendations
 - False signal suppression via the operating tool

Demonstration

- Applications that are not typical level measurements
 - Instrument demonstration
 - Object recognition/monitoring
 - Measured value verification with higher measuring accuracy with reflection without bulk solids, e.g. via a measuring plate

10 Diagnostics and servicing

10.1 Maintenance

Maintenance

If the device is used properly, no special maintenance is required in normal operation.

Precaution measures against buildup

In some applications, buildup on the antenna system can influence the measuring result. Depending on the sensor and application, take measures to avoid heavy soiling of the antenna system. If necessary, clean the antenna system in certain intervals.

Cleaning

The cleaning helps that the type label and markings on the instrument are visible.

Take note of the following:

- Use only cleaning agents which do not corrode the housings, type label and seals
- Use only cleaning methods corresponding to the housing protection rating

10.2 Rectify faults

Reaction when malfunction occurs

The operator of the system is responsible for taking suitable measures to rectify faults.

Causes of malfunction

The device offers maximum reliability. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Voltage supply
- Signal processing

Fault rectification

The first measures are:

- Evaluation of fault messages
- Checking the output signal
- Treatment of measurement errors

A smartphone/tablet with the adjustment app or a PC/notebook with the software PACTware and the suitable DTM offer you further comprehensive diagnostic possibilities. In many cases, the causes can be determined in this way and the faults eliminated.

Reaction after fault rectification

Depending on the reason for the fault and the measures taken, the steps described in chapter "Setup" must be carried out again or must be checked for plausibility and completeness.

24 hour service hotline

Should these measures not be successful, please call in urgent cases the VEGA service hotline under the phone no. **+49 1805 858550**.

The hotline is also available outside normal working hours, seven days a week around the clock.

Since we offer this service worldwide, the support is provided in English. The service itself is free of charge, the only costs involved are the normal call charges.

10.3 Diagnosis, fault messages

4 ... 20 mA signal

Connect a multimeter in the suitable measuring range according to the wiring plan. The following table describes possible errors in the current signal and helps to eliminate them:

Error	Cause	Rectification
4 ... 20 mA signal not stable	Fluctuating measured value	Set damping
4 ... 20 mA signal missing	Electrical connection faulty	Check connection, correct, if necessary
	Voltage supply missing	Check cables for breaks; repair if necessary
	Operating voltage too low, load resistance too high	Check, adapt if necessary
Current signal greater than 22 mA, less than 3.6 mA	Sensor electronics defective	Replace device or send in for repair depending on device version

10.4 Status messages according to NE 107

The instrument features self-monitoring and diagnostics according to NE 107 and VDI/VDE 2650. In addition to the status messages in the following tables there are more detailed error messages available under the menu item "Diagnostics" via the respective adjustment module.

Status messages

The status messages are divided into the following categories:

- Failure
- Function check
- Out of specification
- Maintenance required

and explained by pictographs:

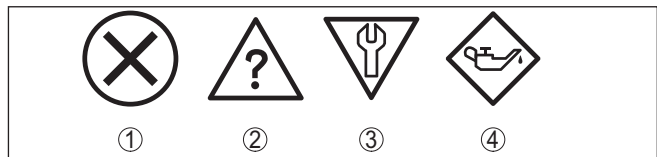


Fig. 24: Pictographs of the status messages

- 1 Failure - red
- 2 Out of specification - yellow
- 3 Function check - orange
- 4 Maintenance required - blue

Malfunction (Failure):

Due to a malfunction in the instrument, a fault signal is output.

This status message is always active. It cannot be deactivated by the user.

Function check:

The instrument is being worked on, the measured value is temporarily invalid (for example during simulation).

This status message is inactive by default.

Out of specification:

The measured value is unreliable because an instrument specification was exceeded (e.g. electronics temperature).

This status message is inactive by default.

Maintenance required:

Due to external influences, the instrument function is limited. The measurement is affected, but the measured value is still valid. Plan in maintenance for the instrument because a failure is expected in the near future (e.g. due to buildup).

This status message is inactive by default.

Failure

Code Text message	Cause	Rectification
F013 no measured value available	No measured value in the switch-on phase or during operation Sensor tilted	Check or correct installation and/or parameter settings Clean the antenna system
F017 Adjustment span too small	Adjustment not within specification	Change adjustment according to the limit values (difference between min. and max. ≥ 10 mm)
F025 Error in the linearization table	Index markers are not continuously rising, for example illogical value pairs	Check linearization table Delete table/Create new
F036 No operable software	Checksum error if software update failed or aborted	Repeat software update Send instrument for repair
F040 Error in the electronics	Limit value exceeded in signal processing Hardware error	Restart instrument Send instrument for repair
F080 General software error	General software error	Restart instrument
F105 Determine measured value	The instrument is still in the switch-on phase, the measured value could not yet be determined	Wait for the end of the switch-on phase Duration up to 3 minutes depending on the measurement environment and parameter settings
F260 Error in the calibration	Checksum error in the calibration values Error in the EEPROM	Send instrument for repair
F261 Error in the instrument settings	Error during setup False signal suppression faulty Error when carrying out a reset	Repeat setup Carry out a reset
F265 Measurement function disturbed	Program sequence of the measuring function disturbed	Device restarts automatically

Function check

Code Text message	Cause	Rectification
C700 Simulation active	A simulation is active	Finish simulation Wait for the automatic end after 60 mins.

Out of specification

Code Text message	Cause	Rectification
S600 Impermissible electronics temperature	Temperature of the electronics in the non-specified range	Check ambient temperature Insulate electronics
S601 Overfilling	Danger of vessel overfilling	Make sure that there is no further filling Check level in the vessel
S603 Impermissible operating voltage	Terminal voltage too small	Check terminal voltage, increase operating voltage

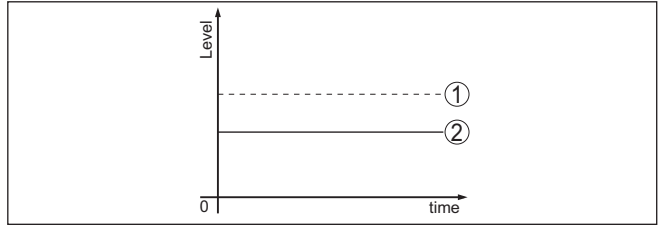
Maintenance

Code Text message	Cause	Rectification
M500 Error in the delivery status	The data could not be restored during the reset to delivery status	Repeat reset Load XML file with sensor data into the sensor
M501 Error in the delivery status	Hardware error EEPROM	Send instrument for repair
M507 Error in the instrument settings	Error during setup Error when carrying out a reset False signal suppression faulty	Carry out reset and repeat setup
M508 No executable Bluetooth software	Checksum error in Bluetooth software	Carry out software update
M509 Software update running	Software update running	Wait until software update is finished
M510 No communication with the main controller	Communication between main electronics and display module disturbed	Check the connection cable to the display Send instrument for repair
M511 Inconsistent software configuration	A software unit requires a software update	Carry out software update

10.5 Treatment of measurement errors

The tables below give typical examples of application-related measurement errors.

The images in column " *Error description*" show the actual level as a dashed line and the output level as a solid line.



- 1 Real level
- 2 Level displayed by the sensor

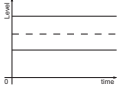
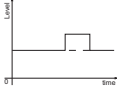


Note:

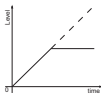
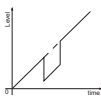
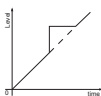
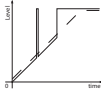
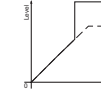
If the output level is constant, the cause could also be the fault setting of the current output to " *Hold value*".

If the level is too low, the reason could be a line resistance that is too high



Liquids: Measurement error at constant level

Fault description	Cause	Rectification
Measured value shows a too low or too high level 	Min./max. adjustment not correct	Adapt min./max. adjustment
	Incorrect linearization curve	Adapt linearization curve
Measured value jumps towards 100 % 	Due to the process, the amplitude of the level echo sinks A false signal suppression was not carried out	Carry out a false signal suppression Determine the reason for the changed false signals, carry out false signal suppression, e.g. with condensation.
	Amplitude or position of a false signal has changed (e.g. condensation, build-up); false signal suppression no longer matches actual conditions	

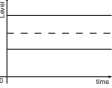
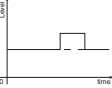
Liquids: Measurement error during filling

Fault description	Cause	Rectification
<p>Measured value remains unchanged during filling</p> 	<p>False signals in the close range too big or level echo too small</p> <p>Strong foam or vortex generation</p> <p>Max. adjustment not correct</p>	<p>Eliminate false signals in the close range</p> <p>Check measuring point: Antenna should protrude out of the threaded mounting socket, possible false echoes through flange socket?</p> <p>Remove contamination on the antenna</p> <p>In case of interferences due to installations in the close range, change polarisation direction</p> <p>Create a new false signal suppression</p> <p>Adapt max. adjustment</p>
<p>Measured value jumps towards 0 % during filling</p> 	<p>The level echo cannot be distinguished from the false signal at a false signal position (jumps to multiple echo)</p>	<p>In case of interferences due to installations in the close range: Change polarisation direction</p> <p>Chose a more suitable installation position</p>
<p>Measured value jumps towards 100 % during filling</p> 	<p>Due to strong turbulence and foam generation during filling, the amplitude of the level echo sinks. Measured value jumps to false signal</p>	<p>Carry out a false signal suppression</p>
<p>Measured value jumps sporadically to 100 % during filling</p> 	<p>Varying condensation or contamination on the antenna</p>	<p>Carry out a false signal suppression or increase false signal suppression with condensation/contamination in the close range by editing</p>
<p>Measured value jumps to $\geq 100\%$ or 0 m distance</p> 	<p>Level echo is no longer detected in the close range due to foam generation or false signals in the close range. The sensor goes into overflow protection mode. The max. level (0 m distance) as well as the status message "Overflow protection" are output.</p>	<p>Check measuring point: Antenna should protrude out of the threaded mounting socket, possible false echoes through flange socket?</p> <p>Remove contamination on the antenna</p>


Liquids: Measurement error during emptying

Fault description	Cause	Rectification
Measured value remains unchanged in the close range during emptying 	False signal larger than the level echo Level echo too small	Check measuring point: Antenna should protrude out of the threaded mounting socket, possible false echoes through flange socket? Remove contamination on the antenna In case of interferences due to installations in the close range: Change polarisation direction After eliminating the false signals, the false signal suppression must be deleted. Carry out a new false signal suppression
Measured value jumps sporadically towards 100 % during emptying 	Varying condensation or contamination on the antenna	Carry out false signal suppression or increase false signal suppression in the close range by editing With bulk solids, use radar sensor with purging air connection

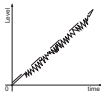
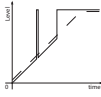
Bulk solids: Measurement error at constant level

Fault description	Cause	Rectification
Measured value shows a too low or too high level 	Min./max. adjustment not correct	Adapt min./max. adjustment
	Incorrect linearization curve	Adapt linearization curve
Measured value jumps towards 100 % 	Due to the process, the amplitude of the product echo decreases A false signal suppression was not carried out	Carry out a false signal suppression
	Amplitude or position of a false signal has changed (e.g. condensation, build-up); false signal suppression no longer matches actual conditions	Determine the reason for the changed false signals, carry out false signal suppression, e.g. with condensation.


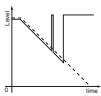
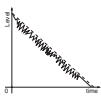
Bulk solids: Measurement error during filling

Fault description	Cause	Rectification
Measured value jumps towards 0 % during filling 	The level echo cannot be distinguished from the false signal at a false signal position (jumps to multiple echo)	Remove/reduce false signal: minimize interfering installations by changing the polarization direction Chose a more suitable installation position
	Transverse reflection from an extraction funnel, amplitude of the transverse reflection larger than the level echo	Direct sensor to the opposite funnel wall, avoid crossing with the filling stream

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Fault description	Cause	Rectification
Measured value fluctuates around 10 ... 20 % 	Various echoes from an uneven medium surface, e.g. a material cone	Check parameter "Material Type" and adapt, if necessary Optimize installation position and sensor orientation
	Reflections from the medium surface via the vessel wall (deflection)	Select a more suitable installation position, optimize sensor orientation, e.g. with a swivelling holder
Measured value jumps sporadically to 100 % during filling 	Changing condensation or contamination on the antenna	Carry out a false signal suppression or increase false signal suppression with condensation/contamination in the close range by editing

Bulk solids: Measurement error during emptying

Fault description	Cause	Rectification
Measured value remains unchanged in the close range during emptying 	False signal greater than level echo or level echo too small	Eliminate false signals in the close range. Check: Antenna must protrude out of the nozzle Remove contamination on the antenna Minimize interfering installations in the close range by changing the polarization direction After eliminating the false signals, the false signal suppression must be deleted. Carry out a new false signal suppression
Measured value jumps sporadically towards 100 % during emptying 	Changing condensation or contamination on the antenna	Carry out false signal suppression or increase false signal suppression in the close range by editing
Measured value fluctuates around 10 ... 20 % 	Various echoes from an uneven medium surface, e.g. an extraction funnel	Check parameter "Material Type" and adapt, if necessary
	Reflections from the medium surface via the vessel wall (deflection)	Optimize installation position and sensor orientation

10.6 Software update

The device software is updated via Bluetooth.

The following components are required:

- Instrument
- Voltage supply
- PC/notebook with PACTware/DTM and Bluetooth USB adapter

- Current instrument software as file

You can find the current instrument software as well as detailed information on the procedure in the download area of our homepage.

**Caution:**

Instruments with approvals can be bound to certain software versions. Therefore make sure that the approval is still effective after a software update is carried out.

You can find detailed information in the download area on our homepage.

10.7 How to proceed if a repair is necessary

You can find an instrument return form as well as detailed information about the procedure in the download area of our homepage. By doing this you help us carry out the repair quickly and without having to call back for needed information.

Proceed as follows in case of repair:

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and, if need be, also a safety data sheet outside on the packaging
- Ask the agency serving you to get the address for the return shipment. You can find the agency on our homepage.

11 Dismount

11.1 Dismounting steps

To remove the device, carry out the steps in chapters "*Mounting*" and "*Connecting to power supply*" in reverse.



Warning:

When dismantling, pay attention to the process conditions in vessels or pipelines. There is a risk of injury, e.g. due to high pressures or temperatures as well as aggressive or toxic media. Avoid this by taking appropriate protective measures.

11.2 Disposal



Pass the instrument on to a specialised recycling company and do not use the municipal collecting points.

Remove any batteries in advance, if they can be removed from the device, and dispose of them separately.

If personal data is stored on the old device to be disposed of, delete it before disposal.

If you have no way to dispose of the old instrument properly, please contact us concerning return and disposal.

12 Certificates and approvals

12.1 Radio licenses

Radars

The device has been tested and approved in accordance with the current edition of the applicable country-specific norms or standards.

Regulations for use can be found in the document "*Regulations for radar level measuring instruments with radio licenses*" on our homepage.

Bluetooth

The Bluetooth radio module in the device has been tested and approved according to the current edition of the applicable country-specific norms or standards.

The confirmations as well as regulations for use can be found in the document "*Radio licenses*" supplied or on our homepage.

12.2 Conformity

The device complies with the legal requirements of the applicable country-specific directives or technical regulations. We confirm conformity with the corresponding labelling.

The corresponding conformity declarations can be found on our homepage.

12.3 NAMUR recommendations

NAMUR is the automation technology user association in the process industry in Germany. The published NAMUR recommendations are accepted as the standard in field instrumentation.

The device fulfils the requirements of the following NAMUR recommendations:

- NE 21 – Electromagnetic compatibility of equipment
- NE 43 – Signal level for fault information from measuring transducers
- NE 53 – Compatibility of field devices and display/adjustment components
- NE 107 – Self-monitoring and diagnosis of field devices

For further information see www.namur.de.

12.4 Environment management system

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Help us to meet these requirements and observe the environmental instructions in the chapters "*Packaging, transport and storage*", "*Disposal*" of this operating instructions.

13 Supplement

13.1 Technical data

Note for approved instruments

The technical data in the respective safety instructions which are included in delivery are valid for approved instruments (e.g. with Ex approval). These data can differ from the data listed herein, for example regarding the process conditions or the voltage supply.

All approval documents can be downloaded from our homepage.

Materials and weights

Materials, wetted parts

– Antenna, process fitting	PVDF
– Counter nut ¹⁾	PP
– Process seal	FKM ¹⁾

Materials, non-wetted parts

– Housing	PVDF
– Cable entry seal	NBR
– Connection cable	PVC

Weight

– Instrument	0.7 kg (1.543 lbs)
– Connection cable	0.1 kg/m

Process fitting Thread G1½, R1½, 1½ NPT

Mounting connection Thread G1, R1, 1 NPT

Max. torque mounting boss 7 Nm (5.163 lbf ft)

Torques

Torque counter nut max. 7 Nm (5.163 lbf ft)

Input variable

Measured variable The measured variable is the distance between the antenna edge of the sensor and the medium surface. The antenna edge is also the reference plane for the measurement.

³⁾ G type threaded connections only

⁴⁾ G type threaded connections only

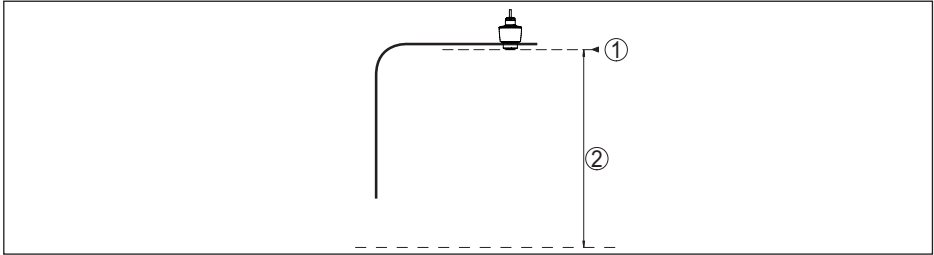


Fig. 25: Data of the input variable

- 1 Reference plane
- 2 Measured variable, max. measuring range

Max. measuring range ¹⁾	8 m (26.25 ft)
Recommended measuring range ¹⁾	up to 5 m (16.4 ft)
Min. dielectric constant of the medium ¹⁾	$\epsilon_r \geq 1.6$
blocking distance ¹⁾	
– Modes 1, 2, 4	0 mm (0 in)
– Mode 3	≥ 250 mm (9.843 in)

Switch-on phase

Run-up time for $U_B = 12$ V DC, 18 V DC, 24 V DC < 15 s

Starting current for run-up time ≤ 3.6 mA

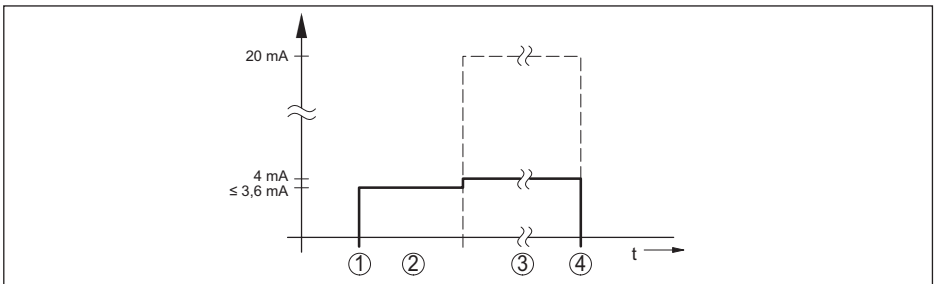


Fig. 26: Run-up time and measured value output

- 1 U_B On
- 2 Run-up time
- 3 Measured value output
- 4 U_B Off

Power consumption

⁵⁾ Depending on application and medium
⁶⁾ With bulk solids
⁷⁾ Depending on application and medium
⁸⁾ Depending on the operating conditions

Sensor current	Operating voltage		
	12 V DC	18 V DC	24 V DC
≤ 3.6 mA	< 45 mW	< 65 mW	< 90 mW
4 mA	< 50 mW	< 75 mW	< 100 mW
20 mA	< 245 mW	< 370 mW	< 485 mW

Output variable

Output signal	4 ... 20 mA
Range of the output signal	3.8 ... 20.5 mA (default setting)
Signal resolution	0.3 μ A
Resolution, digital	1 mm (0.039 in)
Fault signal, current output (adjustable)	≤ 3.6 mA, ≥ 21 mA, last valid measured value
Max. output current	22 mA
Load	See load resistance under Power supply
Starting current	≤ 3.6 mA; ≤ 10 mA for 5 ms after switching on
Damping (63 % of the input variable), adjustable	0 ... 999 s

Deviation (according to DIN EN 60770-1)

Process reference conditions according to DIN EN 61298-1

- Temperature +18 ... +30 °C (+64 ... +86 °F)
- Relative humidity 45 ... 75 %
- Air pressure 860 ... 1060 mbar/86 ... 106 kPa (12.5 ... 15.4 psig)

Installation reference conditions

- Distance to installations > 200 mm (7.874 in)
- Reflector Flat plate reflector
- False reflections Biggest false signal, 20 dB smaller than the useful signal

Deviation with liquids ≤ 5 mm (meas. distance > 0.25 m/0.8202 ft)

Non-repeatability ¹⁾ ≤ 5 mm

Deviation with bulk solids The values depend to a great extent on the application. Binding specifications are thus not possible.

⁹⁾ Already included in the meas. deviation.

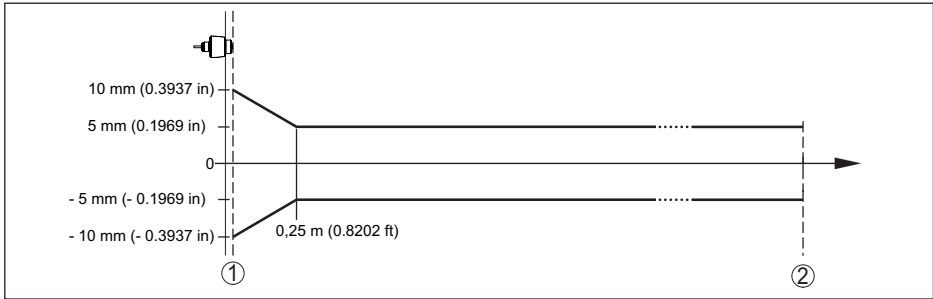


Fig. 27: Deviation under reference conditions ¹⁾

1 Antenna edge, reference plane

2 Recommended measuring range

Variables influencing measurement accuracy ¹⁾

Specifications apply to the digital measured value

Temperature drift - Digital value < 3 mm/10 K, max. 5 mm

Specifications apply also to the current output

Temperature drift - Current output < 0.03 %/10 K or max. 0.3 % relating to the 16.7 mA span

Deviation in the current output due to digital/analogue conversion < 15 µA

Additional measurement deviation through electromagnetic interference

- According to NAMUR NE 21 < 80 µA
- According to EN 61326-1 None
- According to IACS E10 (shipbuilding)/ IEC 60945 < 250 µA

Characteristics and performance data

Measuring frequency W-band (80 GHz technology)

Measuring cycle time ¹⁾ ≤ 250 ms

Step response time ¹⁾ ≤ 3 s

Beam angle ¹⁾ 8°

Emitted HF power (depending on the parameter setting) ¹⁾

- Average spectral transmission power density -3 dBm/MHz EIRP
- Max. spectral transmission power density +34 dBm/50 MHz EIRP

¹⁰⁾ In case of deviations from reference conditions, the offset due to installation can be up to ± 4 mm. This offset can be compensated by the adjustment.

¹¹⁾ Determination of the temperature drift acc. to the limit point method

¹²⁾ With operating voltage $U_B \geq 24$ V DC

¹³⁾ Time span after a sudden distance change from 1 m to 5 m until the output signal reaches 90 % of the final value for the first time (IEC 61298-2). Valid with operating voltage $U_B \geq 24$ V DC.

¹⁴⁾ Outside the specified beam angle, the energy level of the radar signal is 50% (-3 dB) less.

¹⁵⁾ EIRP: Equivalent Isotropic Radiated Power

- Max. power density at a distance of 1 m < 3 $\mu\text{W}/\text{cm}^2$

Ambient conditions

Ambient temperature	-40 ... +60 °C (-40 ... +140 °F)
Storage and transport temperature	-40 ... +80 °C (-40 ... +176 °F)

Mechanical environmental conditions

Vibrations (oscillations)	Class 4M8 acc. to IEC 60271-3-4 (5 g at 4 ... 200 Hz)
Impacts (mechanical shock)	Class 6M4 acc. to IEC 60271-3-6 (50 g, 2.3 ms)
Impact resistance	IK07 acc. to IEC 62262

Process conditions

For the process conditions, please also note the specifications on the type label. The lowest value (amount) always applies.

Process temperature	-40 ... +60 °C (-40 ... +140 °F)
Process pressure	-1 ... 3 bar (-100 ... 200 kPa/-14.5 ... 43.51 psig)

Electromechanical data

Cable entry	Fixed connection
Connection cable	
– Configuration	Cores, sheathing
– Length	10 m (32.81 ft)
– Wire cross-section	0.5 mm ² (AWG 20)
– Min. bending radius (at 25 °C/77 °F)	25 mm (0.984 in)
– Diameter	approx. 8 mm (0.315 in)
– Wire isolating and cable cover	PVC (UV resistant)
– Colour	Black

Bluetooth interface

Bluetooth standard	Bluetooth 5.0
Frequency	2.402 ... 2.480 GHz
Max. emitted power	+2.2 dBm
Max. number of participants	1
Effective range typ. ¹⁾	25 m (82 ft)

Adjustment

PC/Notebook	PACTware/DTM
Smartphone/Tablet	Adjustment app

Voltage supply

Operating voltage U_B	
– at 4 mA	12 ... 35 V DC

¹⁶⁾ Depending on the local conditions

- at 20 mA	9 ... 35 V DC
Reverse voltage protection	Integrated
Permissible residual ripple	
- for 12 V < U _B < 18 V	≤ 0.7 V _{eff} (16 ... 400 Hz)
- for 18 V < U _B < 35 V	≤ 1 V _{eff} (16 ... 400 Hz)
Load resistor	
- Calculation	(U _B - U _{min})/0.022 A
- Example - with U _B = 24 V DC	(24 V - 12 V)/0.022 A = 545 Ω

Overvoltage protection

Dielectric strength against metallic mounting parts	> 10 kV
Overvoltage resistance (test impulse voltages 1.2/50 μs at 42 Ω)	> 1000 V
Additional overvoltage arrester	Due to the floating structure of the electronics and comprehensive insulation measures generally not necessary.

Electrical protective measures

Potential separation	Electronics potential free up to 500 V AC
Protection rating	IP66/IP68 (3 bar, 24 h) acc. to IEC 60529, Type 6P acc. to UL 50
Altitude above sea level	5000 m (16404 ft)
Protection class	III
Pollution degree	4

13.2 Dimensions

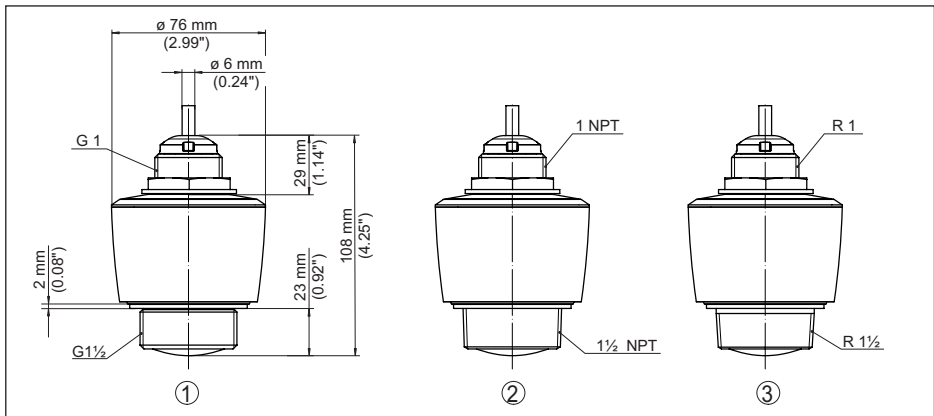


Fig. 28: Dimensions VEGAPULS C 11

- 1 Thread G1½
- 2 Thread 1½ NPT
- 3 Thread R1½

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13.3 Industrial property rights

VEGA product lines are global protected by industrial property rights. Further information see www.vega.com.

VEGA Produktfamilien sind weltweit geschützt durch gewerbliche Schutzrechte.

Nähere Informationen unter www.vega.com.

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进一步信息请参见网站 < www.vega.com。

13.4 Licensing information for open source software

Open source software components are also used in this device. A documentation of these components with the respective license type, the associated license texts, copyright notes and disclaimers can be found on our homepage.

13.5 Trademark

All the brands as well as trade and company names used are property of their lawful proprietor/originator.



Printing date:

VEGA

All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.

Subject to change without prior notice

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Operating Instructions

Capacitive level switch

VEGAPOINT 11

Transistor with IO-Link



Document ID: 63008



VEGA

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1 About this document

1.1 Function

This instruction provides all the information you need for mounting, connection and setup as well as important instructions for maintenance, fault rectification, the exchange of parts and the safety of the user. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

This operating instructions manual is directed to trained personnel. The contents of this manual must be made available to the qualified personnel and implemented.

1.3 Symbols used



Document ID

This symbol on the front page of this instruction refers to the Document ID. By entering the Document ID on www.vega.com you will reach the document download.



Information, note, tip: This symbol indicates helpful additional information and tips for successful work.



Note: This symbol indicates notes to prevent failures, malfunctions, damage to devices or plants.



Caution: Non-observance of the information marked with this symbol may result in personal injury.



Warning: Non-observance of the information marked with this symbol may result in serious or fatal personal injury.



Danger: Non-observance of the information marked with this symbol results in serious or fatal personal injury.



Ex applications

This symbol indicates special instructions for Ex applications.



List

The dot set in front indicates a list with no implied sequence.



Sequence of actions

Numbers set in front indicate successive steps in a procedure.



Disposal

This symbol indicates special instructions for disposal.

2 For your safety

2.1 Authorised personnel

All operations described in this documentation must be carried out only by trained, qualified personnel authorised by the plant operator.

During work on and with the device, the required personal protective equipment must always be worn.

2.2 Appropriate use

The VEGAPOINT 11 is a sensor for point level detection.

You can find detailed information about the area of application in chapter " *Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

2.3 Warning about incorrect use

Inappropriate or incorrect use of this product can give rise to application-specific hazards, e.g. vessel overfill through incorrect mounting or adjustment. Damage to property and persons or environmental contamination can result. Also, the protective characteristics of the instrument can be impaired.

2.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and directives. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument. When measuring aggressive or corrosive media that can cause a dangerous situation if the instrument malfunctions, the operator has to implement suitable measures to make sure the instrument is functioning properly.

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed by the user.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden. For safety reasons, only the accessory specified by the manufacturer must be used.

To avoid any danger, the safety approval markings and safety tips on the device must also be observed.

2.5 Installation and operation in the USA and Canada

This information is only valid for USA and Canada. Hence the following text is only available in the English language.

Installations in the US shall comply with the relevant requirements of the National Electrical Code (ANSI/NFPA 70).

Installations in Canada shall comply with the relevant requirements of the Canadian Electrical Code

A Class 2 power supply unit has to be used for the installation in the USA and Canada.

3 Product description

3.1 Configuration

Scope of delivery

The scope of delivery encompasses:

- VEGAPOINT 11 point level switch
- Information sheet "Documents and software" with:
 - Instrument serial number
 - QR code with link for direct scanning



Information:

Optional instrument features are also described in this operating instructions manual. The respective scope of delivery results from the order specification.

Scope of this operating instructions

This operating instructions manual applies to the following instrument versions:

- Hardware version from 1.0.1
- Software version from 1.2.5

Constituent parts

The VEGAPOINT 11 consists of the components:

- Housing with integrated electronics
- Process fitting
- Plug

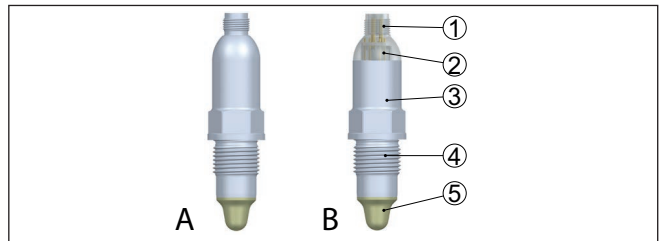


Fig. 1: VEGAPOINT 11

- A Device version with full metal housing 316L
- B Device version with housing 316L and plastic
- 1 Plug connection
- 2 360° status indication
- 3 Instrument housing
- 4 Process fitting
- 5 Sensor

Type label

You will find the type plate on the sensor housing.

The type label contains the most important data for identification and use of the instrument.

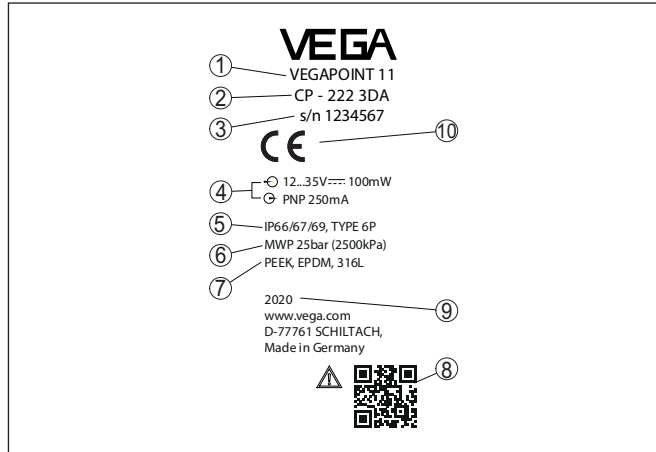


Fig. 2: Layout of the type label (example)

- 1 Order number
- 2 Product name
- 3 Serial number
- 4 Voltage supply and signal output
- 5 Protection rating
- 6 Permissible process pressure
- 7 Material wetted parts
- 8 QR code for device documentation
- 9 Fabrication year
- 10 Approvals

Documents and software Move to "www.vega.com" and enter in the search field the serial number of your instrument.

There you can find the following information about the instrument:

- Order data
- Documentation
- Software

Alternatively, you can find all via your smartphone:

- Scan the QR-code on the type label of the device or
- Enter serial number manually in the VEGA Tools app (available free of charge in the respective stores)

3.2 Principle of operation

Application area

The VEGAPOINT 11 is a capacitive point level sensor for point level detection

It is designed for industrial use in all areas of process technology and can be used in water-based liquids.

Typical applications are overfill and dry run protection. With a the small sensor unit, VEGAPOINT 11 can be also mounted e.g. in thin pipelines. The sensor allows use in vessels, tanks and pipes. Thanks

to its simple and robust measuring system, VEGAPOINT 11 is virtually unaffected by the chemical and physical properties of the medium. It functions even under difficult conditions such as turbulence, air bubbles, buildup, strong external vibration or changing products.

If a malfunction is detected or in case of voltage supply, the electronics takes on a defined switching status, i.e. the output is open (safe state).

Functional principle

An alternating electric field is generated at the tip of the measuring electrode. If the sensor is covered with medium, the resonance frequency changes. This change is detected by the electronics and converted into a switching command.

Buildup is ignored to a certain degree and therefore has no influence on the measurement.

3.3 Adjustment

The switching status of VEGAPOINT 11 can be checked from outside (360° status indication).



Note:

The LED illuminated ring is not available for device versions with full metal housing.

3.4 Packaging, transport and storage

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test based on ISO 4180.

The packaging consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE foil is also used. Dispose of the packaging material via specialised recycling companies.

Transport

Transport must be carried out in due consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

Transport inspection

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

Storage

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

Storage and transport temperature

- Storage and transport temperature see chapter " *Supplement - Technical data - Ambient conditions*"
- Relative moisture 20 ... 85 %

3.5 Accessories

The instructions for the listed accessories can be found in the download area on our homepage.

Threaded and hygienic socket

Various threaded and hygienic sockets are available for devices with threaded version.

You can find further information in chapter " *Technical Data*".

4 Mounting

4.1 General instructions

Ambient conditions

The instrument is suitable for standard and extended ambient conditions acc. to DIN/EN/IEC/ANSI/ISA/UL/CSA 61010-1. It can be used indoors as well as outdoors.

Process conditions



Note:

For safety reasons, the instrument must only be operated within the permissible process conditions. You can find detailed information on the process conditions in chapter " *Technical data* " of the operating instructions or on the type label.

Hence make sure before mounting that all parts of the instrument exposed to the process are suitable for the existing process conditions.

These are mainly:

- Active measuring component
- Process fitting
- Process seal

Process conditions in particular are:

- Process pressure
- Process temperature
- Chemical properties of the medium
- Abrasion and mechanical influences

Switching point

The VEGAPOINT 11 can be mounted in any position. The instrument must be mounted in such a way that the sensor is at the height of the requested switching point.

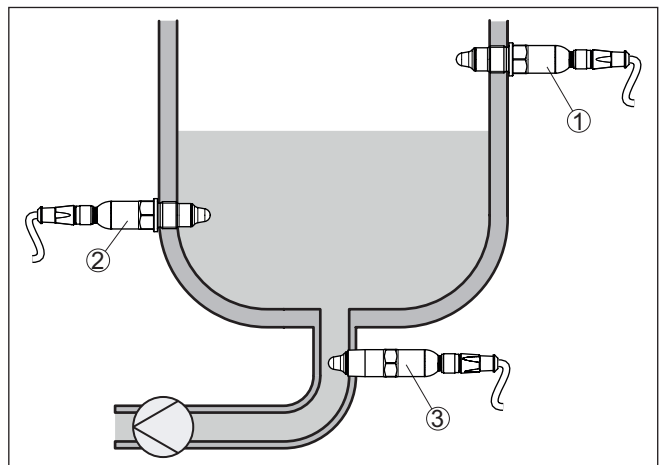


Fig. 3: Installation examples

- 1 Upper level detection (max.) as overflow protection
- 2 Lower level detection (min.) as dry run protection
- 3 Dry run protection (min.) for a pump

Note that the switching point varies depending on the type of medium and the mounting position of the sensor.

Protection against moisture

Protect your instrument against moisture ingress through the following measures:

- Firmly tighten the plug connector
- Lead the connection cable downwards in front of the plug connector

This applies mainly to outdoor installations, in areas where high humidity is expected (e.g. through cleaning processes) and on cooled or heated vessels.

Handling

The level switch is a measuring device for stationary screw mounting and must be treated accordingly. Damage to the measuring tip will destroy the instrument.

Use the hexagon above the thread for screwing in.

After mounting, make sure that the process fitting is screwed in correctly and thus securely seals even at maximum process pressure.

Adhesive products

4.2 Mounting instructions

In adhesive and viscous media, the surfaces of the sensor should protrude into the vessel to avoid buildup. Therefore mounting bosses should not exceed a certain length.

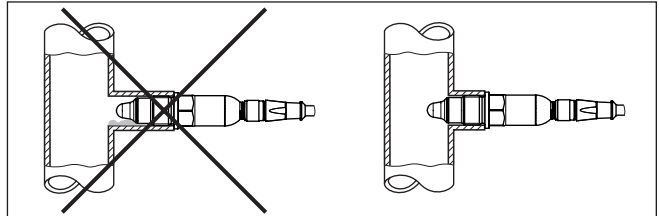


Fig. 4: Adhesive products

In horizontal pipelines, avoid mounting in the upper or lower area of the pipe.

In the upper part of the pipe cavities can form due to air inclusions.

Solids can settle in the lower pipe area. Both can lead to measurement errors.

In horizontal pipelines, lateral installation is therefore recommended.

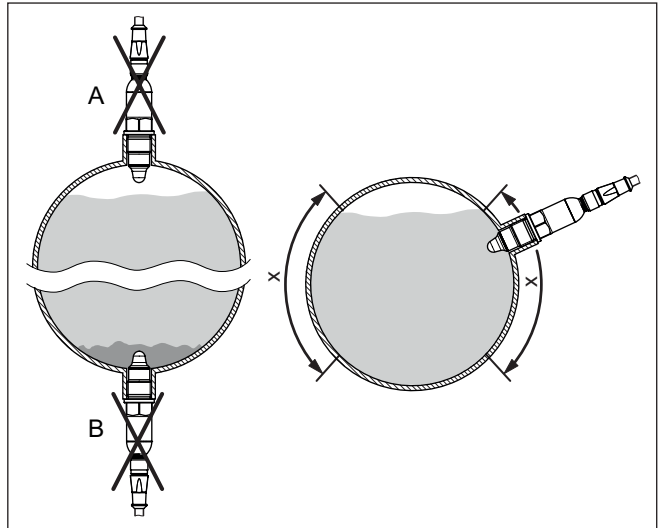


Fig. 5: Installation in horizontal pipelines

x Recommended mounting area

A Not recommended - danger of air inclusions

B Not recommended - Danger of buildup

Inflowing medium

If VEGAPOINT 11 is mounted in the filling stream, unwanted false measurement signals can be generated. For this reason, mount VEGAPOINT 11 at a position in the vessel where no disturbances, e.g. from filling openings, agitators, etc., can occur.

5 Connecting to power supply

5.1 Preparing the connection

Safety instructions

Always keep in mind the following safety instructions:

- Carry out electrical connection by trained, qualified personnel authorised by the plant operator
- If overvoltage surges are expected, overvoltage arresters should be installed



Warning:

Only connect or disconnect in de-energized state.

Voltage supply

The data for power supply are specified in chapter " *Technical data*".



Note:

Power the instrument via an energy-limited circuit (power max. 100 W) acc. to IEC 61010-1, e.g.

- Class 2 power supply unit (acc. to UL1310)
- SELV power supply unit (safety extra-low voltage) with suitable internal or external limitation of the output current

Keep in mind the following additional factors that influence the operating voltage:

- Lower output voltage of the power supply unit under nominal load
- Influence of additional instruments in the circuit (see load values in chapter " *Technical data*")

Connection cable

The instrument is connected with standard four-wire cable. If electromagnetic interference is expected which is above the test values of EN 61326-1 for industrial areas, shielded cable should be used.

Plug connections

Make sure that the cable and the plug used have the required temperature resistance and fire safety for max. occurring ambient temperature.

When mounting outdoors, on cooled vessels or in moist areas in which cleaning is made with steam or high pressure, it is very important that the plug is screwed on correctly.

5.2 Connecting

Instrument versions

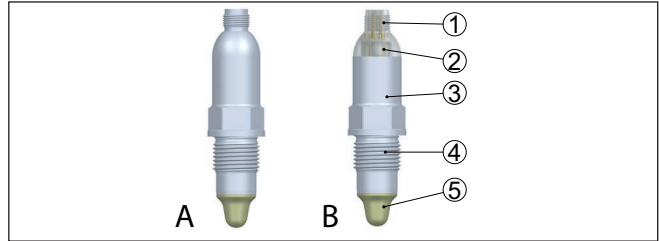


Fig. 6: VEGAPOINT 11 - M12 x 1 plug

- A Device version with full metal housing 316L
- B Device version with housing 316L and plastic
- 1 Plug connection
- 2 360° status indication
- 3 Instrument housing
- 4 Process fitting
- 5 Sensor

M12 x 1 plug connection

This plug connection requires a prefabricated cable with plug. Depending on the version, protection IP66/IP67 or IP69.

5.3 Wiring plan

For connection to binary inputs of a PLC.

M12 x 1 plug

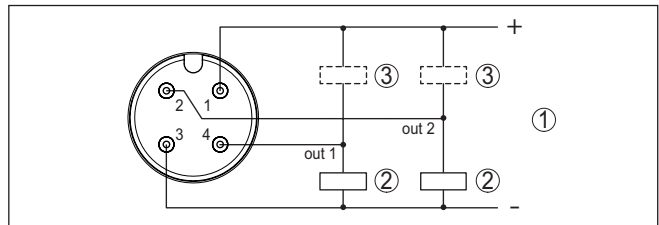


Fig. 7: Wiring plan M12 x 1 plug - Transistor output, three-wire

- 1 Voltage supply
- 2 PNP switching
- 3 NPN switching

Contact, plug connector	Function/Polarity
1	Voltage supply/+
2	Transistor output 2
3	Voltage supply/-
4	Transistor output 1/IO-Link

5.4 Switch-on phase

After switching on, the device first carries out a self-check.

The current measured value is then output on the signal cable.

6 Setup

6.1 Indication of the switching status



The switching status of the electronics can be checked via the 360° status indication (LEDs) integrated in the upper part of the housing.

The colours of the 360° status indication have the following meaning:
1)

- Green lights up - power supply connected, sensor output high-impedance
- Green flashing - Maintenance required
- Yellow lights up - power supply connected, sensor output low impedance
- Red lights - shortcircuit or overload in the load circuit (sensor output high-impedance)
- Red flashing - Error at sensor or electronics (sensor output high impedance) or device is in simulation

6.2 Function table

The following table provides an overview of the switching conditions depending on the set mode and the level (factory setting).

Coverage	Switching status ²⁾ Output 1	Switching status ³⁾ Output 2	Control lamp ⁴⁾
Covered 	open	closed	Green
Uncovered 	closed	open	Yellow
Covered/Uncovered	open	open	Red

6.3 Extended functions

Output

Transistor function

For devices with transistor output, you can set the function of the output.

- Functional principle PNP (Factory setting)
- Functional principle NPN

- 1) Default setting
- 2) Default setting
- 3) Default setting
- 4) Output 1

With the outputs

Function output (OU1)

In this menu item you can set the function of the two outputs independently of each other.

Closing contact = HNO (Hysterese Normally Open)

Opener = HNC (Hysterese Normally Closed)

Closing contact = FNO (Window Normally Open)

Opener = FNC (Window Normally Closed)

Function output 2 (OU2)

In this menu item you can set the function of the two outputs independently of each other.

The selection options are the same as in output 1.

Hysteresis function (HNO/HNC)

The hysteresis has the task of keeping the switching state of the output stable.

When the switching point (SP) is reached, the output switches and remains in this switching state. Only when the reset point (RP) is reached does the output switch back.

If the measured variable moves between switching and reset point, the state of the output does not change.

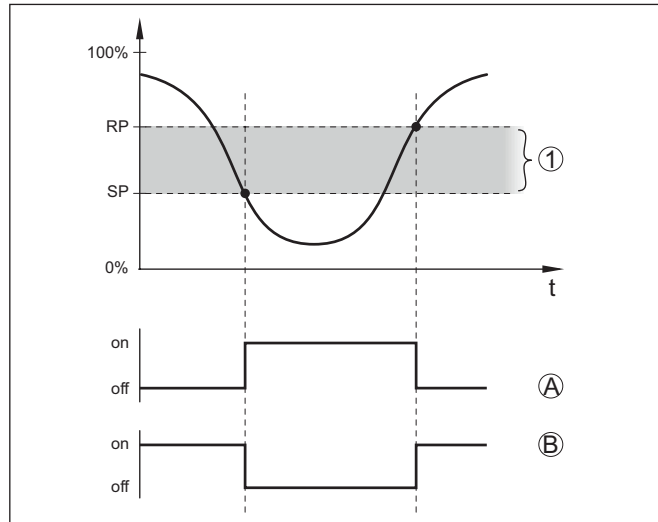


Fig. 8: Hysteresis function

SP Switching point

RP Reset point

A HNO (Hysterese Normally Open) = Closing contact

B HNC (Hysterese Normally Closed) = Opener

t Timeline

1 Hysteresis

Window function (FNO/FNC)

With the window function (FNO and FNC) a nominal range, a so-called window, can be defined.

The output changes its state when the measured variable enters the window between the values Window High (FH) and Window Low (FL). If the measured variable leaves the window, the output returns to its previous state. If the measured variable moves within the window, the state of the output does not change.

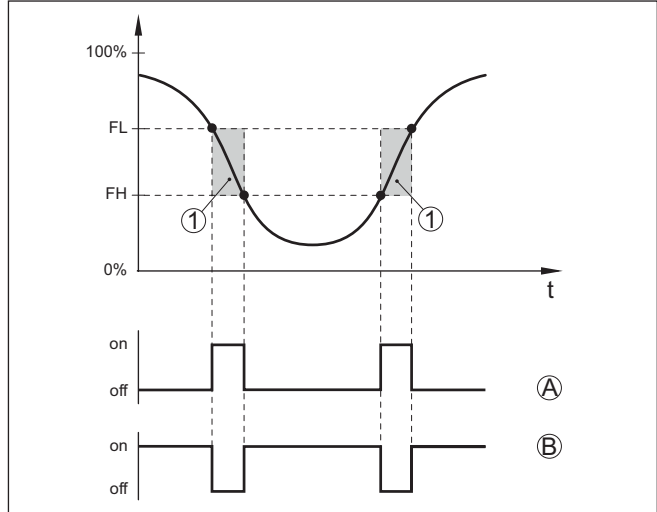


Fig. 9: Window function

FH Window high - upper value

FL Window low - lower value

A FNO (Window Normally Open) = Closing contact

B FNC (Window Normally Closed) = Opener

t Timeline

1 Window area

Switching delay

Here you can adjust the settings for the switching delay.

- Switching delay (DS1)
- Reset delay (DR1)

Switching delay (DS1)

The switching delay (DS) extends the reaction time until the sensor is switched over when the sensor tip is covered.

You can enter a delay time from 0 to 60 seconds.

Reset delay (DR1)

The reset delay (DR) extends the reaction time until the sensor switches over when the sensor tip becomes free.

You can enter a delay time from 0 to 60 seconds.

Switching output

If *User-defined* is selected in the application, you can select the settings for the switching output.

- Switching point (SP1)
- Reset point (RP1)

Switching point (SP1)

The switching point (SP1) indicates the switching threshold of the sensor related to the immersion depth or the degree of coverage.

The percentage defines the lower range limit of the hysteresis.

The setting is a degree for the sensitivity of the sensor tip.

Reset point (RP1)

The reset point (RP) controls the sensitivity of the sensor when the sensor tip becomes free.

The percentage defines the upper range limit of the hysteresis.

The setting is a degree for the sensitivity of the sensor tip.

7 Diagnostics and servicing

7.1 Maintenance

Maintenance

If the device is used properly, no special maintenance is required in normal operation.

Cleaning

The cleaning helps that the type label and markings on the instrument are visible.

Take note of the following:

- Use only cleaning agents which do not corrode the housings, type label and seals
- Use only cleaning methods corresponding to the housing protection rating

7.2 Rectify faults

Reaction when malfunction occurs

The operator of the system is responsible for taking suitable measures to rectify faults.

Causes of malfunction

The device offers maximum reliability. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Sensor
- Process
- Voltage supply
- Signal processing

Fault rectification

The first measure to take is to check the output signal. In many cases, the causes can be determined this way and the faults quickly rectified.

Reaction after fault rectification

Depending on the reason for the fault and the measures taken, the steps described in chapter "Setup" must be carried out again or must be checked for plausibility and completeness.

24 hour service hotline

Should these measures not be successful, please call in urgent cases the VEGA service hotline under the phone no. **+49 1805 858550**.

The hotline is also available outside normal working hours, seven days a week around the clock.

Since we offer this service worldwide, the support is provided in English. The service itself is free of charge, the only costs involved are the normal call charges.

7.3 Diagnosis, fault messages

Checking the switching signal

The 360° status indication on the device indicates the operating status of the device. At the same time it indicates the switching state of the output. This enables simple on-site diagnosis without the need for tools.

Error	Cause	Rectification
Green signal lamp off	Voltage supply interrupted.	Check voltage supply and cable connection
	Electronics defective	Exchange the instrument or send it in for repair
Green signal lamp flashes	Maintenance required	Carry out maintenance
Red signal lamp lights (switching output high-impedance)	Error with the electrical connection	Connect device according to wiring plan
	Shortcircuit or overload	Check electrical connection
	Measuring tip damaged	Check whether the measuring tip is damaged
Red signal lamp flashes (switching output high-impedance)	Sensor outside the specification	Check sensor adjustment Switching points may be interchanged
	Sensor is in simulation mode	Terminate simulation mode

Error messages



Information:

You can read out the error codes from the IO-Link data.

Under " *Device Status*" (ISDU 36) you can find the status of the device.

Failure/Error		
Red control lamp lights up		
Error	Cause	Rectification
F013	no measured value available	Error in the electronics Restart instrument If the error occurs again, replace the device
F080	General software error	Restart instrument
F105	Measured value is determined	Device is still in the switch-on phase Wait until the device is ready for operation
F111	Switching points interchanged	Repeat sensor adjustment The switching point (SP) must be smaller than the reset point (RP)
F260	Error in the calibration	Repeat device adjustment If the error occurs again, replace the device
F261	Error in the instrument settings	Carry out device reset Reset device to delivery status

Out of specification		
Red signal lamp flashes		
Error	Cause	Rectification
S600	Electronics temperature too high	Error in the electronics Allow device to cool down and restart If the error occurs again, check the ambient temperature

Out of specification		
Red signal lamp flashes		
Error	Cause	Rectification
S604	Overload on output	Switching output overloaded Check electrical connection Reduce switching load

Function check		
Red signal lamp flashes		
Error	Cause	Rectification
C700	Simulation active	Terminate simulation mode

7.4 How to proceed if a repair is necessary

You can find an instrument return form as well as detailed information about the procedure in the download area of our homepage. By doing this you help us carry out the repair quickly and without having to call back for needed information.

Proceed as follows in case of repair:

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and, if need be, also a safety data sheet outside on the packaging
- Ask the agency serving you to get the address for the return shipment. You can find the agency on our homepage.

8 Dismount

8.1 Dismounting steps

To remove the device, carry out the steps in chapters " *Mounting*" and " *Connecting to power supply*" in reverse.



Warning:

When dismantling, pay attention to the process conditions in vessels or pipelines. There is a risk of injury, e.g. due to high pressures or temperatures as well as aggressive or toxic media. Avoid this by taking appropriate protective measures.

8.2 Disposal



Pass the instrument on to a specialised recycling company and do not use the municipal collecting points.

Remove any batteries in advance, if they can be removed from the device, and dispose of them separately.

If personal data is stored on the old device to be disposed of, delete it before disposal.

If you have no way to dispose of the old instrument properly, please contact us concerning return and disposal.

9 Certificates and approvals

9.1 Food and pharmaceutical certificates

Versions for use in the food and pharmaceutical industries are available or in preparation for the device or the device series.

The corresponding certificates can be found on our homepage.

9.2 Conformity

The device complies with the legal requirements of the applicable country-specific directives or technical regulations. We confirm conformity with the corresponding labelling.

The corresponding conformity declarations can be found on our homepage.

Electromagnetic compatibility

The instruments are designed for use in an industrial environment. Nevertheless, electromagnetic interference from electrical conductors and radiated emissions must be taken into account, as is usual with a class A instrument according to EN 61326-1.

When the device is mounted in metal containers or tubes, the interference resistance requirements of IEC/EN 61326 for "Industrial environment" and the NAMUR recommendation EMC (NE21) are met.

If the device is to be used in other environments, the electromagnetic compatibility to other devices must be ensured by suitable measures.

When using communication via IO-Link, the requirements of IEC/EN 61131-9 are fulfilled.

9.3 Environment management system

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Help us to meet these requirements and observe the environmental instructions in the chapters "*Packaging, transport and storage*", "*Disposal*" of this operating instructions.

10 Supplement

10.1 Technical data

Note for approved instruments

The technical data in the respective safety instructions which are included in delivery are valid for approved instruments (e.g. with Ex approval). These data can differ from the data listed herein, for example regarding the process conditions or the voltage supply.

All approval documents can be downloaded from our homepage.

Materials and weights

Material 316L corresponds to 1.4404

Materials, wetted parts

- Sensor tip PEEK, polished
- Device seal - Standard version FKM
- Device seal - Hygienic version EPDM
- Process seal Klingersil C-4400
- Process fittings 316L

Materials, non-wetted parts

- Housing 316L and plastic (Polycarbonate) or 316L
- Device seal - Hygienic design AC and EPDM
AM⁵⁾

Weight approx. 200 g (0.441 lbs)

General data

Process fittings

- Pipe thread, cylindrical (DIN 3852-A) or ISO 228-1 G½, G¾, G1
- Pipe thread, conical (ASME B1.20.1) ½ NPT, ¾ NPT, 1 NPT
- Metric fine thread, cylindrical M24 x 1.5

Threaded and hygienic adapter

- Standard hygienic adapter G½, G1
- Other connections via hygiene adapters possible

Max. torque - process fitting

- Thread G½, ½ NPT 50 Nm (37 lbf ft)
- Thread G¾, ¾ NPT 75 Nm (55 lbf ft)
- Thread G1, 1 NPT 100 Nm (73 lbf ft)
- Hygienic adapter 20 Nm (15 lbf ft)

Surface quality $R_a < 0.76 \mu\text{m} (3.00 \cdot 10^{-5} \text{ in})$

Measurement accuracy

Hysteresis approx. 1 mm (0.04 in)

5) not in contact with the medium

Switching delay	approx. 500 ms (on/off) Adjustable: 0.5 ... 60 s
Repetitive accuracy	± 1 mm (± 0.04 in)

Ambient conditions

Ambient temperature on the housing	-40 ... +70 °C (-40 ... +158 °F)
Storage and transport temperature	-40 ... +80 °C (-40 ... +176 °F)

Mechanical environmental conditions

Sinusoidal vibrations	4M8 (5 g) at 4 ... 200 Hz according to EN 60068-2-6 (vibration with resonance)
Impacts	50 g, 2.3 ms according to EN 60068-2-27 (mechanical shock)
Impact resistance	IK05 acc. to IEC 62262

Process conditions

Process pressure	-1 ... 25 bar/-100 ... 2500 kPa (-14.5 ... 363 psig)
Process temperature	-20 ... +100 °C (-4 ... +212 °F)

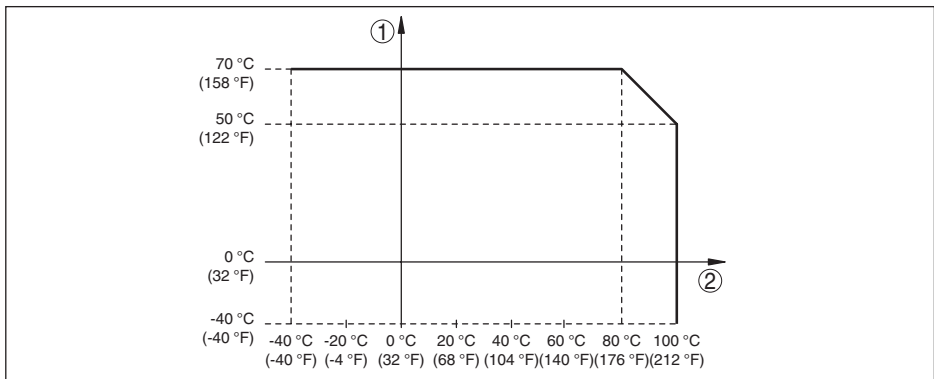


Fig. 10: Dependency ambient temperature to process temperature

- 1 Ambient temperature in °C (°F)
2 Process temperature in °C (°F)

SIP process temperature (SIP = Sterilization in place)

Vapour stratification up to 1 h	+135 °C (+275 F)
Dielectric constant	≥ 2.0

Indication (NE 107)

360° status indication (LED)

- Green	Power supply on - Output 1 open
- Yellow	Power supply on - Output 1 closed
- Red	Voltage supply on - failure/simulation

Output variable - Transistor output

Output	Transistor (PNP/NPN)
Load current	max. 250 mA (output, permanently short-circuit proof)
Voltage loss	< 3 V
Switching voltage	< 34 V DC
Blocking current	< 10 μ A

Measuring cell temperature

Range	-40 ... +115 °C (-40 ... +239 °F)
Resolution	< 0.2 K
Deviation	\pm 3 K
Output of the temperature values via ⁶⁾	IO-Link

Voltage supply

Operating voltage	12 ... 35 V DC
Max. power consumption	1 W
Reverse voltage protection	Integrated
Max. power consumption	1 W

Electrical protective measures

Potential separation	Electronics potential free up to 500 V AC
Protection rating	

Connection technology	Protection according to EN 60529/IEC 529	Protection according to UL 50
M12 x 1 plug	IP66/IP67/IP69	NEMA 6P

Altitude above sea level	up to 5000 m (16404 ft)
Overvoltage category	I
Protection rating (IEC 61010-1)	III
Pollution degree	4

Output variable - Transistor output/IO-Link

Output signal	Transistor output PNP/NPN
Output signal	IO-Link acc. to IEC 61131-9
Connection technology	Three-wire
Load current	max. 250 mA (output, permanently short-circuit proof)
Overload resistance	yes
Short-circuit resistance	Permanently
Switching voltage	< 34 V DC
Voltage loss	< 3 V
Inverse current PNP	< 10 μ A

6) Depending on the instrument version

Inverse current NPN	< 25 μ A
Switching time	< 10 ms
Max. cable length to the IO-Link master	20 m (66 ft)
Output	Transistor (PNP/NPN)

10.2 Device communication IO-Link

In the following, the necessary device-specific details are shown. You can find further information of IO-Link on www.io-link.com.

Physical layer

IO-Link specification: Revision 1.1

SIO mode: Yes

Speed: COM2 38.4 kBaud

Min. cycle time 4.0 ms

Length process data word: 32 Bit

IO-Link Data Storage: Yes

Block parameter adjustment: Yes

Direct parameter

Byte	Parameter	HexCode	Note, value
0	-	-	-
1	MasterCycleTime	-	-
2	MinCycleTime	0x28	4 ms
3	M-SequenceCapability	0x2B	Frametypes, SIO-Mode, ISDU
4	Revision ID	0x11	IO-Link Revision 1.1
5	Input process data length	0xC3	4 bytes length (SIO mode available)
6	Output process data length	0x00	Not available
7, 8	VendorID	0x00, 0x62	98
9, 10, 11	DeviceID	0x00, 0x02, 0x00	1024

Process data word

Configuration

Bit	31 (MSB)	...	16	15	...	2	1	0 (LSB)
Sensor	X-value 0.1 % (frequency)			Temperature in °C, resolution 0.1 K			Out2	Out1

Formats

	Value	Type
Out1	1 Bit	Boolean
Out2	1 Bit	Boolean

	Value	Type
Temperature	14 Bit	Integer
X-value	16 Bit	Integer

Events

	HexCode	Type
6202	0x183A	FunctionCheck
6203	0x183B	Maintenance
6204	0x183C	OutOfSpec
6205	0x183D	Failure

Information

Detailed information about error messages can be found under Diagnosis, Error Messages.

Under " *Device Status*" (ISDU 36) you can read out the status of the device.

Device data ISDU

Device data can be parameters, identification data and diagnostic information. They are exchanged acyclically and on request of the IO-Link master. Device data can be written to the sensor (write) or read from the device (read). The ISDU (Indexed Service Data Unit) determines, among other things, whether the data is read or written.

IO-Link specific device data

Designation	ISDU (dez)	ISDU (hex)	Size (Byte)	Data type	Access	Value
Device Access	12	0x000C	-	-	RW	-
Profile Identification	13	0x000D	2	unsigned8[2]	RO	0x40, 0x00
PD-Descriptor	14	0x000E	12	unsigned8[12]	RO	0x01, 0x01, 0x00, 0x01, 0x01, 0x01, 0x03, 0x0E, 0x02, 0x03, 0x0E, 0x10
Vendor Name	16	0x0010	31	String	RO	VEGA Grieshaber KG
VendorText	17	0x0011	31	String	RO	www.vega.com
Product Name	18	0x0012	31	String	RO	VEGAPOINT
Product ID	19	0x0013	31	String	RO	VEGAPOINT 11
ProductText	20	0x0014	31	String	RO	LevelSwitch
Serial Number	21	0x0015	16	String	RO	-
Hardware Revision	22	0x0016	20	String	RO	-

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Designation	ISDU (dez)	ISDU (hex)	Size (Byte)	Data type	Access	Value
Software Revision	23	0x0017	20	String	RO	-
Application Specific Tag	24	0x0018	Max. 31	String	RW	Sensor
Function Tag	25	0x0019	Max. 31	String	RW	-
Location Tag	26	0x001A	Max. 31	String	RW	-
Device Status	36	0x0024	1	unsigned8[2]	RO	-
Detailed Device Status	37	0x0025	12	unsigned8[12]	RO	-
PDin	40	0x0028	4	-	RO	see process word

VEGA-specific device data

Designation	ISDU (dez)	ISDU (hex)	Size (Byte)	Data type	Access	Value range
Measurement loop name (TAG)	256	0x0100	20	String	RW	Sensor
Application	257	0x0101	1	unsigned8	RW	0 = User defined 1 = Standard
Switching point (SP1)	258	0x0102	4	Float	RW	0 ... 100 %
Reset point (RP1)	259	0x0103	4	Float	RW	0 ... 100 %
Switching delay (DS1)	260	0x0104	4	Float	RW	0 ... 60 s
Reset delay (DR1)	261	0x0105	4	Float	RW	0 ... 60 s
Switching point (FH1)	262	0x0106	4	Float	RW	0 ... 100 %
Reset point (FL1)	263	0x0107	4	Float	RW	0 ... 100 %
Switching delay (DS1)	264	0x0108	4	Float	RW	0 ... 60 s
Reset delay (DR1)	265	0x0109	4	Float	RW	0 ... 60 s
Switching point (SP2)	266	0x010A	4	Float	RW	0 ... 100 %
Reset point (RP2)	267	0x010B	4	Float	RW	0 ... 100 %
Switching delay (DS2)	268	0x010C	4	Float	RW	0 ... 60 s
Reset delay (DR2)	269	0x010D	4	Float	RW	0 ... 60 s
Switching point (FH2)	270	0x010E	4	Float	RW	0 ... 100 %
Reset point (FL2)	271	0x010F	4	Float	RW	0 ... 100 %
Switching delay (DS2)	272	0x0110	4	Float	RW	0 ... 60 s
Reset delay (DR2)	273	0x0111	4	Float	RW	0 ... 60 s
Transistor function (P-N)	274	0x0112	1	unsigned8	RW	0 = pnp, 1 = npn
Function output (OU1)	275	0x0113	1	unsigned8	RW	0 = HNO, 1=HNC 2 = FNO, 3=FNC

Designation	ISDU (dez)	ISDU (hex)	Size (Byte)	Data type	Access	Value range
Function output 2 (OU2)	276	0x0114	1	unsigned8	RW	0 = HNO, 1=HNC 2 = FNO, 3=FNC
Temperature unit (TMP)	291	0x0123	4	Float	RW	1001 = °C 1002 = °F
Device status acc. to NE 107	294	0x0126	1	Unsigned8	RO	0 = Good 1 = Function Check 2 = Maintenance required 3 = Out of Specification 4 = Failure
Device status	295	0x0127	19	Unsigned16	RO	-
Counter for change of parameters (PCO)	296	0x0128	4	Unsigned32	RO	-
Actual electronics temperature	297	0x0129	4	Float	RO	-20 ... +70 °C -4 ... +158 °F
Min. electronics temperature	299	0x012B	4	Float	RO	-20 ... +70 °C -4 ... +158 °F
Max. electronics temperature	300	0x012C	4	Float	RO	-20 ... +70 °C -4 ... +158 °F
Actual measuring cell temperature	301	0x011C	4	Float	RO	-20 ... +100 °C -4 ... +212 °F
Min. measuring cell temperature	302	0x011D	4	Float	RO	-20 ... +100 °C -4 ... +212 °F
Max. measuring cell temperature	303	0x011E	4	Float	RO	-20 ... +100 °C -4 ... +212 °F
Actual resonance frequency	304	0x0130	4	Float	RO	0 ... 100 %
Min. resonance frequency	305	0x0131	4	Float	RO	0 ... 100 %
Max. resonance frequency	306	0x0132	4	Float	RO	0 ... 100 %
Probe	307	0x0133	2	Unsigned16	RO	0 = Not Covered 256 = Covered 512 = Covered inside Window 768 = Covered outside Window
Output	308	0x0134	2	Unsigned16	RO	0 = Open 1 = Closed
Output 2	309	0x0135	2	Unsigned16	RO	0 = Open 1 = Closed

Designation	ISDU (dez)	ISDU (hex)	Size (Byte)	Data type	Access	Value range
Device name	310	0x0136	19	String	RO	-
Serial number	311	0x0137	16	String	RO	-
Hardware version	312	0x0138	19	String	RO	-
Software version	313	0x0139	19	String	RO	-
Device revision	314	0x013A	2	Unsigned16	RO	-
Simulation switching output	315	0x013B	1	Unsigned8	RW	0 = Off 1 = On
Simulation value output	316	0x013C	2	Unsigned16	RW	0 = Open 1 = Closed
Simulation switching output 2	317	0x013D	1	Unsigned8	RW	0 = Off 1 = On
Simulation value output	318	0x013E	2	Unsigned16	RW	0 = Open 1 = Closed
Device status detailed status	319	0x013F	4	Unsigned32	RO	-

- Switch point settings (ISDU 258, 259, 262, 263, 266, 267, 270, 271) are generally possible but the settings are only effective if, under "*Application*", the setting "*User defined*" was selected.
- Switching point settings (SP, RP, FH, FL) depending on the selection under "*Function Output*".
- Temperature specifications in °C or °F, depending on the setting under "*Temperature Unit*".

System commands

Designation	ISDU (dez)	ISDU (hex)	Access
Factory Reset	130	0x082	WO
Reset Pointer - Resonance Frequency	161	0x0A1	WO
Reset Pointer - Measuring Cell Temperature	163	0x0A3	WO
Reset Pointer - Electronic Temperature	164	0x0A4	WO

10.3 Dimensions

VEGAPOINT 11, standard version - thread

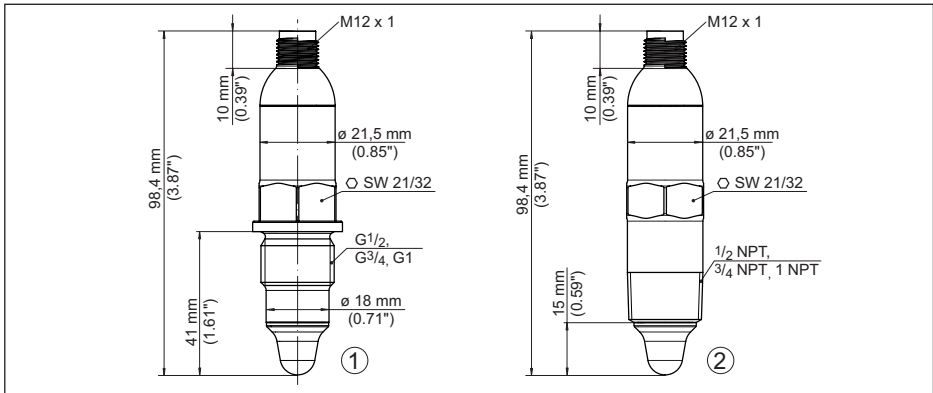


Fig. 11: VEGAPOINT 11, standard version - thread

- 1 Thread G $\frac{1}{2}$, G $\frac{3}{4}$, G1 (DIN ISO 228/1) with M12 x 1 plug connection (Housing: 316L and plastic)
- 2 Thread $\frac{1}{2}$ NPT, $\frac{3}{4}$ NPT, 1 NPT with M12 x 1 plug connection (full metal housing: 316L)

VEGAPOINT 11, hygienic version - Thread

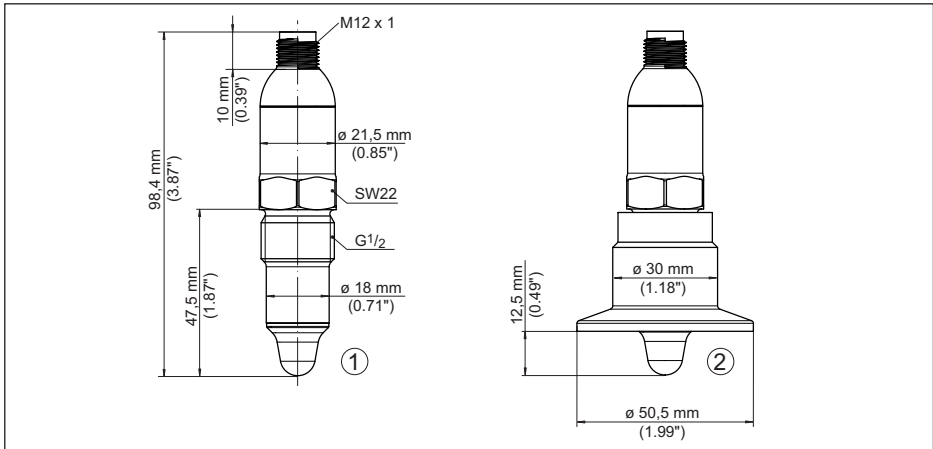


Fig. 12: VEGAPOINT 11, hygienic version - Thread

- 1 Thread G $\frac{1}{2}$ for hygienic threaded adapter (DIN ISO 228/1) with M12 x 1 plug connection
- 2 VEGAPOINT 11, hygienic version in threaded adapter, Clamp

Keep in mind that the total length is extended by the plug connection.

10.4 Industrial property rights

VEGA product lines are global protected by industrial property rights. Further information see www.vega.com.

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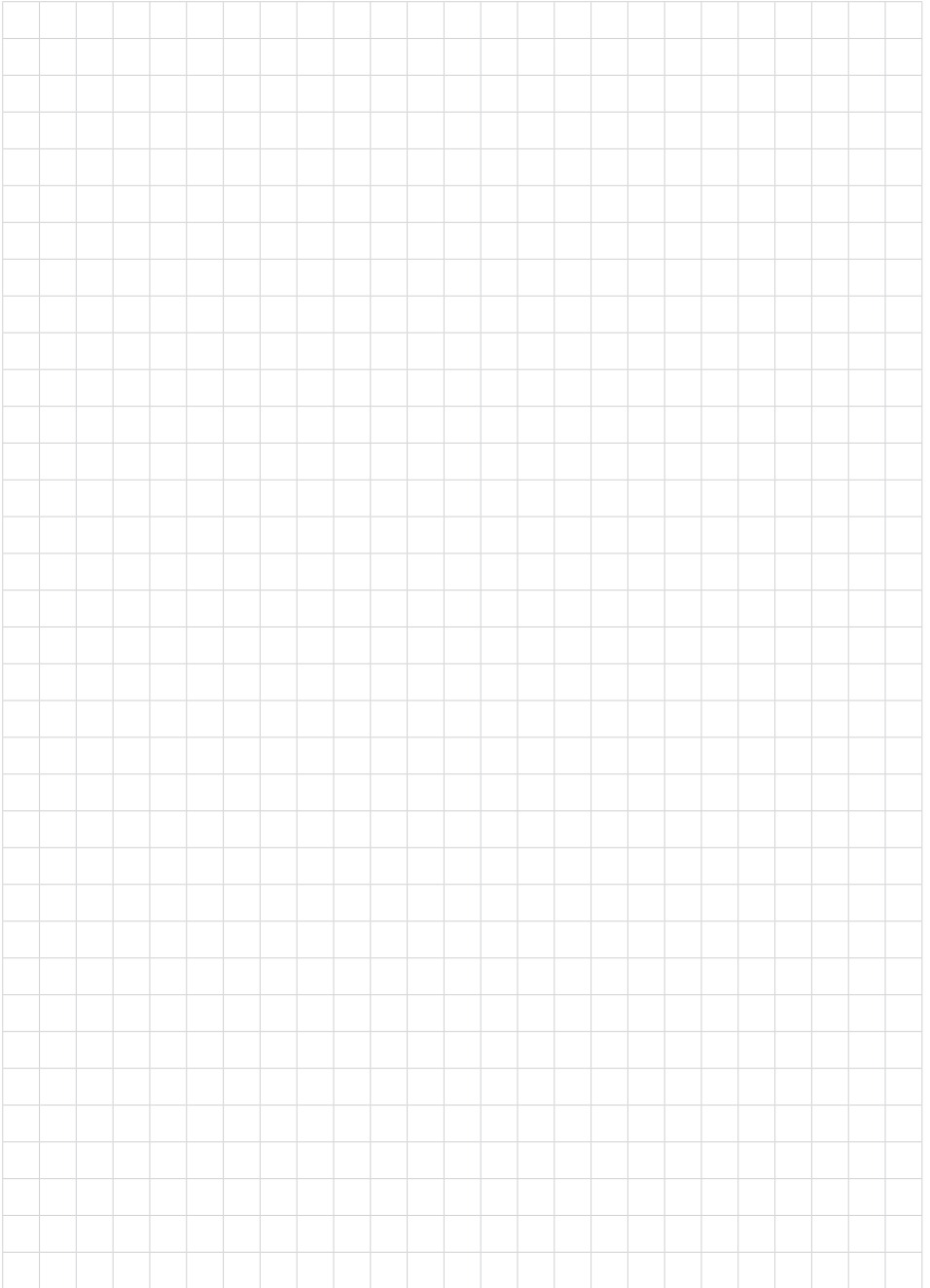
进一步信息请参见网站 < www.vega.com。

10.5 Licensing information for open source software

Open source software components are also used in this device. A documentation of these components with the respective license type, the associated license texts, copyright notes and disclaimers can be found on our homepage.

10.6 Trademark

All the brands as well as trade and company names used are property of their lawful proprietor/originator.



Printing date:

VEGA

All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.

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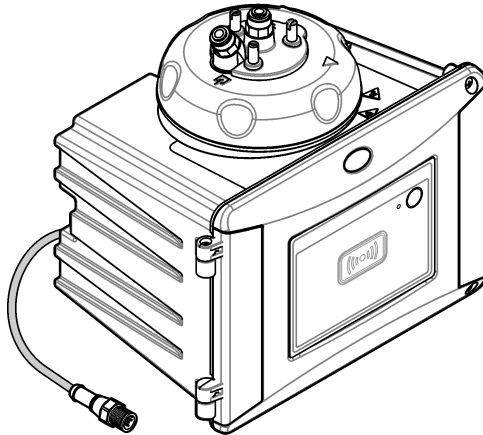


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TU5300 sc/TU5400 sc

08/2021, Edition 6

User Manual



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Section 1 Specifications

Specifications are subject to change without notice.

Specification	Details
Measurement method	Nephelometry with scattered light collected at a 90-degree angle to the incident light and 360 degrees around the sample vial
Primary compliance method	EPA approved Hach Method 10258 ¹
Enclosure	Material: ASA Luran S 777K / RAL7000, TPE RESIN Elastocon [®] STK40, Thermoplastic Elastomer TPS-SEBS (60 Shore) and stainless steel
IP rating	Electronic compartment IP55; process head/Automatic Cleaning Module attached to the instrument and all of the other functional units IP65 ²
Dimensions (W x D x H)	268 x 249 x 190 mm (10.6 x 9.8 x 7.5 in.)
Weight	Instrument with the process head: 2.7 kg (6.0 lb); Instrument with the optional automatic cleaning module: 5.0 kg (11.0 lb)
Power requirements	12 VDC (+2 V, -4 V), 14 VA
Protection class	III
Pollution degree	2
Overvoltage category	II
Environmental conditions	Indoor use
Operating temperature	0 to 50 °C (32 to 122 °F)
Storage temperature	-40 to 60 °C (-40 to 140 °F)
Humidity	5 to 95% relative humidity, non-condensing
Sensor cable length	TU5x00 sc without Automatic Cleaning Module or flow sensor: 50 m (164 ft); TU5x00 sc with Automatic Cleaning Module: 10 m (33 ft)
Laser	Class 2 laser product: Contains a non user-serviceable class 2 laser.
Optical light source	650 nm, maximum 0.43 mW
Fittings	Sample inlet and outlet: ¼-in. OD tubing (optional tubing adapter, ¼ in. to 6 mm)
Altitude	2000 m (6562 ft) maximum
Tubing requirements	Polyethylene, polyamide or polyurethane tubing. Calibrated ¼ in. OD, +0.03 or -0.1 mm (+0.001 or -0.004 in.)
Measurement units	TU5300 sc: NTU, FNU, TE/F, EBC or FTU; TU5400 sc: NTU, mNTU ³ , FNU, mFNU, TE/F, EBC, FTU or mFTU.
Range	0 to 700 NTU, FNU, TE/F and FTU; 0 to 175 EBC

¹ <http://www.hach.com>

² Water drops, puddles or runlets that will not damage the instrument may be in the inner of the enclosure.

³ 1 mNTU = 0.001 NTU

Specification	Details
Method detection limit	0.0001 NTU at 25 °C (77 °F)
Response time	T90 < 30 seconds at 100 mL/min
Signal averaging	TU5300 sc: 30–90 seconds TU5400 sc: 1–90 seconds
Accuracy	± 2% or ± 0.01 NTU (the larger value) from 0 to 40 NTU ± 10% of reading from 40 to 700 NTU based on Formazin primary standard at 25 °C (77 °F)
Linearity	Better than 1% for 0 to 40 NTU based on Formazin primary standard at 25 °C (77 °F).
Repeatability	TU5300 sc: 0.002 NTU or 1% (the larger value) at 25 °C (77 °F) (> 0.025 NTU range); TU5400 sc: 0.0006 NTU or 1% (the larger value) at 25 °C (77 °F) (> 0.025 NTU range)
Stray light	< 0.01 NTU
Resolution	0.0001 NTU (0.0001 to 0.9999/1.000 to 9.999/10.00 to 99.99/100.0 to 700 NTU) Default: TU5300 sc: 0.001 NTU and TU5400 sc: 0.0001 NTU
Air bubble compensation	Physical, mathematical
Sample requirements	Temperature: 2 to 60 °C (35.6 to 140 °F) Conductivity: 3000 µS/cm maximum at 25 °C (77 °F) Flow rate ⁴ : 100 to 1000 mL/min; optimal flow rate: 200 to 500 mL/min Pressure: 6 bar (87 psi) maximum compared to air, 2 to 40 °C (35.6 to 104 °F) sample; 3 bar (43.5 psi) maximum compared to air, 40 to 60 °C (104 to 140 °F) sample
Calibration options	StablCal [®] or Formazin: 1-point calibration (20 NTU) for 0 to 40 NTU measurement range, 2-point calibration (20 and 600 NTU) for 0 to 700 NTU (full) measurement range or 2- to 6-point custom calibration for a measurement range of 0 NTU to the highest calibration point.
Verification options	Glass verification rod (solid secondary standard) ≤ 0.1 NTU, StablCal or Formazin
Verification (RFID or Link2SC [®])	Verification of the measurement value by comparison of the process and lab measurements with RFID or Link2SC.
Certifications	CE compliant; US FDA accession number: 1420493-xxx. This product complies with IEC/EN 60825-1 and to 21 CFR 1040.10 in accordance with Laser Notice No. 50. Australian RCM.
Warranty	1 year (EU: 2 years)

Section 2 General information

In no event will the manufacturer be liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual. The manufacturer reserves the right to

⁴ For the best results, operate the instrument at a flow rate of 200 mL/min when the maximum particle size is 20 µm. For larger particles (150 µm maximum), the best flow rate is 350 to 500 mL/min.

make changes in this manual and the products it describes at any time, without notice or obligation. Revised editions are found on the manufacturer's website.

2.1 Safety information

The manufacturer is not responsible for any damages due to misapplication or misuse of this product including, without limitation, direct, incidental and consequential damages, and disclaims such damages to the full extent permitted under applicable law. The user is solely responsible to identify critical application risks and install appropriate mechanisms to protect processes during a possible equipment malfunction.

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.





Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in this manual.




2.1.1 Use of hazard information

▲ DANGER
Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.
▲ WARNING
Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.
▲ CAUTION
Indicates a potentially hazardous situation that may result in minor or moderate injury.
NOTICE
Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.



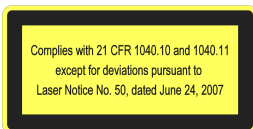

2.1.2 Precautionary labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed. A symbol on the instrument is referenced in the manual with a precautionary statement.

	Electrical equipment marked with this symbol may not be disposed of in European domestic or public disposal systems. Return old or end-of-life equipment to the manufacturer for disposal at no charge to the user.
	This symbol, if noted on the instrument, references the instruction manual for operation and/or safety information.
	This symbol indicates the need for protective eye wear.
	This symbol indicates a laser device is used in the equipment.

	This symbol indicates that the marked item can be hot and should not be touched without care.
	This symbol identifies a risk of chemical harm and indicates that only individuals qualified and trained to work with chemicals should handle chemicals or perform maintenance on chemical delivery systems associated with the equipment.
	This symbol indicates radio waves.

2.1.3 Class 2 laser product

⚠ DANGER	
	Personal injury hazard. Never remove covers from the instrument. This is a laser-based instrument and the user risks injury if exposed to the laser.
	Class 2 laser product, IEC60825-1:2014, 650 nm, maximum 0.43 mW Location: Rear of the instrument.
	Conforms to U.S. regulations 21 CFR 1040.10 and 1040.11 in accordance with Laser Notice No. 50. Location: Rear of the instrument.
	Caution—Class 2 laser radiation when the lid is open. Do not look into the laser beam. Location: Top of the vial compartment.

This instrument is a Class 2 Laser product. There is only visible laser radiation when the instrument is defective and when the instrument lid is open. This product complies with EN 61010-1, "Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use" and with IEC/EN 60825-1, "Safety of Laser Products" and with 21 CFR 1040.10 in accordance with Laser Notice No. 50. Refer to the labels on the instrument that supply laser information.

2.1.4 RFID module


Instruments with the optional RFID module receive and transmit information and data. The RFID module operates with a frequency of 13.56 MHz.


RFID technology is a radio application. Radio applications are subject to national conditions of authorization. The use of instruments with the optional RFID module is currently permitted in the regions that follow:

EU (European Union) countries, EFTA (European Free Trade Association) countries, Turkey, Serbia, Macedonia, Australia, Canada, US, Chile, Ecuador, Venezuela, Mexico, Brazil, South Africa, India, Singapore, Argentina, Columbia, Peru and Panama

The use of instruments with the optional RFID module outside of the above-mentioned regions can violate national laws. The manufacturer reserves the right also to get authorization in other countries. In case of doubt, contact the manufacturer.

2.1.4.1 Safety information for RFID modules

⚠ WARNING	
	Multiple hazards. Do not disassemble the instrument for maintenance. If the internal components must be cleaned or repaired, contact the manufacturer.

⚠ WARNING	
	Electromagnetic radiation hazard. Do not use the instrument in dangerous environments.

NOTICE	
This instrument is sensitive to electromagnetic and electromechanical interference. These interferences can have an effect on the analysis performance of this instrument. Do not put this instrument near equipment that can cause interference.	

Obey the safety information that follows to operate the instrument in accordance with local, regional and national requirements.

- Do not operate the instrument in hospitals and equivalent establishments or near medical equipment, such as pace makers or hearing aids.
- Do not operate the instrument near highly flammable substances, such as fuels, highly flammable chemicals and explosives.
- Do not operate the instrument near combustible gases, vapors or dust.
- Keep the instrument away from strong vibration or shock.
- The instrument can cause interference in immediate proximity to televisions, radios and computers.
- The warranty does not cover improper use or wear.

2.1.4.2 FCC conformance for RFID

This instrument may contain a registered radio frequency identification device (RFID). Refer to [Table 1](#) for the Federal Communications Commission (FCC) registration information.

Table 1 Registration information

Parameter	Value
FCC identification number (FCC ID)	YCB-ZBA987
IC	5879A-ZBA987
Frequency	13.56 MHz

2.1.5 Compliance and certification

⚠ CAUTION	
This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.	

Canadian Radio Interference-Causing Equipment Regulation, ICES-003, Class A:

Supporting test records reside with the manufacturer.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de classe A répond à toutes les exigences de la réglementation canadienne sur les équipements provoquant des interférences.

FCC Part 15, Class "A" Limits


Supporting test records reside with the manufacturer. The device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

1. The equipment may not cause harmful interference.
2. The equipment must accept any interference received, including interference that may cause undesired operation.

Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their expense. The following techniques can be used to reduce interference problems:

1. Disconnect the equipment from its power source to verify that it is or is not the source of the interference.
2. If the equipment is connected to the same outlet as the device experiencing interference, connect the equipment to a different outlet.
3. Move the equipment away from the device receiving the interference.
4. Reposition the receiving antenna for the device receiving the interference.
5. Try combinations of the above.

2.2 Product overview

⚠ DANGER	
	Chemical or biological hazards. If this instrument is used to monitor a treatment process and/or chemical feed system for which there are regulatory limits and monitoring requirements related to public health, public safety, food or beverage manufacture or processing, it is the responsibility of the user of this instrument to know and abide by any applicable regulation and to have sufficient and appropriate mechanisms in place for compliance with applicable regulations in the event of malfunction of the instrument.

The TU5300 sc and the TU5400 sc turbidimeters are used with an SC controller to measure low-range turbidity mostly in finished drinking water applications. Refer to [Figure 1](#).

The TU5300 sc and the TU5400 sc turbidimeters measure scattered light at an angle of 90° in a 360° radius around the axis of the incident light beam.

An optional RFID module and an automatic system check option are available⁵. The RFID module is shown in [Figure 1](#). The RFID module lets process and laboratory turbidity measurements be easily compared. A description of the automatic system check option is given in [Configure the instrument](#) on page 22.

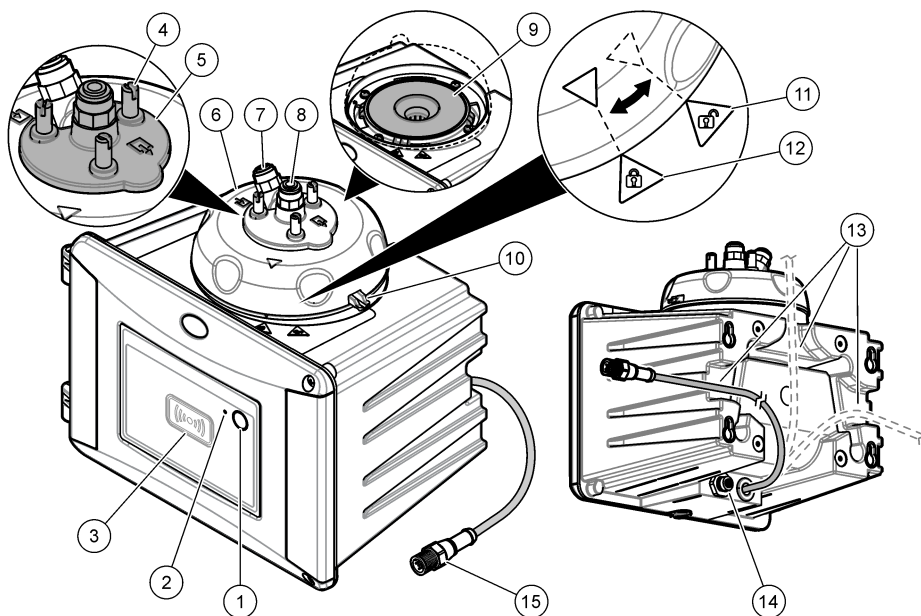
PROGNOSYS predictive diagnostic software is available for the TU5300 sc and TU5400 sc turbidimeters. To use PROGNOSYS, connect the turbidimeter to an SC controller with PROGNOSYS.

Instructional videos are available in the support section of the manufacturer's website.

The accessories are shown in [Installation overview](#) on page 11.

⁵ The RFID module and automatic system check option is only available at the time of purchase.

Figure 1 Product overview



1 Programmable button	9 Vial compartment
2 Status indicator light (refer to Status indicator light on page 9)	10 Overflow drain
3 RFID module indicator (optional)	11 Process head (open)
4 Cleaning lid screws (3x)	12 Process head (closed)
5 Cleaning lid	13 Channels for cables
6 Process head	14 Extension connector for accessories
7 Sample inlet	15 Sensor cable
8 Sample outlet	

2.3 Status indicator light

The status indicator light shows the instrument status. Refer to [Table 2](#) for status descriptions.

Note: The status indicator light is only on when the SC controller power is set to on and the sensor cable is connected to the sc controller.

Table 2 Status indicator light

Color	Status
Green (stable)	The instrument is in operation. The instrument status is ok—no warnings, errors or reminders.
Green (flashes)	Calibration is complete. The instrument status is ok.
	Verification is complete. The instrument status is ok.
Yellow (stable)	Read the warning that shows on the controller display. Refer to Warnings on page 52 for the warning description and solution.

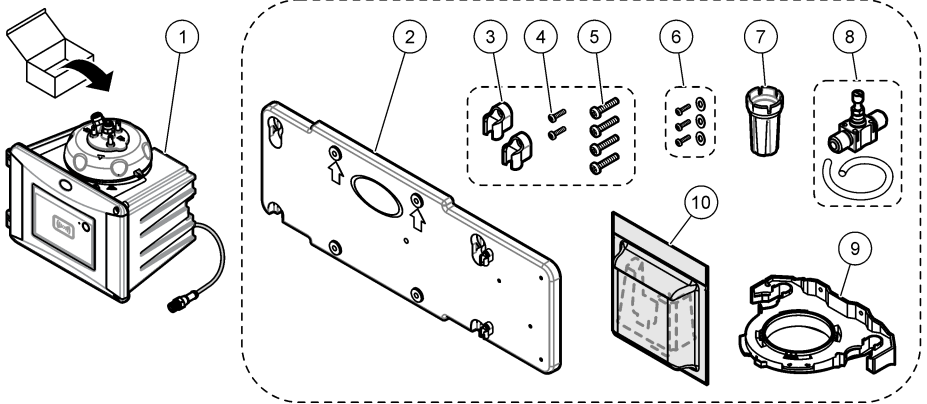
Table 2 Status indicator light (continued)

Color	Status
Yellow (flashes)	The instrument is in Service Mode.
	An automatic cleaning is in progress.
Yellow (flashes slow)	The optional flow sensor has identified that there is no sample flow or the sample flow is lower than the limit. Read the warning that shows on the controller display. Refer to Warnings on page 52 for the warning description and solution.
Yellow (flashes fast)	The optional flow sensor has identified that the sample flow rate is higher than the limit. Read the warning that shows on the controller display. Refer to Warnings on page 52 for the warning description and solution.
Red (stable)	Read the error that shows on the controller display. Refer to Errors on page 53 for the error description and solution.
Red (flashes)	Calibration or verification was not completed.
	The instrument cannot start calibration or verification for one or more reason that follows. <ul style="list-style-type: none">• The standard expired.• The first measurement of the verification standard was done with a different method (EPA/ISO).• The first measurement value of the verification standard is missing.
Blue (stable)	A calibration or verification is started.
Blue (flashes)	A calibration or verification measurement is started.
Blue (flashes fast)	A calibration or verification is started with RFID.

2.4 Product components

Make sure that all components have been received. Refer to [Figure 2](#). If any items are missing or damaged, contact the manufacturer or a sales representative immediately.

Figure 2 Product components



1 TU5300 sc or TU5400 sc	6 Cleaning lid screws and washers for hot water applications
2 Wall mount bracket (two tubing clips on bracket)	7 Vial replacement tool
3 Tubing clips	8 Flow regulator
4 Tubing clip screws, 2.2 x 6 mm	9 Service bracket
5 Mounting screws, 4 x 16 mm	10 Desiccant cartridge

Section 3 Installation

▲ CAUTION



Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

3.1 Installation guidelines

NOTICE

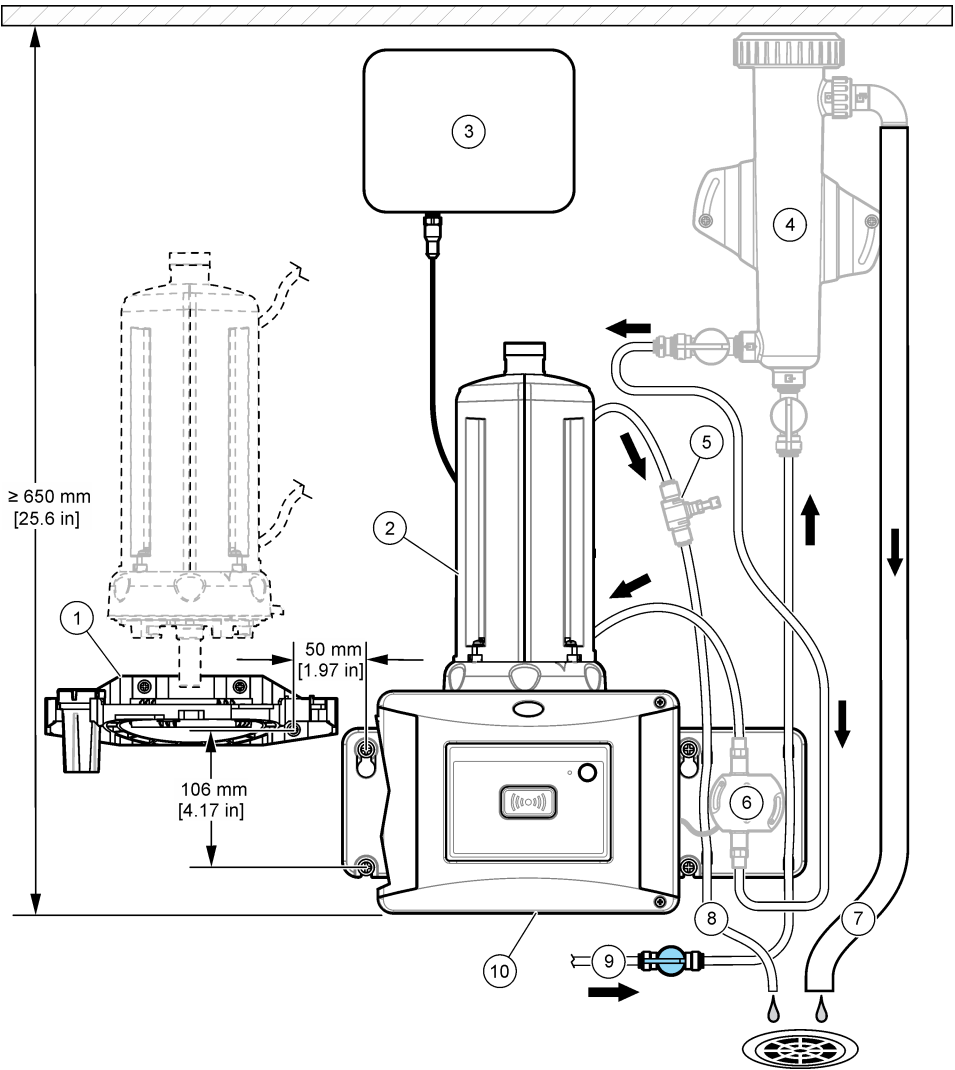
Make sure that there is a floor drain near the instrument. Examine the instrument daily for leaks.

This instrument is rated for an altitude of 3100 m (10,170 ft) maximum. Use of this instrument at an altitude higher than 3100 m can slightly increase the potential for the electrical insulation to break down, which can result in an electric shock hazard. The manufacturer recommends that users with concerns contact technical support.

3.2 Installation overview

Figure 3 shows the installation overview with all of the accessories and the clearances necessary.

Figure 3 Installation overview with accessories



1 Service bracket	6 Flow sensor (accessory)
2 Automatic cleaning module (accessory)	7 Bubble trap overflow
3 SC controller	8 Sample outlet
4 Bubble trap (accessory)	9 Sample inlet
5 Flow regulator ⁶	10 TU5300 sc or TU5400 sc

⁶ Not used with the bubble trap.

3.3 Wall mount

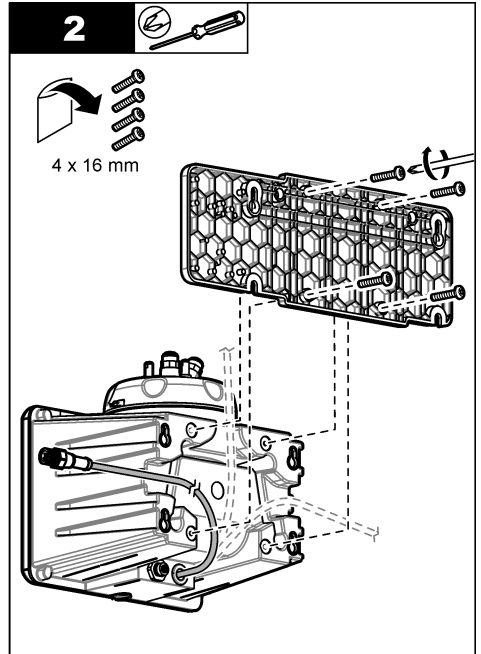
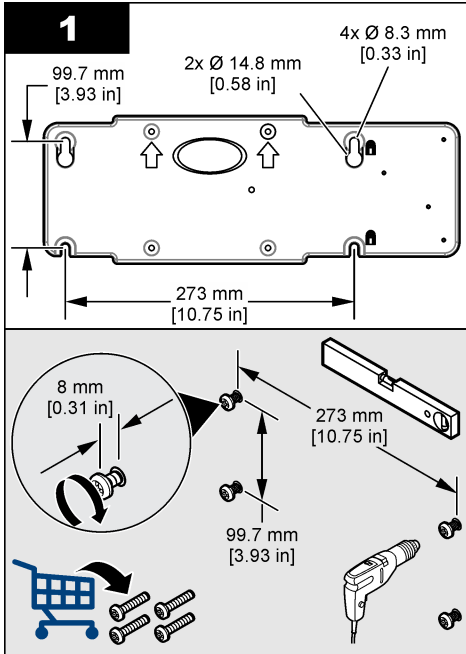
Install the instrument on a wall in a vertical position. Install the instrument so that it is level.

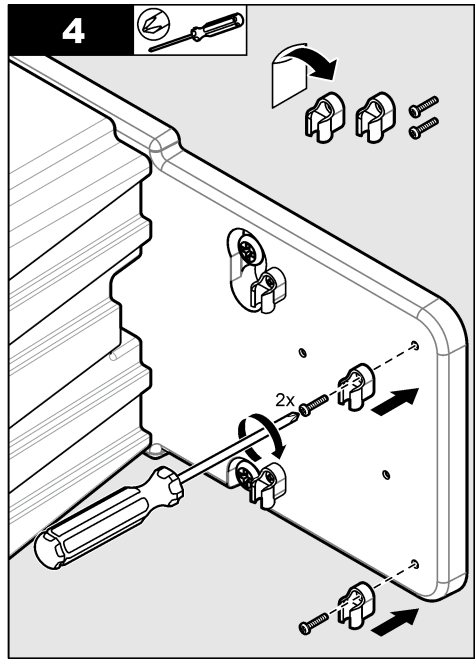
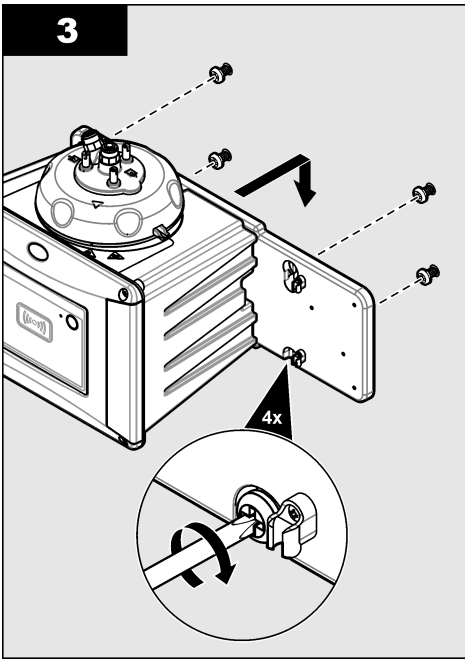
3.3.1 Install with the wall mount bracket

Refer to the illustrated steps that follow to install the instrument on a wall with the wall mount bracket. The mounting hardware to install the wall mount bracket on a wall is supplied by the user.

If a 1720D, 1720E, or FT660 instrument is replaced, remove the instrument from the wall. Then do steps 2 to 4 of the illustrated steps that follow to install the instrument on the existing hardware.

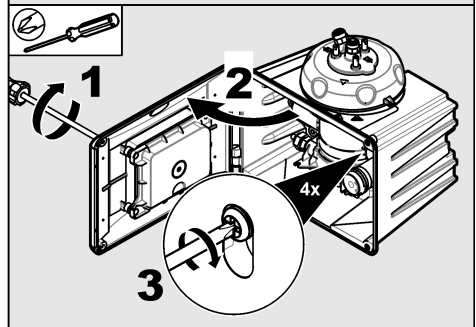
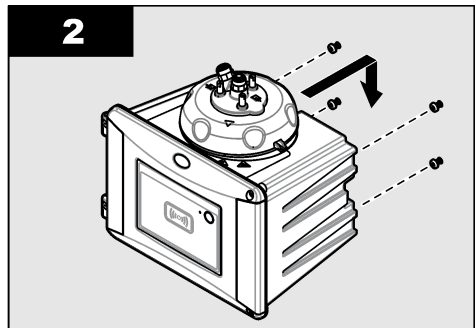
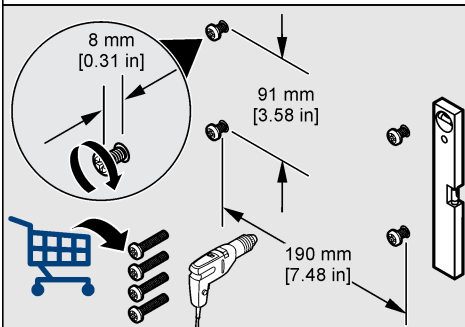
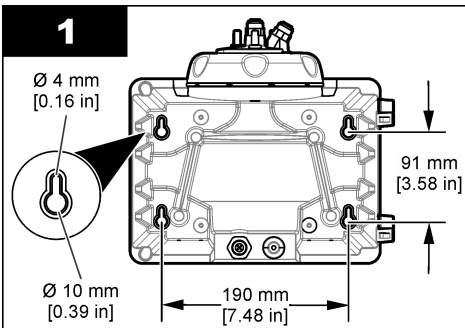
Note: When the accessories are used, the installation location of the tubing clips is different. Refer to the documentation supplied with the accessories for tubing clip installation.





3.3.2 Install directly on a wall

As an alternative, refer to the illustrated steps that follow to install the instrument directly on a wall. The mounting hardware is supplied by the user. Remove the thin, plastic film from the mounting holes on the back of the instrument.



3.4 Install the desiccant cartridge

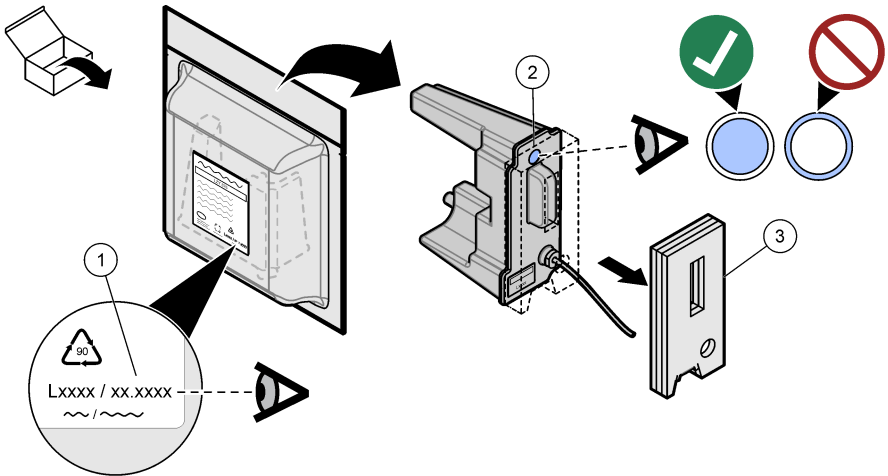
NOTICE

Make sure that the desiccant cartridge is installed or damage to the instrument will occur.

For initial installation, complete the steps below. For replacement, refer to the documentation supplied with the desiccant cartridge.

1. Look at the install by date on the packaging. Refer to [Figure 4](#). Do not use if the current date is past the install by date.
2. Make sure that the indicator on the new desiccant cartridge is light blue. Refer to [Figure 4](#).
3. Install the new desiccant cartridge. Refer to the illustrated steps that follow.

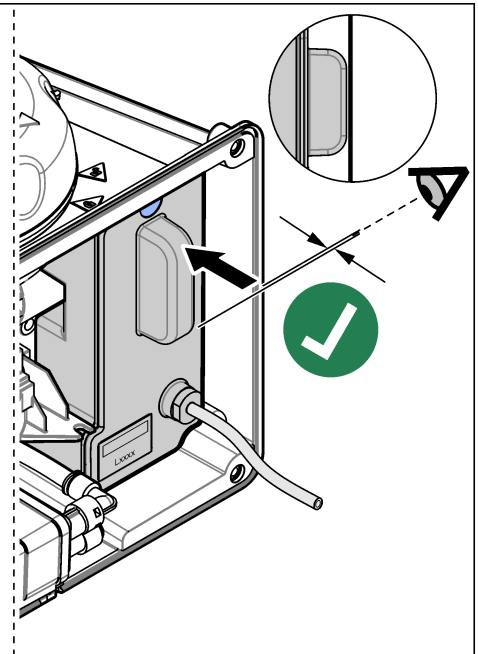
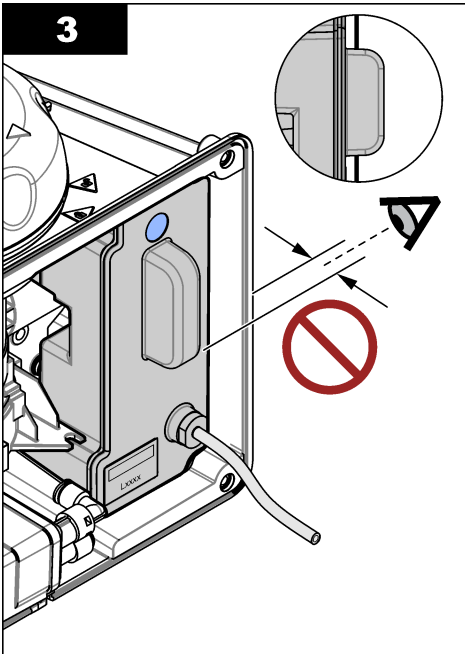
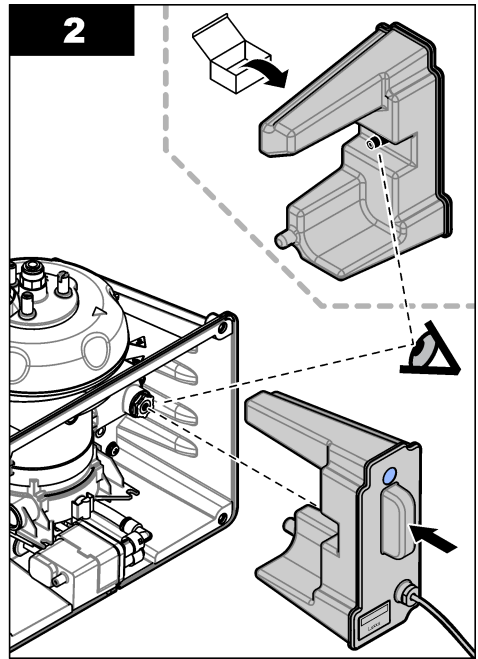
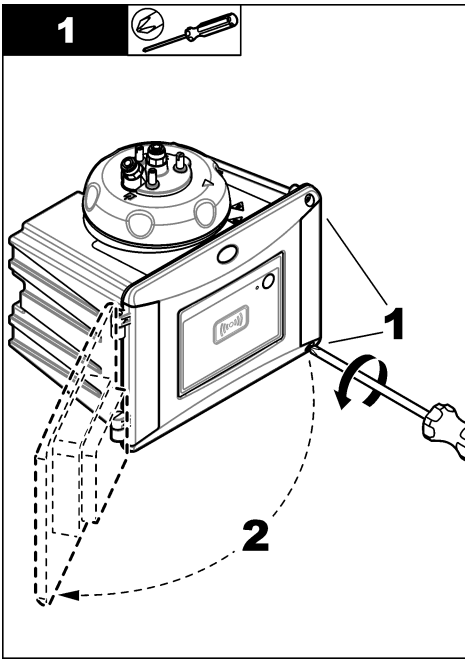
Figure 4 Examine the desiccant cartridge

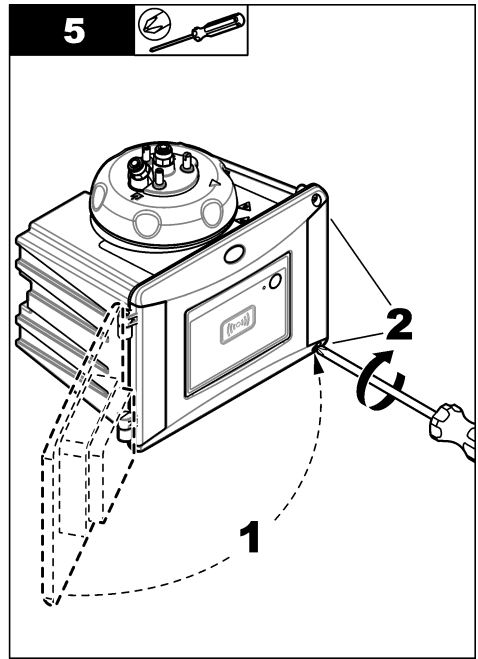
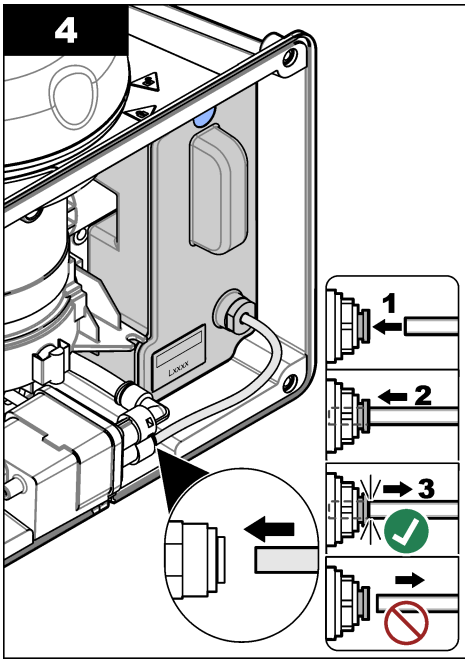


1 Install by date (mm.yyyy = month and year)

2 Indicator (light blue = not expired, white = expired)

3 Transport safety protection





3.5 Replace the cleaning lid screws

NOTICE

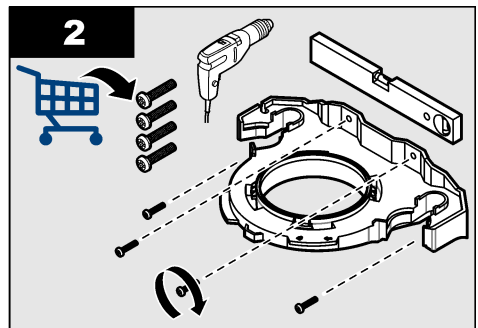
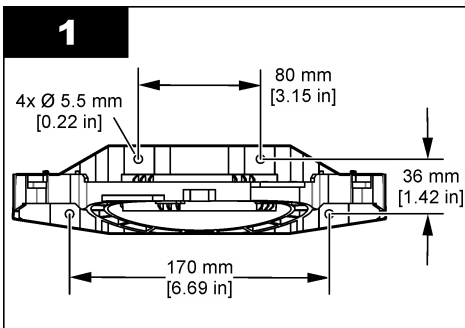
Do not overtighten the screws or breakage will occur. Hand tighten the screws.

If the sample temperature is 40 to 60 °C (104 to 140 °F), the cleaning lid screws will become hot. To prevent burns, replace the standard cleaning lid screws with the cleaning lid screws and washers for hot water. Refer to [Figure 1](#) on page 9 for the location of the cleaning lid screws.

3.6 Install the service bracket

The service bracket holds the process head (or the optional automatic cleaning module) when it is not installed on the instrument.

Refer to [Installation overview](#) on page 11 to install the service bracket the correct distance from the instrument. Refer to the illustrated steps that follow to install the service bracket.



3.7 Install the flow sensor (optional)

The optional flow sensor identifies if the sample flow is within specifications. A warning shows on the controller display and the status indicator light when a no flow, low flow or high flow warning occurs.

Install the optional flow sensor. Refer to the documentation supplied with the optional flow sensor.

3.8 Install the automatic cleaning module (optional)

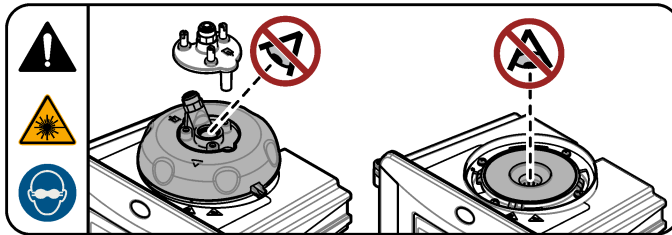
The automatic cleaning module cleans the inside of the process vial at a selected time interval. Install the optional automatic cleaning module. Refer to the documentation supplied with the automatic cleaning module.

3.9 Connect to an SC controller

⚠ CAUTION



Personal injury hazard. Do not look into the vial compartment when the instrument is connected to power.



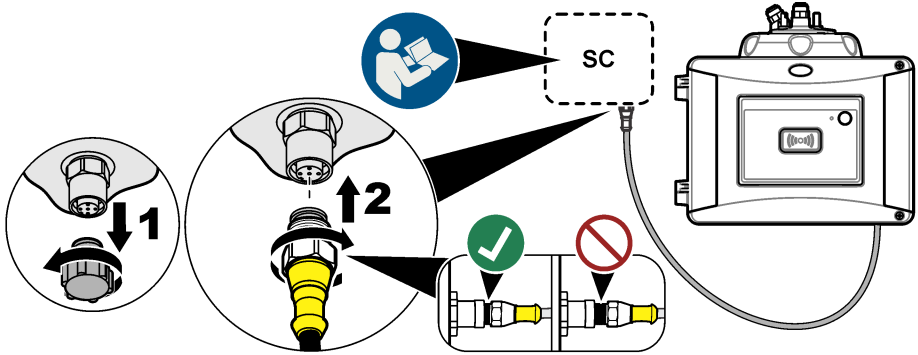
1. Get the latest software version from www.hach.com. Install the latest software version on the SC controller before the instrument is connected to the SC controller.

Refer to the software installation instructions supplied in the box or supplied in the software download for the SC controller.

2. Remove power to the SC controller.
3. Connect the sensor cable to the quick-connect fitting of the SC controller. Refer to [Figure 5](#). Keep the connector cap for later use.
4. Supply power to the SC controller.
The SC controller looks for the instrument.
5. When the SC controller finds the instrument, push **enter**.

On the main screen, the controller shows the turbidity value measured by the turbidimeter.

Figure 5 Connect the sensor cable to the SC controller



3.10 Plumbing

3.10.1 Plumb the instrument

⚠ WARNING



Explosion hazard. Make sure that the drain tube is free of all obstructions. If the drain tube has a blockage or is pinched or bent, high pressure can build up in the instrument.

⚠ WARNING



Personal injury hazard. The sample line contains water under high water pressure that can burn skin if hot. Qualified personnel must remove the water pressure and wear personal protective equipment during this procedure.



NOTICE

Do not let water get in the vial compartment or instrument damage will occur. Before the process head is installed on the instrument, make sure that there are no water leaks. Make sure that all tubing is fully seated. Make sure that the vial nut is tight. The full water pressure should be on the system, the water flow is on and no water leak on the glass vial is seen.

NOTICE

Hold the automatic cleaning module vertically when it is installed on the instrument or the vial can break. If the vial breaks, water will get in the vial compartment and instrument damage will occur.

NOTICE

Before the instrument is plumbed, make sure that the desiccant cartridge and vial are installed.

NOTICE

Based on the environmental conditions, is necessary to wait a minimum of 15 minutes to let the system become stable.

Items supplied by the user:

- Flow shutoff valve

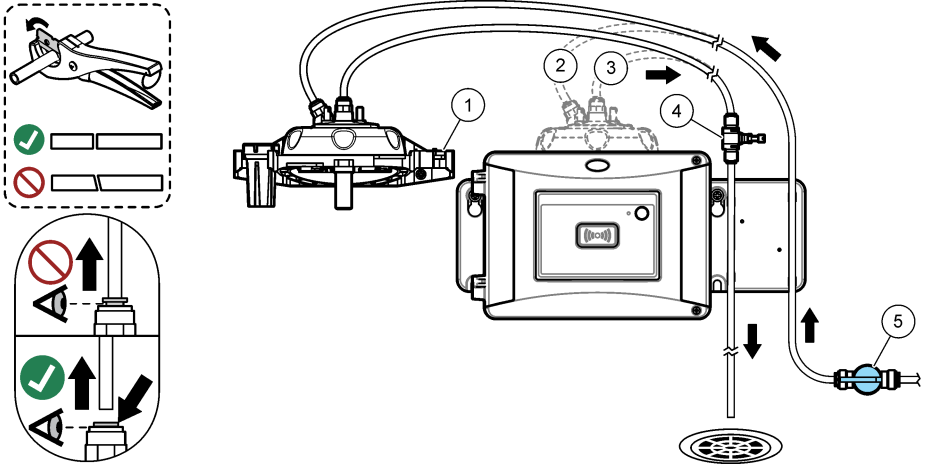
- Tubing⁷
- Tubing cutter

1. Plumb the instrument. Refer to the illustrated steps that follow and [Figure 6](#).

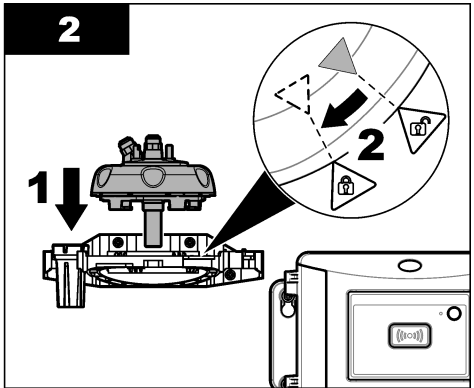
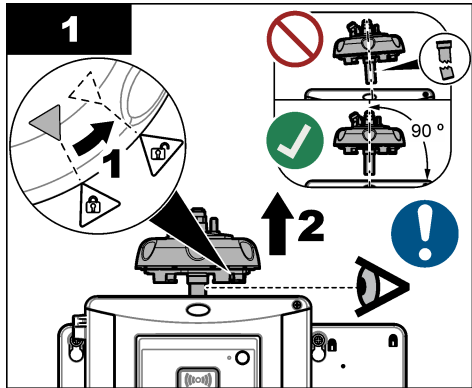
Note: To plumb the instrument with accessories, refer to the documentation supplied with the accessories.

Note: Use the opaque tubing accessory supplied from HACH accessory to prevent the bacteria growth.

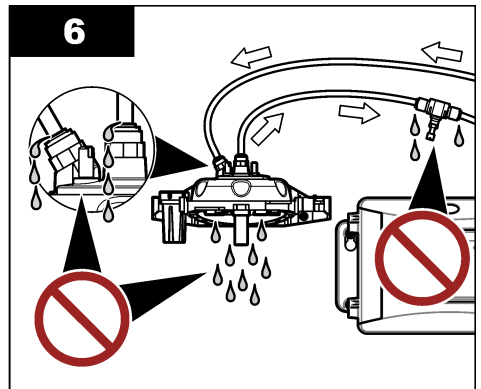
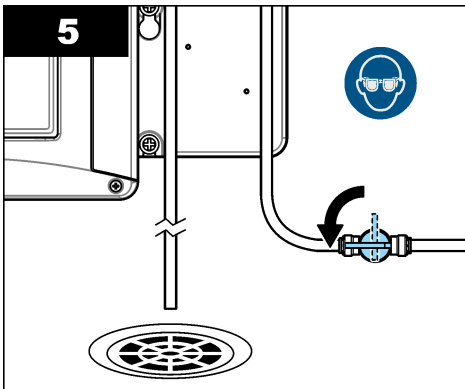
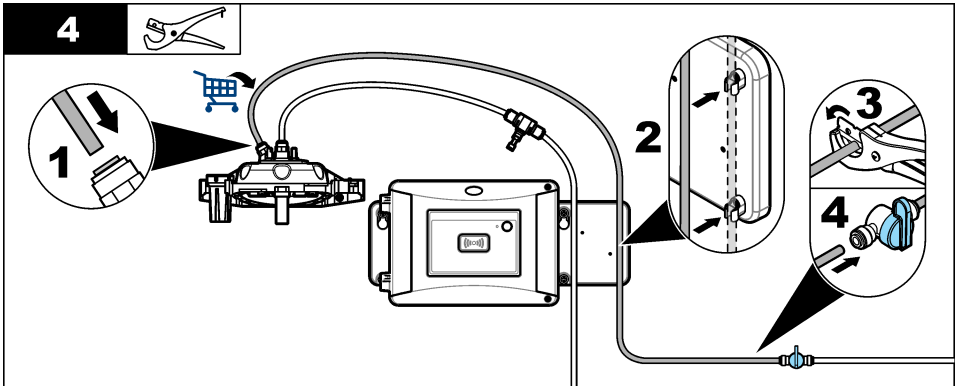
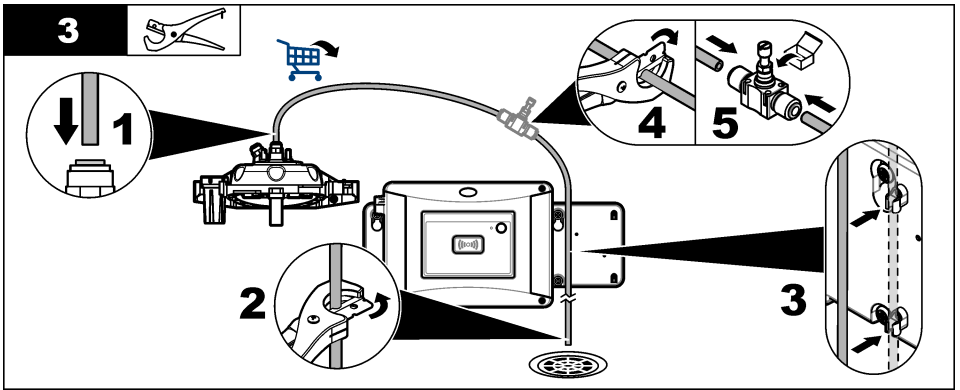
Figure 6 Plumbing overview – no accessories

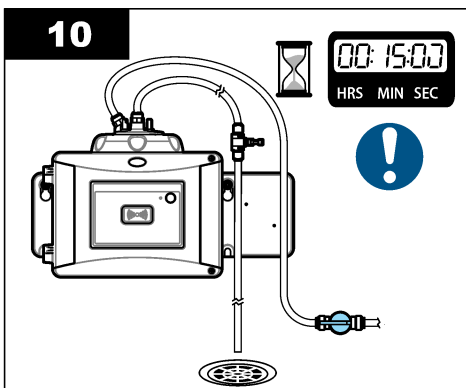
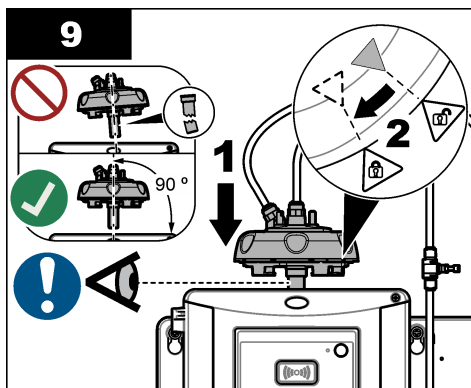
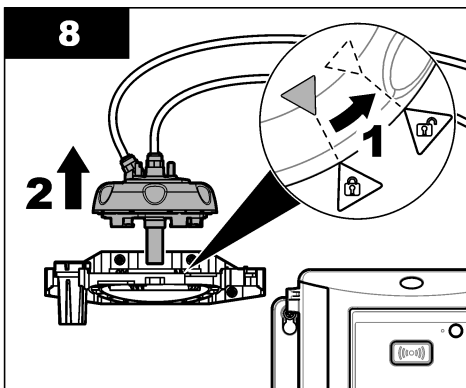
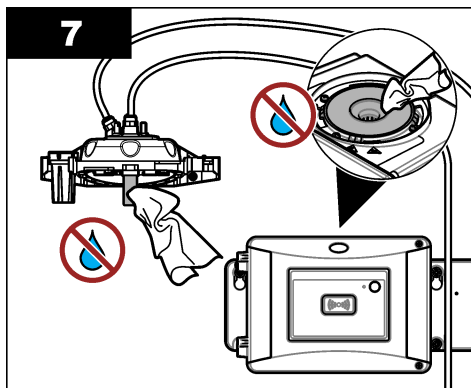


1 Service bracket	4 Flow regulator
2 Sample inlet	5 Flow shutoff valve
3 Sample outlet	



⁷ Refer to [Specifications](#) on page 3 for the tubing requirements.





3.10.2 Set the flow rate

1. Measure the flow with the flow regulator fully open. Make sure that the flow is in the middle of the flow specification. Refer to [Specifications](#) on page 3.
2. Slowly close the flow regulator until the flow decreases by 20 to 30%.
Note: The flow regulator causes back pressure in the tubing and decreases the quantity of bubbles that can form in the vial.

Section 4 User navigation

Refer to the controller documentation for keypad description and navigation information.

Push the **RIGHT** arrow key on the controller multiple times to show more information on the home screen and to show a graphical display.

Section 5 Operation

5.1 Configure the instrument

Select the location name, signal averaging, measurement units, resolution, bubble reject, logger interval, programmable button function and more.

1. Push **menu**.
2. Select **SENSOR SETUP>TU5x00 sc>CONFIGURE**.
3. Select an option.

Option	Description
LOCATION	Sets the name or location of the sample source. The name or location entered shows on the measurement screen (16 characters maximum, default: serial number).
SIGNAL AVG	When enabled, the turbidity reading that shows on the controller display is an average of the values measured during the time interval selected. TU5300 sc options: 30–90 seconds; TU5400 sc options: 1–90 seconds (default: 30 seconds). <i>Note: The manufacturer recommends that the Signal Average setting be set to 30 seconds or less because of the fast response of the instrument.</i>
MEAS UNITS	Selects the measurement units that show on the controller display and that are recorded to the data log. TU5300 sc options: NTU, FNU, TE/F, EBC or FTU. TU5400 sc options: NTU, mNTU, FNU, mFNU, TE/F, EBC, FTU or mFTU. Default: NTU.
RESOLUTION	Selects the number of decimal places that show on the controller display. Options: 0.001 or 0.0001. TU5300 sc default: 0.001. TU5400 sc default: 0.0001.
BUBBLE REJECT	Sets the bubble reject to on (default) or off. When set to on, high turbidity readings caused by bubbles in the sample are not shown or saved to the data log.
LOGGER INTERVAL	Sets the frequency that the turbidity reading is saved to the data log. Options: 5 or 30 seconds or 1, 2, 5, 10 (default), 15 or 30 minutes.
CLEANING	Configures the optional automatic cleaning module settings. Refer to the documentation supplied with the automatic cleaning module to configure the CLEANING setting. This option only shows when CLEANING MODULE is set to ON.
SET DEFAULTS	Sets the instrument settings to the factory defaults.
BUTTON FUNCTION	Sets the function of the programmable button. Refer to Figure 1 on page 9. SERVICE —When the button is pushed, changes the output mode to HOLD if the output mode is currently ACTIVE and changes the output mode to ACTIVE if the output mode is currently HOLD. LINK2SC —When the button is pushed, makes a Link2SC job file. Refer to Compare measurements with Link2SC on page 26. OFF (default) —Disables the button. In addition, when CLEANING MODULE is set to ON, the options that follow show. START WIPE —When the button is pushed, start a wiper cleaning cycle. WIPER REPLACE —When the button is pushed, puts the wiper in the position for wiper replacement.
FLOW SENSOR	Enables or disables the flow signal to show on the measurement screen and the DIAG/TEST>SIGNALS screen. Enables or disables flow signal warnings and errors to occur. When the optional flow sensor is installed, set to ON (default: OFF).

Option	Description
CLEANING MODULE	Enables or disables the automatic cleaning module menu options. When the optional automatic cleaning module is installed, set to ON (default: OFF). When this option is set to ON, the START WIPE option shows in the main SENSOR SETUP menu.
AUTO-CHECK	Sets the time interval and sensitivity of the automatic system check. This option only shows when the instrument has the automatic system check option. CHECK INTERVAL —Sets the time interval between automatic system checks. The automatic system check examines the condition of the vial. If the condition of the vial is bad, a warning message shows on the controller display. Options: OFF, 1, 2 (default), 3, 6, 12 hours or 1 day. SENSITIVITY —Sets the sensitivity of the automatic system check to the condition of the vial. Options: HIGH or LOW (default).

5.2 Show instrument information

Show instrument information and the instrument status to get diagnostic information.

1. Push **menu**.
2. Select **SENSOR SETUP>TU5x00 sc>DIAG/TEST**.
3. Select an option.

Option	Description
SENSOR INFO	Shows the sensor name, location, serial number, type (EPA or ISO), model number, software version and measurement device version.
SIGNALS	Shows real-time values for turbidity, flow rate ⁸ , the humidity set point and the air system humidity and temperature. Shows the vial condition (condensation and clarity) and the vial status (installed or not installed). Shows the lid type installed (calibration lid or process head).
COUNTERS	Shows the total operational time of the instrument, remaining number of wiper cycles, date the vial was installed/replaced, date the vial was cleaned, date of calibration, date of verification, operational time of the desiccant, remaining desiccant life, operational time of the air pump and date factory service was done. <i>Note: The counters are reset when menu-guided maintenance is done. Refer to the MAINTENANCE option that follows.</i>
MAINTENANCE	Starts menu-guided maintenance to replace or clean the vial, replace the wiper or replace the desiccant cartridge. START WIPE —Starts a wiper cleaning when the optional automatic cleaning module is installed. OUTPUT MODE —Selects the output behaviour during maintenance (default: HOLD). FACTORY SERVICE —For service use only.

5.3 Compare process and laboratory measurements

Compare process and laboratory measurements with RFID or Link2SC. Make sure that the process and lab instrument are calibrated with the same number of calibration points and with the same standards. Make sure that the calibrations are not expired.

⁸ A value less than 0.1 shows if the optional flow sensor is not installed.

5.3.1 Collect a grab sample

Collect a 100-mL sample (minimum) from the sample outlet tubing of the process instrument. Collect the sample in a clean glass bottle with a tight-fitting cap. Do not collect samples directly into a sample vial.

1. Rinse the glass bottle a minimum of three times with water from the sample outlet tubing of the process instrument. Let the bottle overflow with the sample.
2. Collect a 100-mL sample (minimum) in the glass bottle from the sample outlet tubing of the process instrument.
3. Put the cap on the sample bottle.
4. Analyze the grab sample immediately with the laboratory instrument to prevent settling, bacteria growth and temperature changes.

5.3.2 Compare measurements with RFID

When the process instrument and laboratory instrument have the optional RFID module, compare process and laboratory measurements with RFID.

Items to collect:

- TU5300 sc or TU5400 sc with the optional RFID module
- TU5200 with the optional RFID module
- TU5200 sample vials
- Glass sample bottle with a sample RFID sticker
- Operator RFID tag (optional)

1. At the process instrument, put the operator RFID tag (if available) near the RFID module. Refer to [Figure 1](#) on page 9 for the location of the RFID module.
2. Put a sample RFID sticker on the sample bottle.
3. Collect a grab sample. Refer to [Collect a grab sample](#) on page 25.
4. At the process instrument, put the RFID sticker that is on the sample bottle near the RFID module.

The instrument gives a sound signal. The status indicator light changes to blue.

The turbidity reading, operator ID (if available), location of the process instrument and the date and time are recorded on the RFID sticker.

5. Move the grab sample bottle to the laboratory instrument.
6. On the TU5200, push **Options>Reading Setup**.
7. Push **Bubble Reject**, then set bubble reject to on.
8. If the grab sample is 1 NTU or less, push **Reading>Minimum Mode**, then select 60 seconds.
Note: In minimum mode, readings are done continuously for 60 seconds when a measurement is done. The smallest reading within 60 seconds is saved to the data log.
9. At the laboratory instrument, put the operator RFID tag (if available) near the RFID module to log in.
10. Put the RFID sticker that is on the sample bottle near the RFID module.
The instrument gives a sound signal. The turbidity reading from the process instrument shows on the display.
11. Prepare a grab sample vial. Refer to *Prepare a sample vial* in the TU5200 documentation.
12. Measure the turbidity of the grab sample with the laboratory instrument. Refer to the TU5200 documentation.

If the difference between the process and laboratory measurements is not more than the selected acceptance range, "Measurement values match." shows on the display. Refer to the TU5200 documentation to select the acceptance range.

If "Measurement values do not match." shows on the display, click the link to show the troubleshooting steps.

13. To show the compare log, push **Options>Compare Log**. Refer to the TU5200 documentation for more options.
14. To send the verification data to external devices that are connected to the instrument, push **Options>Send Data**. Refer to the TU5200 documentation for more options.

5.3.3 Compare measurements with Link2SC

When the process instrument and laboratory instrument do not have the optional RFID module, compare the process and laboratory measurements with Link2SC.

Items to collect:

- TU5300 sc or TU5400 sc
- TU5200
- TU5200 sample vials
- SD card⁹ (or a LAN connection at the SC controller¹⁰ and the laboratory instrument¹¹)
- USB adapter for the SD card (if used)

1. Collect a grab sample. Refer to [Collect a grab sample](#) on page 25.
2. If the SC controller and laboratory instrument do not have a LAN connection, install the SD card in the SC controller. Refer to the SC controller documentation to install the SD card.
3. At the SC controller, make a Link2SC job file as follows:
 - a. Push **menu**.
 - b. Select **LINK2SC>CREATE A NEW JOB>TU5x00 sc**.
The SC controller makes a Link2SC job file. The turbidity reading, operator ID (if available), location of the process instrument and the date and time are recorded to the job file.
In addition, the temperature, calibration settings, bubble reject setting, vial clarity and desiccant cartridge life are recorded to the Link2SC job file.
4. Push **OK**, then **YES**.
5. Select **JOB>LAB**.
The Link2SC job file is saved to the SD card (if available) or sent to the laboratory instrument (when the SC controller and laboratory instrument have a LAN connection).
To see the Link2SC job files on the SD card, select **JOBS FROM CARD**.
6. If the SC controller and laboratory instrument do not have a LAN connection, complete the steps that follow.
 - a. Remove the SD card from the SC controller.
 - b. At the laboratory instrument, put the SD card in the USB adapter. Then put the USB adapter in a USB port type A on the laboratory instrument.
7. Move the grab sample bottle to the laboratory instrument.
8. On the TU5200, push **Options>Reading Setup**.
9. Push **Bubble Reject**, then set bubble reject to on.
10. If the grab sample is 1 NTU or less, push **Reading>Minimum Mode**, then select 60 seconds.
Note: In minimum mode, readings are done continuously for 60 seconds when a measurement is done. The smallest reading within 60 seconds is saved to the data log.
11. At the laboratory instrument, push the **LINK2SC** to show the job list.
12. Select the latest Link2SC job file.
The turbidity measurement from the process instrument shows on the right side of the display.
13. Prepare a grab sample vial. Refer to *Prepare a sample vial* in the TU5200 documentation.

⁹ Refer to the SC controller documentation for the SD card requirements.

¹⁰ Refer to the SC controller documentation to set up a LAN connection at the SC controller.

¹¹ Refer to the TU5200 documentation to set up a LAN connection at the laboratory instrument.

14. Measure the turbidity of the grab sample with the laboratory instrument. Refer to the TU5200 documentation.
If the difference between the process and laboratory measurements is not more than the selected acceptance range, "Measurement values match." shows on the display. Refer to to select the acceptance range.
If "Measurement values do not match." shows on the display, click the link to show the troubleshooting steps.
15. To show the compare log, push **Options>Compare Log**. Refer to the TU5200 documentation for more options.
16. To send the verification data to external devices that are connected to the instrument, push **Options>Send Data**. Refer to the TU5200 documentation for more options.

5.3.3.1 Configure the Link2SC settings

Select the acceptance range permitted when process and laboratory measurements are compared with Link2SC.

1. Push **menu**.
2. Select **SENSOR SETUP>TU5x00 sc>LINK2SC**.
3. Select an option.

Option	Description
ACCEPT. UNIT	Sets the units used to compare the process and laboratory measurements. Options: %, NTU or LAB. Select LAB when the acceptance range is supplied by the laboratory instrument.
ACCEPT. RANGE	Sets the maximum difference permitted between the process and laboratory measurements. Options: 1 to 50% (default: 10%). This option only shows when ACCEPT. UNIT is set to % or NTU.

Section 6 Calibration

▲ WARNING



Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

When the instrument is used for US EPA regulatory reporting, calibrations must be done according to US EPA guidance documents and methodologies. Contact local regulating authorities for additional compliance regulations.

The instrument is factory calibrated and the laser light source is stable. The manufacturer recommends that a calibration verification be done periodically to make sure that the system operates as intended. The manufacturer recommends calibration as local regulations require and after repairs or comprehensive maintenance work.

Use the optional calibration lid and a vial(s) with a StablCal standard or Formazin standard to calibrate the instrument. Refer to the Calibration lid documentation for more calibration procedures with and without RFID vials, 1-point and 2-point calibrations. As an alternative, use a syringe and StablCal standard or Formazin standard to calibrate the instrument.

6.1 Configure the calibration settings

Select the calibration curve, calibration interval, output behavior during calibration and more.

1. Push **menu**.
2. Select **SENSOR SETUP>TU5x00 sc>CALIBRATION>SETUP**.
3. Select an option.

Option	Description
MENU GUIDED	Sets menu-guided calibration to SEALED VIAL , SYRINGE or OFF (default). Calibration instructions show on the controller display ¹² during calibration when set to SEALED VIAL or SYRINGE . <i>Note: The MENU GUIDED option does not show when sealed vials with RFID are used.</i>
CAL CURVE¹³	Selects the type of standard and the calibration curve (range). STABLCAL 0–40 NTU (default)—1-point calibration (20 NTU) with StablCal. STABLCAL 0–700 NTU —2-point calibration (20 NTU and 600 NTU) with StablCal. FORMAZIN 0–40 NTU —2-point calibration (20 NTU and dilution water) with Formazin. FORMAZIN 0–700 NTU —3-point calibration (20 NTU and 600 NTU and dilution water) with Formazin. CUSTOM —2- to 6-point calibration (0.02 to 700 NTU) with StablCal or Formazin. The user selects the number of calibration points and the value of each calibration point.
VER AFTER CAL	Sets the instrument to start a verification immediately after the instrument is calibrated. When set to on, the verification standard is measured immediately after a calibration is done. Refer to Configure the verification settings on page 39.
CAL REMINDER	Sets the time interval between calibrations. The controller will show a reminder when a calibration is due. When a calibration is done, the calibration time is set to zero. Options: OFF (default), 1 day, 7 days, 30 days or 90 days.
OUTPUT MODE	Selects the output behavior during calibration. ACTIVE —The outputs continues to give the measurement values during calibration. HOLD (default)—Keeps the outputs at the last measurement value before calibration. The outputs give the measurement values again when the calibration procedure is complete. SET TRANSFER —Sets the outputs to the SET TRANSFER value selected in the controller settings. Refer to the controller setting for more information.
CAL POINTS	When the CAL CURVE setting is set to CUSTOM , this option sets the number of calibration points (2 to 6). This option only shows when the CAL CURVE setting is set to CUSTOM .
SET FACT CAL	Sets the calibration settings to the factory defaults.

¹² Or the Claros user interface for Claros controllers without a display.

¹³ Select the correct setting for the calibration with StablCal vials with RFID procedure. Refer to the applicable section of this manual.

6.2 Calibrate with a syringe

Pre-requisite: Configure the calibration settings. Refer to [Configure the calibration settings](#) on page 28.

⚠ WARNING



Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

Items to collect:

- StabiCal standard or prepared Formazin standard at the same ambient temperature as the sensor
- Calibration syringe and tubing

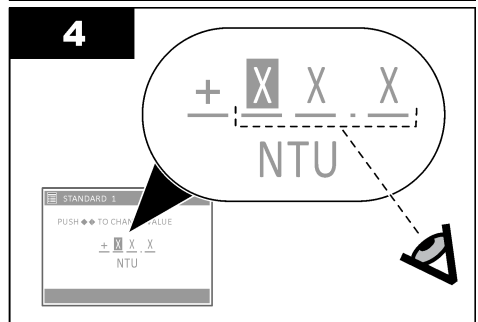
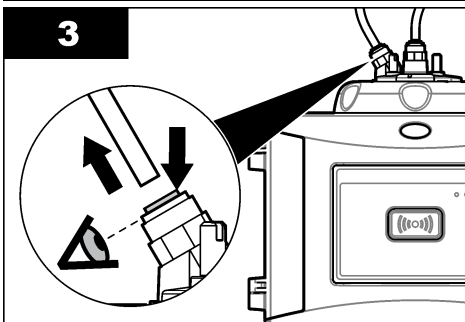
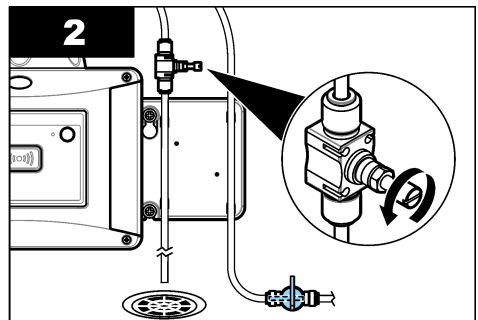
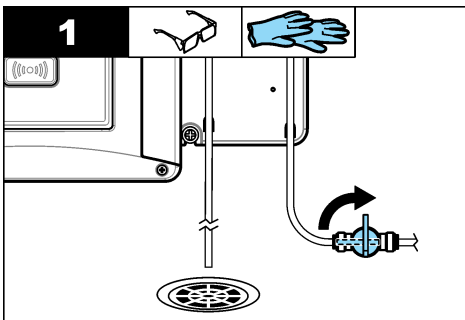
To prepare a Formazin standard(s), refer to [Prepare Formazin standards](#) on page 31. To make 4000-NTU Formazin stock solution, refer to [Make 4000-NTU Formazin stock solution](#) on page 31.

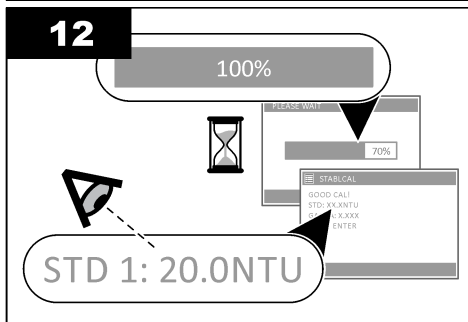
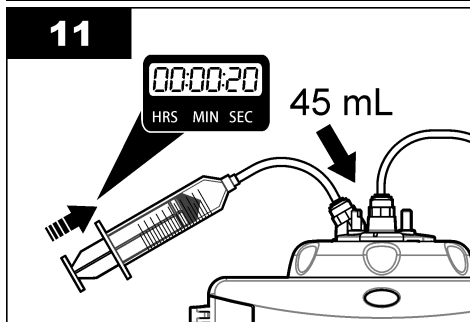
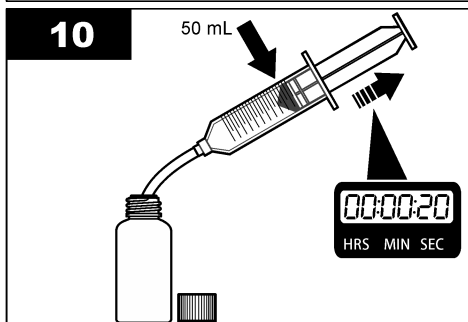
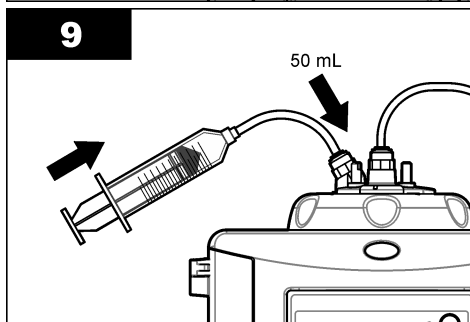
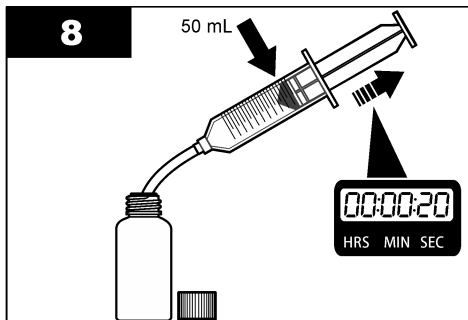
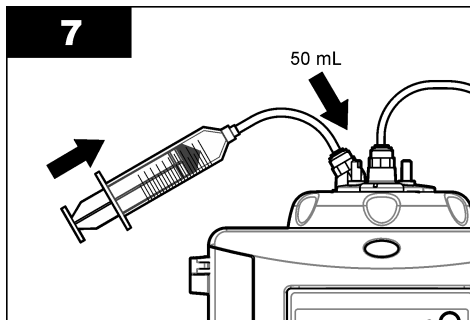
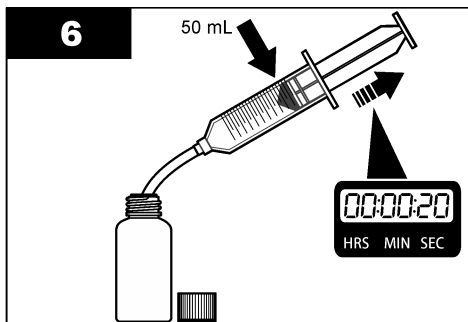
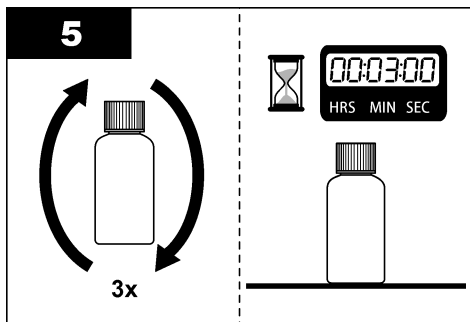
1. Push **menu**.
2. Select **SENSOR SETUP>TU5x00 sc>CALIBRATION>SETUP>MENU GUIDED>SYRINGE**.
3. Select **SENSOR SETUP>TU5x00 sc>CALIBRATION>START**.
4. Complete the steps shown on the display.

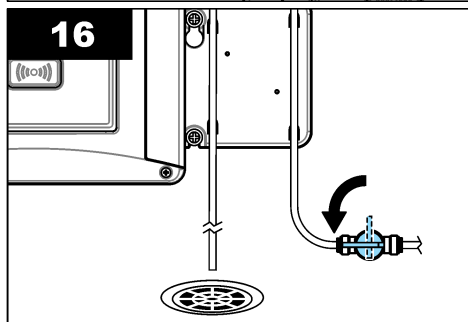
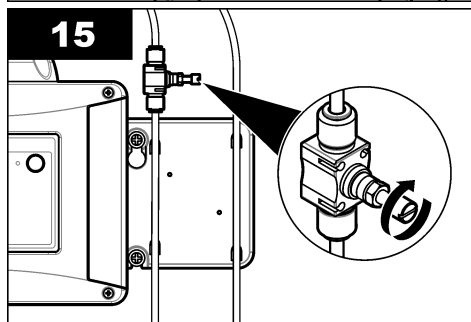
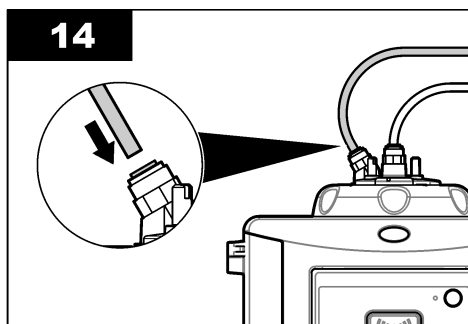
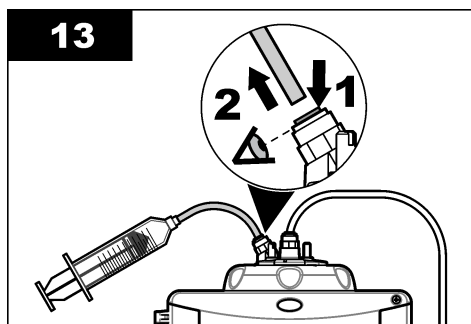
Refer to the illustrated steps that follow to complete the steps shown on the display.

At illustrated step 4, enter the measured turbidity value of the standard. If the standard value that shows on the display is correct, push confirm. The status indicator light changes to blue.

At illustrated step 15, fully open the flow regulator. Then slowly close the flow regulator until the flow decreases by 20 to 30%.







6.2.1 Make 4000-NTU Formazin stock solution

⚠ WARNING



Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

Note: The manufacturer recommends that Formazin stock solution is not made from raw materials. Preparation of Formazin stock solution is temperature and technique sensitive. Use Hach Formazin stock solution to get the best instrument performance and analytical standard accuracy.

1. Dissolve 5.000 grams of reagent grade hydrazine sulfate ($(\text{NH}_2)_2\text{H}_2\text{SO}_4$) in about 400 mL of demineralized water.
2. Dissolve 50.000 grams of reagent grade hexamethylenetetramine in approximately 400 mL of demineralized water.
3. Quantitatively, pour the two solutions in a 1-liter volumetric flask, and dilute to volume with demineralized water. Mix fully.
4. Let the solution stand for 48 hours at $25 \pm 1 \text{ }^\circ\text{C}$ ($77 \pm 1 \text{ }^\circ\text{F}$).

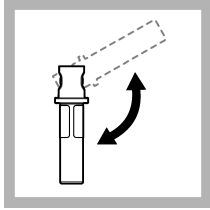
6.2.2 Prepare Formazin standards

Prepare Formazin standards immediately before a calibration and discard after use.

1. Prepare a 20 NTU Formazin standard as follows:
 - a. Use a pipet to add 5.0 mL of 4000 NTU Formazin standard solution in a 1-L volumetric flask.

- b. Dilute to the mark with deionized water or distilled water with a turbidity of less than 0.5 NTU. Put in the stopper and mix well.
2. When the sample turbidity range is 40 to 700 NTU¹⁴, prepare a 600 NTU Formazin standard as follows:
- a. Use a pipet to add 15.0 mL of 4000 NTU Formazin standard solution in a 100-mL volumetric flask.
 - b. Dilute to the mark with deionized water or distilled water with a turbidity of less than 0.5 NTU. Put in the stopper and mix well.

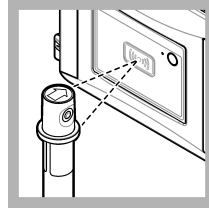
6.3 1-point calibration without verification



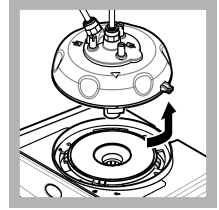
1. Invert the 20 NTU StablCal vial for 2 to 3 minutes. Refer to the documentation supplied with the StablCal vials.



2. Clean and dry the vial with a no-lint cloth. Refer to [Prevent vial contamination](#) on page 34.

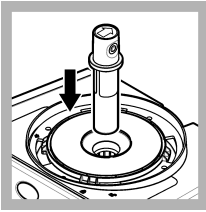


3. Put the 20 NTU vial in front of the RFID module. A beep sound is heard and the status indicator light flashes blue. If the status indicator light does not flash blue refer to [Troubleshooting](#) on page 34. The instrument records the value, the lot number, the expiration date and the Certificate of Analysis information from the RFID vial to the data log.

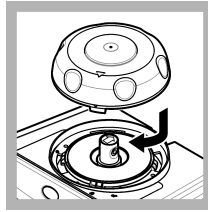


4. Remove the process head (or the automatic cleaning module).

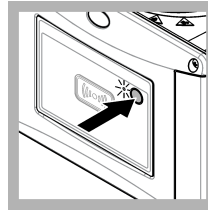
¹⁴ 1 mNTU = 0.001 NTU



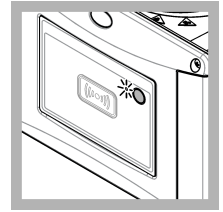
5. Put the 20 NTU vial in the vial compartment.



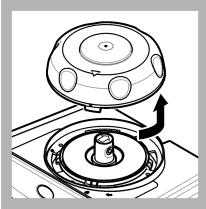
6. Install the calibration lid. Make sure that the calibration lid is in the closed position.



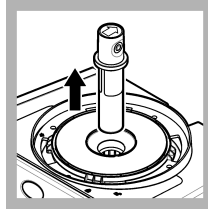
7. Push the button on the front of the instrument.



8. Wait 30 to 60 seconds for the measurement to complete. The status indicator light slowly flashes blue during the measurement.



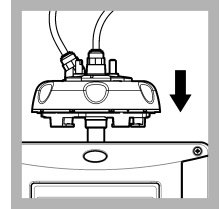
9. When the status indicator light flashes green, remove the calibration lid.



10. Remove the vial.



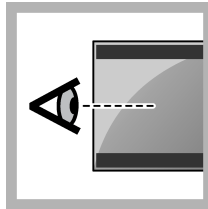
11. Make sure that there is no water on the process head (or the automatic cleaning module). Dry all possible spills to prevent water ingress on the vial compartment.



12. Hold the process head (or automatic cleaning module) vertically when it is installed on the instrument or the vial can break.



13. Push the button on the front of the instrument to save the calibration value. The status indicator light stays green.



14. Examine the calibration data on the controller menu or the Claros user interface.

6.3.1 Troubleshooting

6.3.1.1 Status indicator light

Problem	Possible cause	Solution
The status indicator light does not change.	RFID communication failure	Make sure that the TU5x00 has an RFID reader.
		Make sure that the StablCal vial is an RFID cuvette.
		The RFID tag of the cuvette is defective.
The status indicator light flashes red.	The calibration setting is not correct.	Make sure that the calibration setting is configured with STABL CAL.
	The cuvette has expired.	Use a new cuvette.

6.3.2 Prevent vial contamination

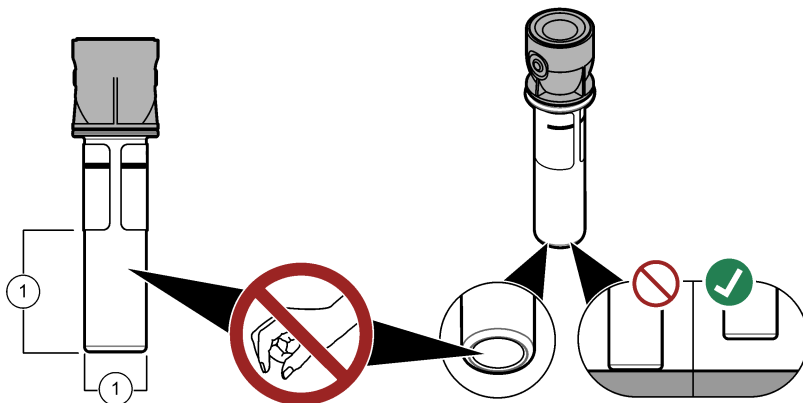
NOTICE

Do not to touch or scratch the glass of the sample vial. Contamination or scratches on the glass can cause measurement errors.

The glass must stay clean and have no scratches. Use a no-lint cloth to remove dirt, fingerprints or particles from the glass. Replace the sample vial when the glass has scratches.

Refer to [Figure 7](#) to identify where not to touch the sample vial. Always keep the sample vials in the vial stand to prevent contamination on the bottom of the vial.

Figure 7 Sample vial overview



1 Measurement surface—Do not touch.

6.4 Calibrate with vials without RFID

6.4.1 Make 4000-NTU Formazin stock solution

▲ WARNING



Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

Note: The manufacturer recommends that Formazin stock solution is not made from raw materials. Preparation of Formazin stock solution is temperature and technique sensitive. Use Hach Formazin stock solution to get the best instrument performance and analytical standard accuracy.

1. Dissolve 5.000 grams of reagent grade hydrazine sulfate ((NH₂)₂-H₂SO₄) in about 400 mL of demineralized water.
2. Dissolve 50.000 grams of reagent grade hexamethylenetetramine in approximately 400 mL of demineralized water.
3. Quantitatively, pour the two solutions in a 1-liter volumetric flask, and dilute to volume with demineralized water. Mix fully.
4. Let the solution stand for 48 hours at 25 ± 1 °C (77 ± 1 °F).

6.4.2 Prepare the standard vial(s)

▲ CAUTION



Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.

NOTICE

Always put a cap on the sample vial to prevent spills in the vial compartment.

To use sealed vials for calibration, immediately go to [Calibration procedure—vials without RFID](#) on page 37. To use unsealed vials for calibration, prepare the standard vial(s) as follows:

1. For formazin calibration, prepare the formazin standards with 4000-NTU formazin stock solution. Refer to [Prepare Formazin standards](#) on page 31.

Note: To make 4000-NTU formazin stock solution, refer to [Make 4000-NTU Formazin stock solution](#) on page 31.

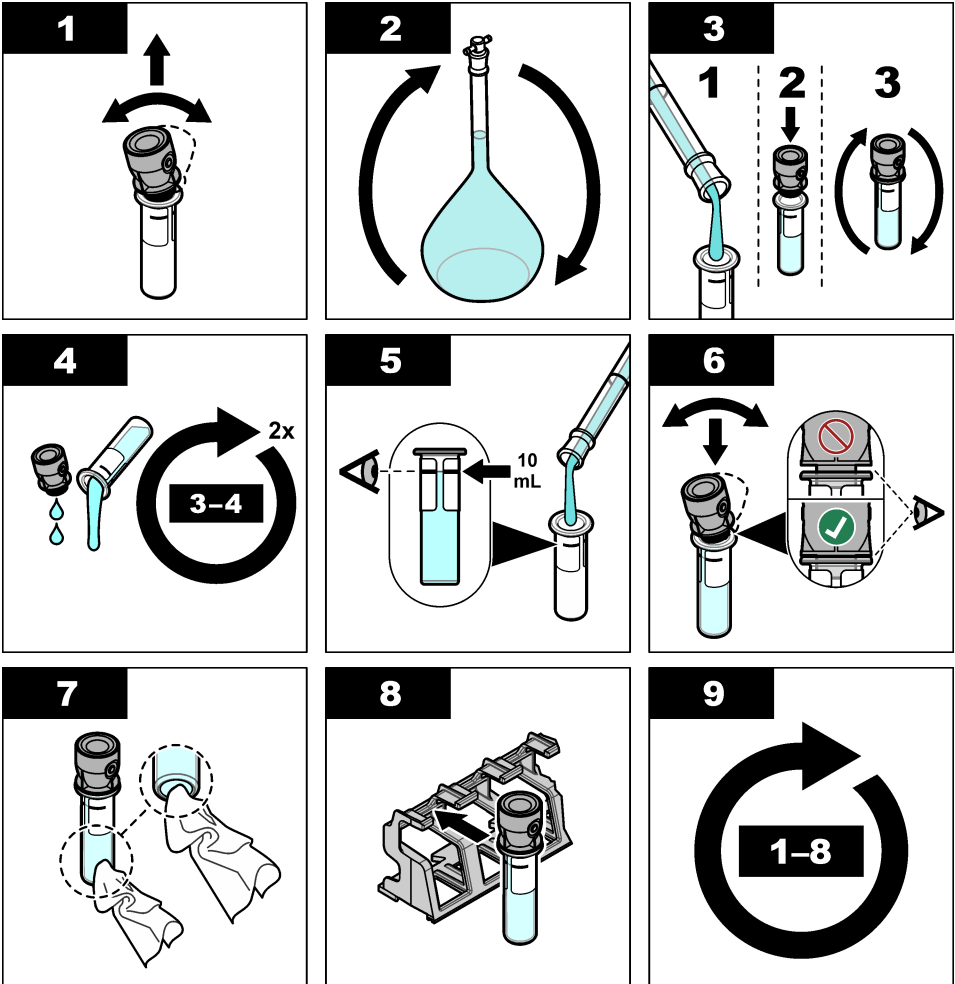
2. Prepare the standard vial(s). Refer to the illustrated steps that follow.
 - **FORMAZIN 0–40 NTU (or 0–40 FNU) calibration**—Two vials: formazin 20 NTU and dilution water¹⁵ used to prepare the formazin standard.
 - **FORMAZIN 0–700 NTU (or 0–1000 FNU) calibration**—Three vials: formazin 20 NTU, formazin 600 NTU and the dilution water¹⁵ used to prepare the formazin standards
 - **STABLCAL 0-40 NTU (or 0–40 FNU) calibration**—One vial: StablCal 20 NTU
 - **STABLCAL 0-700 NTU (or 0–1000 FNU) calibration**—Two vials: StablCal 20 NTU and StablCal 600 NTU

Make sure that the standard is at the same ambient temperature as the sensor.

If there is contamination in the sample vial after it is rinsed with the sample, clean the sample vial. Refer to the TU5200 documentation for vial cleaning instructions.

¹⁵ Make sure that the vial contains dilution water for a minimum of 12 hours before the procedure.

If calibration with verification is used, make sure to measure the verification standard with the menu item **Define Std Val**. Refer to [Configure the verification settings](#) on page 39.



6.4.2.1 Make 4000-NTU Formazin stock solution

⚠ WARNING



Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

Note: The manufacturer recommends that Formazin stock solution is not made from raw materials. Preparation of Formazin stock solution is temperature and technique sensitive. Use Hach Formazin stock solution to get the best instrument performance and analytical standard accuracy.

1. Dissolve 5.000 grams of reagent grade hydrazine sulfate ((NH₂)₂-H₂SO₄) in about 400 mL of demineralized water.
2. Dissolve 50.000 grams of reagent grade hexamethylenetetramine in approximately 400 mL of demineralized water.
3. Quantitatively, pour the two solutions in a 1-liter volumetric flask, and dilute to volume with demineralized water. Mix fully.
4. Let the solution stand for 48 hours at 25 ± 1 °C (77 ± 1 °F).

6.4.2.2 Prepare Formazin standards

Prepare Formazin standards immediately before a calibration and discard after use.

1. Prepare a 20 NTU Formazin standard as follows:
 - a. Use a pipet to add 5.0 mL of 4000 NTU Formazin standard solution in a 1-L volumetric flask.
 - b. Dilute to the mark with deionized water or distilled water with a turbidity of less than 0.5 NTU. Put in the stopper and mix well.
2. When the sample turbidity range is 40 to 700 NTU¹⁶, prepare a 600 NTU Formazin standard as follows:
 - a. Use a pipet to add 15.0 mL of 4000 NTU Formazin standard solution in a 100-mL volumetric flask.
 - b. Dilute to the mark with deionized water or distilled water with a turbidity of less than 0.5 NTU. Put in the stopper and mix well.

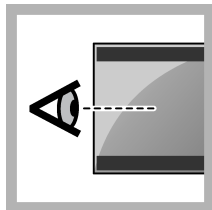
6.4.3 Calibration procedure—vials without RFID



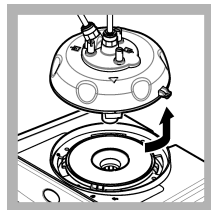
1. Push menu.
Select SENSOR
SETUP> TU5x00
sc> CALIBRATION>
SETUP> MENU
GUIDED> SEALED
VIAL.



**2. Select SENSOR
SETUP> TU5x00
sc> CALIBRATION>
START.**
The status indicator
light changes to
blue.



**3. Follow the
instructions on the
controller display.**



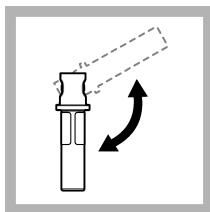
**4. Remove the
process head (or the
automatic cleaning
module).**

¹⁶ 1 mNTU = 0.001 NTU



5. Enter the value of the vial and push **ENTER**.

The status indicator light changes to blue.

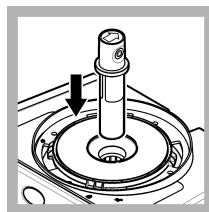


6. Carefully invert the vial a minimum of three times.

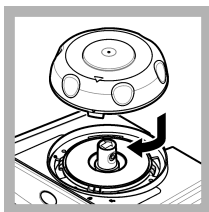
For StabCal vials, invert the 20 NTU StabCal vial for 2 to 3 minutes. Refer to the documentation supplied with the StabCal vials.



7. Clean and dry the vial with a no-lint cloth. Refer to [Prevent vial contamination](#) on page 34.



8. Put the vial in the vial compartment.

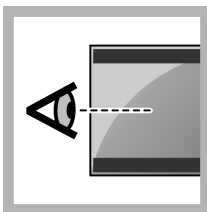


9. Install the calibration lid. Make sure that the calibration lid is in the closed position.

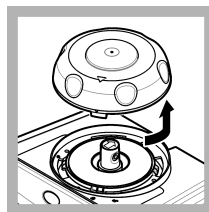


10. If the standard value that shows on the display is not correct, enter the accurate turbidity value of the standard from the certificate of analysis.

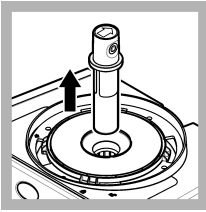
If the standard value that shows on the display is correct, push **enter**.



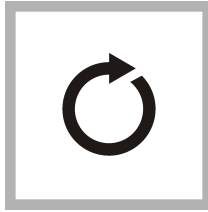
11. Complete the steps that show on the controller display.



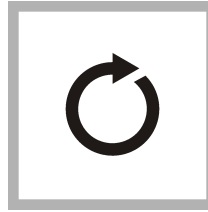
12. When the status indicator light changes to green, remove the calibration lid.



13. Remove the vial.



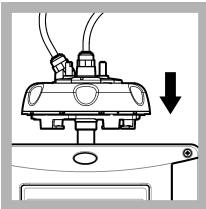
14. Do steps 4 to 12 again until all of the standard vials are measured.



15. If the value of the verification standard shows on the display, do steps 6 to 12 again to measure the verification standard.



16. Make sure that there is no water on the process head (or the automatic cleaning module). Dry all possible spills to prevent water ingress on the vial compartment.



17. Install the process head (or the automatic cleaning module).



18. Push ENTER to save the calibration value. The status indicator light stays green.

Section 7 Verification

Use the optional calibration lid and a sealed-vial 10-NTU StablCal standard (or a StablCal 10 NTU standard and a syringe) to do a primary calibration verification. As an alternative, use the optional calibration lid and the optional glass verification rod (< 0.1 NTU) to do a secondary calibration verification in the lower range of turbidity.

Do a calibration verification immediately after each calibration to measure the verification standard and record the measured value to the instrument.

Do calibration verifications between calibrations according to the regulatory recommendations to identify if the instrument operates correctly and is calibrated.

When a calibration verification is done between calibrations, the verification standard is measured. The measured value is compared to the recorded value of the verification standard.

7.1 Configure the verification settings


Measure the value of the verification standard. Set the acceptance range and measurement units for verification. Set the verification reminder and type of menu guided verification. Set the output behavior during verification.

1. Push **menu**.
2. Select SENSOR SETUP>VERIFICATION>SETUP.
3. Select an option.

Option	Description
MENU GUIDED	Sets menu-guided verification to SEALED VIAL, SYRINGE or OFF (default). Verification instructions show on the controller display during verification when set to SEALED VIAL or SYRINGE. Select SEALED VIAL for verification with the glass verification rod.
DEFINE STD VAL	Measures the verification standard for later use during the verification. The instrument records the results to the data log. For the best results, measure the verification standard immediately after calibration.
ACCEPT. UNIT	Sets the acceptance range for verification to a percentage (1 to 99%) or an NTU value (0.015 to 100.00 NTU). Options: % or NTU (or mNTU).
ACCEPT. RANGE	Sets the maximum difference permitted between the recorded value of the verification standard and the measured value of the verification standard during verification. Options: 1 to 99% or 0.015 to 100.00 NTU.
VERIF REMINDER	Sets the time interval between calibration verifications. The display will show a reminder when a verification is due. Options: OFF(default), 1 day, 7 days, 30 days or 90 days. When a verification is done, the verification time is set to zero.
OUTPUT MODE	Sets the output behavior during verification. ACTIVE -The outputs continues to agree with the operating conditions. HOLD (default)-Keeps the outputs at the last known value when communication is lost. SET TRANSFER -Sets the outputs to the Set Transfer value selected in the controller settings.

7.2 Do a calibration verification with a syringe

Pre-requisite: Configure the verification settings. Refer to [Configure the verification settings](#) on page 39.

⚠ WARNING	
	<p>Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.</p>

Items to collect:

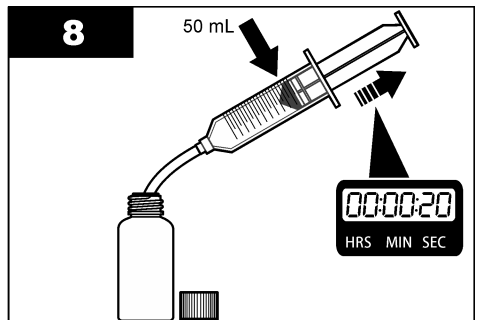
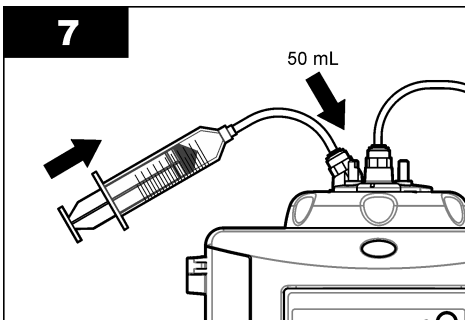
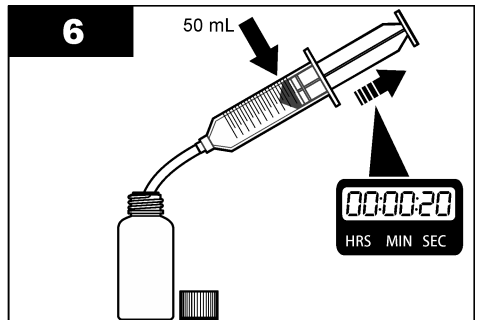
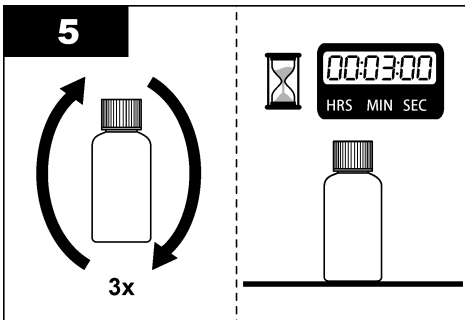
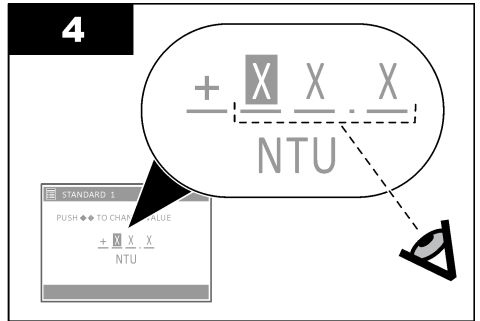
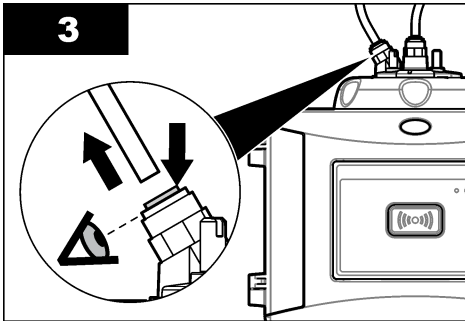
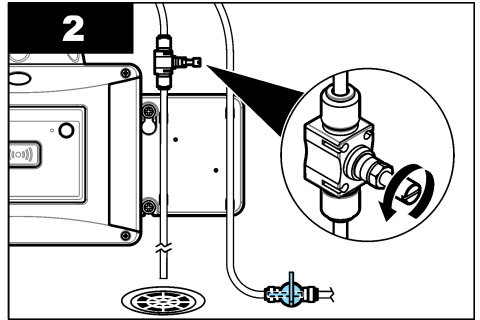
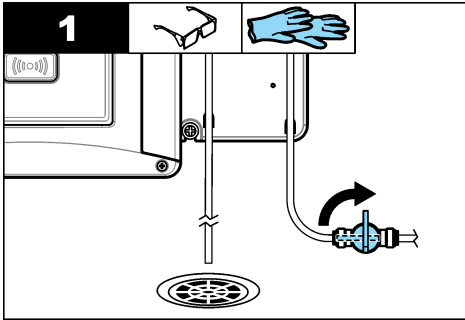
- StablCal 10 NTU standard at the same ambient temperature as the sensor
- Calibration syringe and tubing

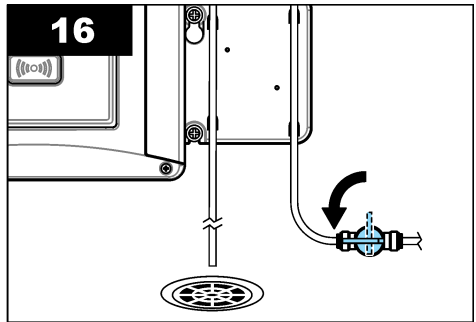
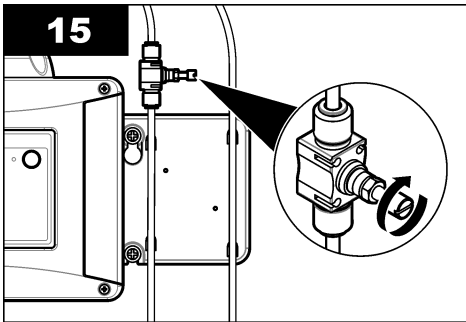
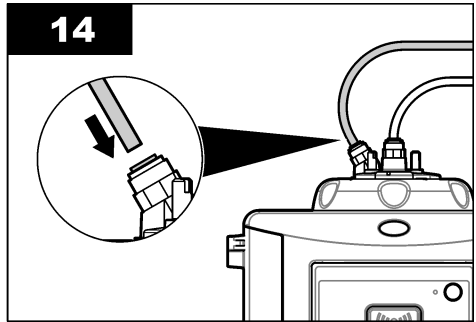
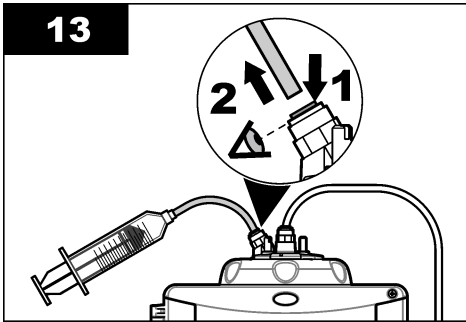
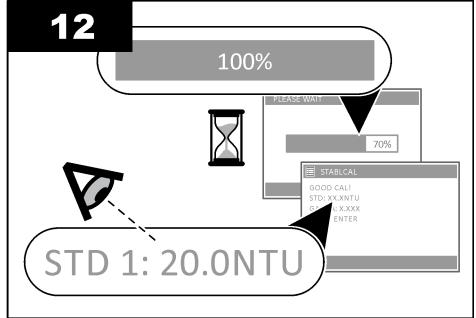
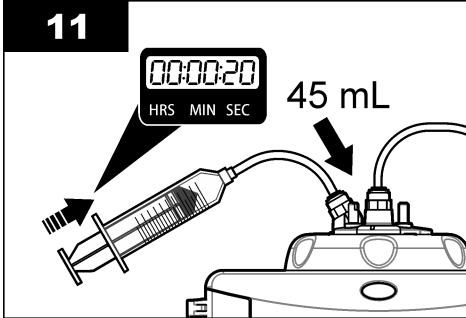
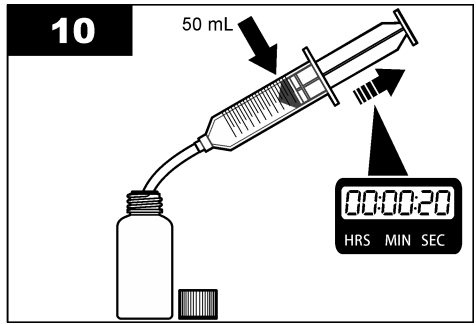
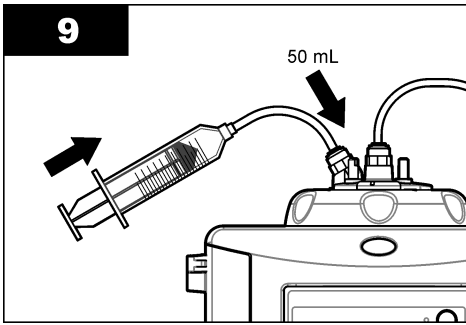
1. Push **menu**.
2. Select SENSOR SETUP>TU5x00 sc>VERIFICATION>SETUP>MENU GUIDED>SYRINGE.
3. Select SENSOR SETUP>TU5x00 sc>VERIFICATION>START.

4. Complete the steps shown on the display.
Refer to the illustrated steps that follow to complete the steps shown on the display.

At illustrated step 4, enter the measured turbidity value of the verification standard. If the verification standard value that shows on the display is correct, push confirm. The status indicator light changes to blue.

At illustrated step 15, fully open the flow regulator. Then slowly close the flow regulator until the flow decreases by 20 to 30%.





7.3 Do a calibration verification with a sealed vial or glass rod

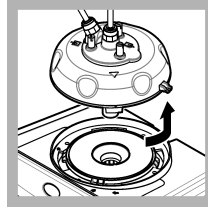
Use the optional calibration lid and a sealed-vial 10-NTU StablCal standard to do a primary calibration verification. As an alternative, use the optional calibration lid and the optional glass verification rod (< 0.1 NTU) to do a secondary calibration verification.



1. Push menu.
Select SENSOR
SETUP> TU5x00
sc>
VERIFICATION>
SETUP>MENU
GUIDED> SEALED
VIAL.



**2. Select SENSOR
SETUP> TU5x00
sc>
VERIFICATION>
START.**



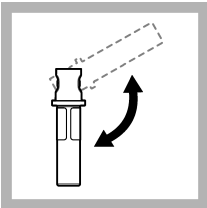
**3. Remove the
process head (or the
automatic cleaning
module). Press
ENTER.**



**4. If the verification
standard value that
shows on the display
is not correct, enter
the accurate turbidity
value of the
verification standard
from the certificate of
analysis for the
sealed-vial StablCal
standard or from the
last recorded value
from the <0.1 NTU
glass rod.**

If the verification
standard value that
shows on the display
is correct, push
confirm.

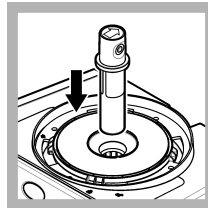
The status indicator
light flashes blue.



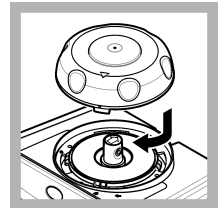
**5. If the verification
standard is a liquid
standard, carefully
invert the verification
standard vial a
minimum of three
times.**



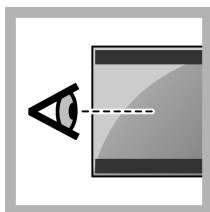
**6. Clean and dry the
verification standard
vial with a no-lint
cloth. Refer to
[Prevent vial
contamination](#)
on page 34.**



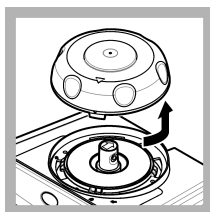
**7. Put the vial in the
vial compartment.**



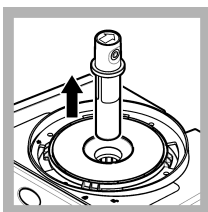
**8. Install the
calibration lid. Make
sure that the
calibration lid is in
the closed position.**



9. Complete the steps that show on the controller display.



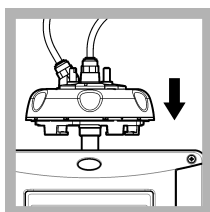
10. When the status indicator light flashes green, remove the calibration lid.



11. Remove the vial.



12. Make sure that there is no water on the process head (or the automatic cleaning module). Dry all possible spills to prevent water ingress on the vial compartment.



13. Install the process head (or the automatic cleaning module).



14. Push ENTER to save the calibration value. The status indicator light stays green.

7.4 Show the calibration or verification history

To show the historical data for the last four calibrations, push menu and select SENSOR SETUP>TU5x00 sc>CALIBRATION>CAL LOG.

To show the historical data for the last four verifications, push menu and select SENSOR SETUP>TU5x00 sc>VERIFICATION>VERIF LOG.

Section 8 Maintenance

▲ WARNING



Burn hazard. Obey safe handling protocols during contact with hot liquids.

▲ CAUTION



Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

▲ CAUTION



Personal injury hazard. Never remove covers from the instrument. This is a laser-based instrument and the user risks injury if exposed to the laser.

▲ CAUTION



Personal injury hazard. Glass components can break. Handle with care to prevent cuts.

NOTICE

Do not disassemble the instrument for maintenance. If the internal components must be cleaned or repaired, contact the manufacturer.

NOTICE

Stop the sample flow to the instrument and let the instrument become cool before maintenance is done.

To set the output behavior during maintenance, push **menu** and select SENSOR SETUP>TU5x00 sc>DIAG/TEST>MAINTENANCE>OUTPUT MODE.

8.1 Maintenance schedule

Table 3 shows the recommended schedule of maintenance tasks. Facility requirements and operating conditions may increase the frequency of some tasks.

Table 3 Maintenance schedule

Task	1 to 3 months	1 to 2 years	As necessary
Clean the vial on page 46 <i>Note: The cleaning interval is dependent on the water quality.</i>	X		
Clean the vial compartment on page 48			X
Replace the vial on page 49		X	
Replace the desiccant cartridge on page 51 <i>Note: The replacement interval is dependent on the ambient humidity, ambient temperature and sample temperature.</i>		X ¹⁷	
Replace the tubing on page 51			X

8.2 Clean spills

▲ CAUTION



Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.

1. Obey all facility safety protocols for spill control.
2. Discard the waste according to applicable regulations.

¹⁷ Two years or as identified by instrument notification.

8.3 Clean the instrument

Clean the exterior of the instrument with a moist cloth and a mild soap solution and then wipe the instrument dry as necessary.

8.4 Clean the vial

⚠ WARNING



Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

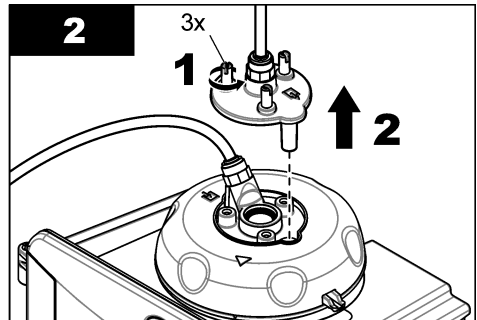
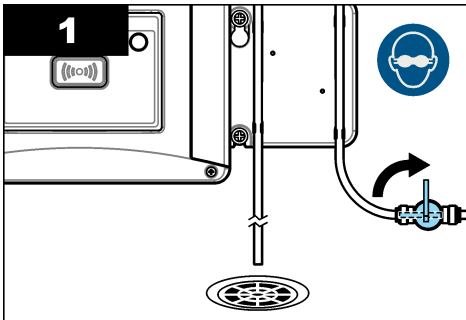
When the turbidity reading shows that there is contamination in the process vial or "VIAL CLARITY" shows on the controller display, clean the vial.

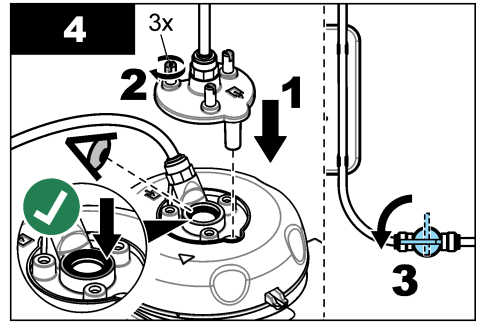
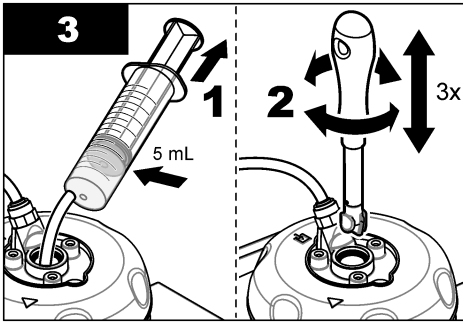
1. Push **menu**.
2. Select **SENSOR SETUP>TU5x00 sc>DIAG/TEST>MAINTENANCE>VIAL CLEANING**.
3. Complete the steps that show on the controller display. The instrument automatically saves the cleaning process date after the last screen shows.
4. If the optional automatic cleaning module is installed, push **menu** and select **SETUP>TU5x00 sc>START WIPE** to start the automatic cleaning process.
5. If the optional automatic cleaning module is not installed, clean the vial with the manual vial wiper.

NOTICE

Carefully remove most of the water in the vial. Carefully put the vial wiper into the process vial so that no water spills out.

Clean the process vial with the manual vial wiper as shown in the illustrated steps that follow.

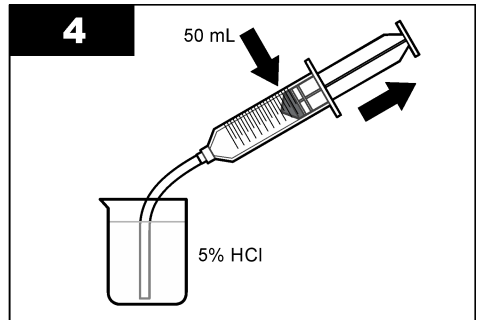
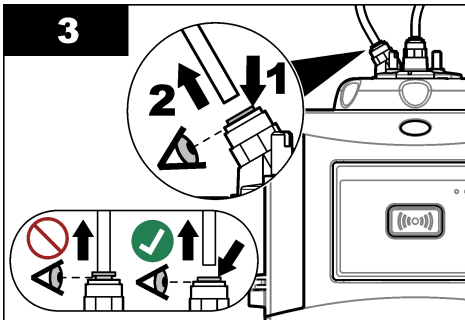
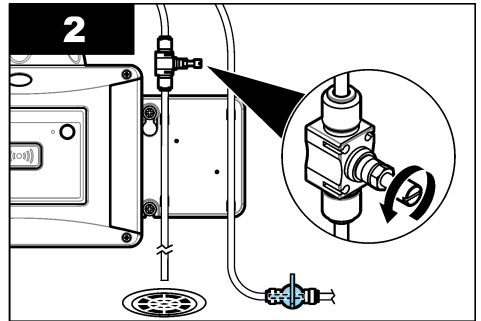
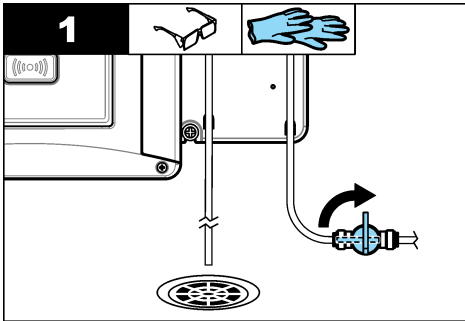


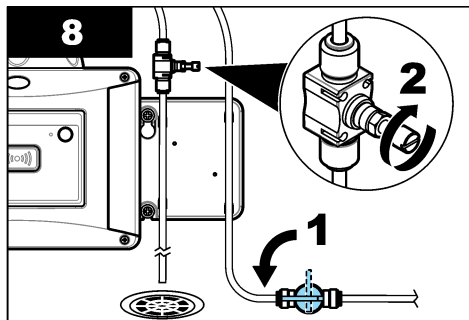
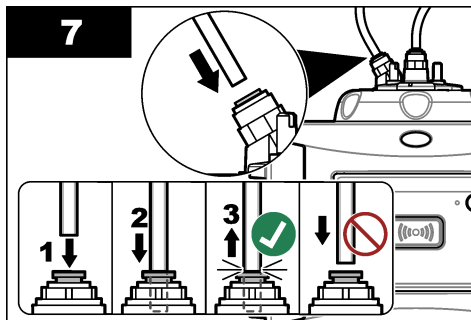
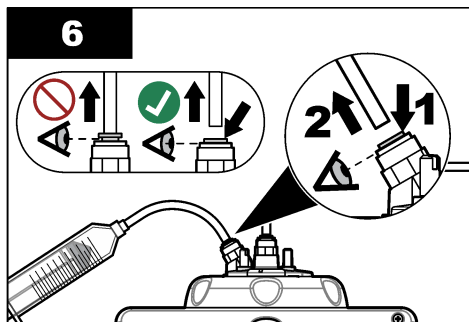
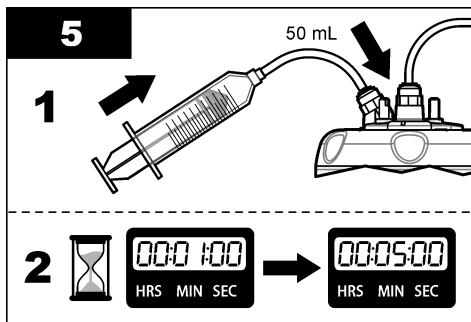


8.4.1 Do a chemical vial cleaning

If the turbidity readings do not go back to the original values, do the illustrated steps that follow to clean the vial.

Note: Hold the output values of the SC controller as necessary before the illustrated steps are done. Refer to the SC controller documentation to hold the outputs.





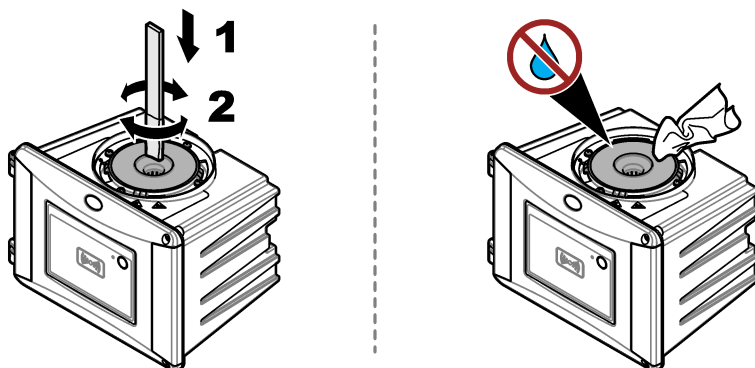
8.5 Clean the vial compartment

Clean the vial compartment only when the compartment has contamination. Make sure that the tool to clean the vial compartment has a soft surface and does not damage the instrument. [Table 4](#) and [Figure 8](#) show the options on how to clean the vial compartment.

Table 4 Cleaning options

Contaminant	Options
Dust	Vial compartment wiper, micro fiber cloth, lint-free cloth
Liquid, oil	Cloth, water and cleaning agent

Figure 8 Cleaning options



8.6 Replace the vial

NOTICE

Keep water out of the vial compartment or instrument damage will occur. Before the automatic cleaning module is installed on the instrument, make sure that there are no water leaks. Make sure that all tubing is fully seated. Make sure that the green O-ring is in place to seal the vial. Make sure that the vial nut is tight.

NOTICE



Hold the automatic cleaning module vertically when it is installed on the instrument or the vial can break. If the vial breaks, water will get in the vial compartment and instrument damage will occur.

NOTICE

Do not touch or scratch the glass of the process vial. Contamination or scratches on the glass can cause measurement errors.

NOTICE



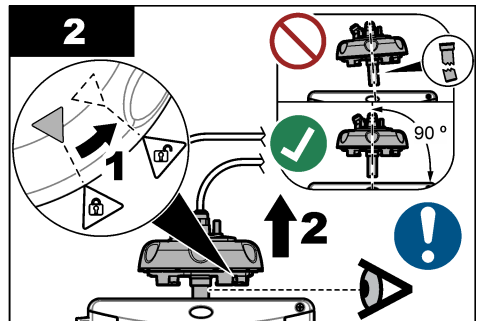
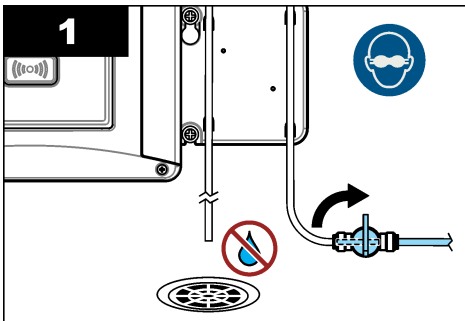
Based on the environmental conditions, is necessary to wait a minimum of 15 minutes to let the system become stable.

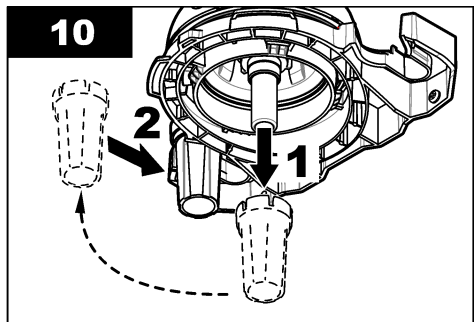
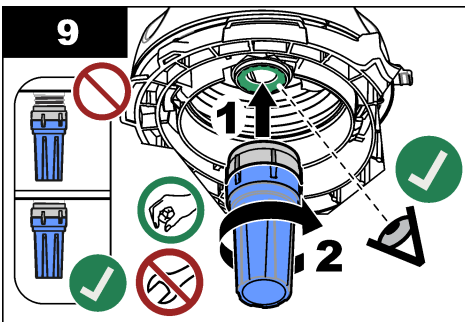
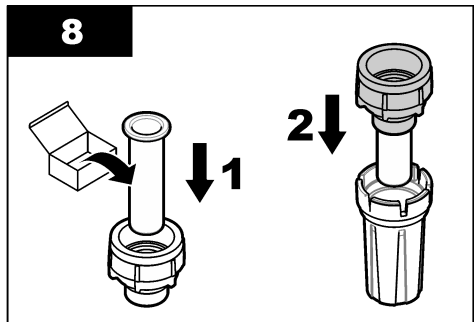
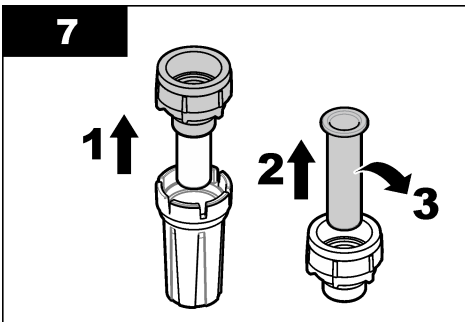
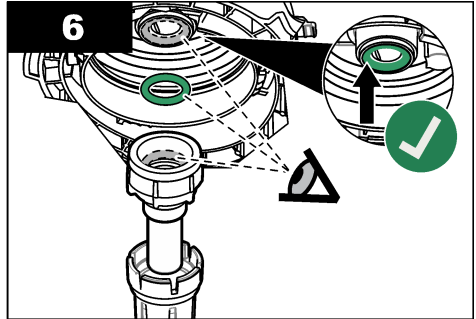
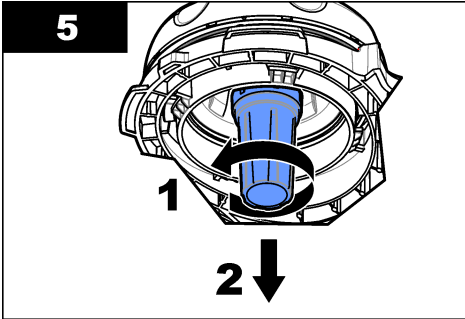
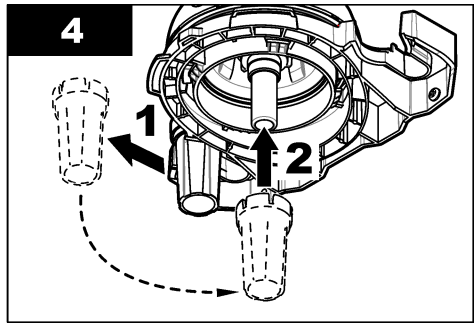
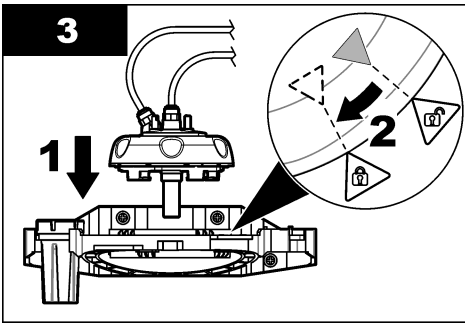
Note: Make sure that no particles fall into the vial compartment.

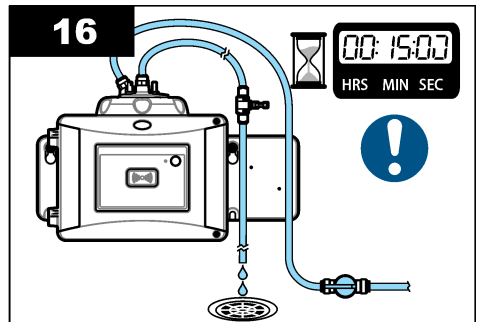
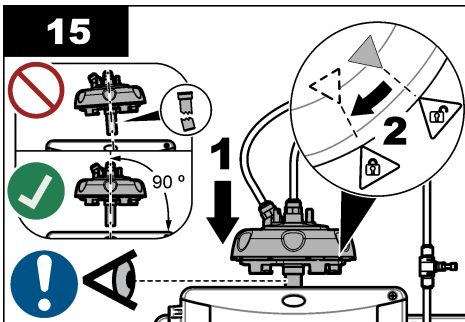
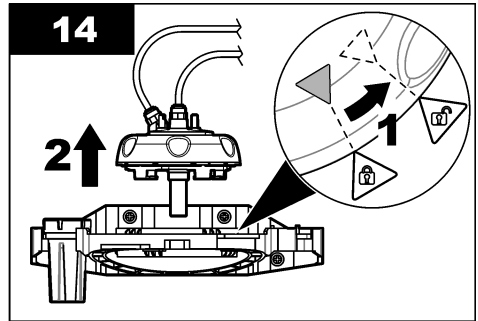
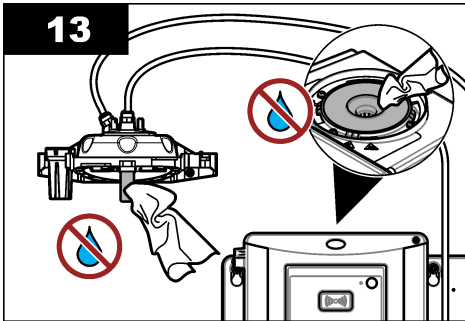
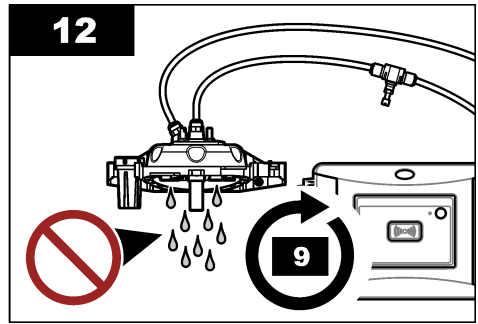
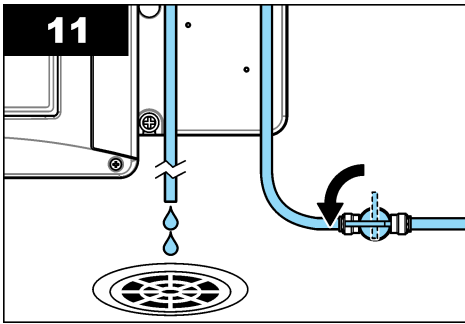
1. Push **menu**.
2. Select **SENSOR SETUP**>[select analyzer]>**DIAG/TEST**>**MAINTENANCE**>**VIAL REPLACEMENT**.
3. Complete the steps that show on the controller display. The date the vial was replaced is automatically saved after the last screen shows.

Refer to the illustrated steps that follow to replace the vial. To protect the new vial from contamination, use the vial replacement tool to install the vial.

At illustrated step 3, put the process head on its side on a flat surface if a service bracket is not installed near the instrument.







8.7 Replace the desiccant cartridge

The controller display will show when a desiccant cartridge replacement is due. Refer to the documentation included in the desiccant cartridge bag to replace the desiccant cartridge.

8.8 Replace the tubing

Replace the tubing when the tubing has a blockage or has damage.

Turn the flow shutoff valve to stop flow to the instrument. Then refer to [Plumb the instrument](#) on page 19 to replace the tubing.

Section 9 Troubleshooting

More troubleshooting information is available online. Go to www.hach.com, then click Support to go to Hach Support Online.

9.1 Reminders

Reminders show on the controller display. To see all of the reminders, push **menu** then select DIAGNOSTICS>TU5x00 sc>REMINDER.

Message	Description	Solution
DRYER RANGE	The desiccant cartridge capacity is low.	Replace the desiccant cartridge. Refer to the documentation supplied with the desiccant cartridge.
PERFORM CAL	A calibration is due.	Do a calibration. Refer to Calibration on page 27.
PERFORM VER	A verification is due.	Do a verification. Refer to Verification on page 39.
WIPER REPLACE	A wiper replacement is due in the automatic cleaning module.	Replace the wiper in the automatic cleaning module. Refer to the documentation supplied with the automatic cleaning module to replace the wiper.

9.2 Warnings

Warnings show on the controller display. To see all of the active warnings, push **menu** then select DIAGNOSTICS>TU5x00 sc>WARNING LIST.

Warning	Description	Solution
CLEANING MODULE	The automatic cleaning module does not operate correctly.	Make sure that the wiper head is installed correctly and the wiper arm can move up and down.
DESICCANT OLD	The desiccant cartridge is more than 2 years old.	Replace the desiccant cartridge. Refer to the documentation supplied with the desiccant cartridge.
DRYER EXHAUS'D	The desiccant cartridge life is zero.	Replace the desiccant cartridge. Refer to the documentation supplied with the desiccant cartridge.
HIGH FLOW	The flow rate is higher than the limit (more than 1250 mL/min).	Adjust the flow regulator as necessary. Make sure that the flow regulator does not have a malfunction.
HUM PCB SC	There is humidity on the interior electronics of the instrument.	Contact technical support. Measurements with limited validity are still available.
LASER-TEMP HIGH	The laser temperature is higher than the limit.	Decrease the environmental temperature of the instrument.
LASER-TEMP SENS	The laser temperature sensor has a malfunction.	Contact technical support. Measurements with limited validity are still available.

Warning	Description	Solution
LOW FLOW	The flow rate is lower than the limit (less than 75 mL/min).	Examine the tubing for blockages that decrease the flow rate. Remove the blockages. Adjust the flow regulator as necessary. Make sure that the flow regulator does not have a malfunction.
NO FLOW	The flow rate is less than 10 mL/min.	Examine the tubing for blockages stop the flow. Remove the blockages.
NOT DRYING	The instrument cannot regulate the internal humidity.	Replace the desiccant cartridge. Refer to Replace the desiccant cartridge on page 51. If the error continues, contact technical support. Measurements with limited validity are still available.
PUMP	The air pump for the drying circuit has a malfunction.	Contact technical support. Measurements with limited validity are still available.
SENS.DRY: FUNC	The air system of the drying system has a malfunction.	Contact technical support. Measurements are still available, but the life of the desiccant cartridge is decreases.
TURB TOO HIGH	The turbidity reading is not within the calibration range.	Make sure that the calibration range selected is applicable to the turbidity value of the sample.
WIPER REPLACE	A wiper replacement is due in the automatic cleaning module.	Replace the wiper in the automatic cleaning module. Refer to the documentation supplied with the automatic cleaning module to replace the wiper.
VIAL CLARITY	The vial or vial compartment is dirty.	Clean or dry the vial and the vial compartment.

9.3 Errors

Errors show on the controller display. To see all of the active errors, push **menu** then select **DIAGNOSTICS>TU5x00 sc>ERROR LIST**.

Error	Description	Solution
AUTOCHK. NO FUNC	The automatic system check does not complete.	Contact technical support.
CLEANING MODULE	The automatic cleaning module has a malfunction.	Contact technical support.
EE RSRVD ERR	There is a problem with the internal memory.	Contact technical support.
FLASH FAIL	The internal calibration memory is corrupted.	Contact technical support.
HUMIDITY PCB	There is humidity or water in the instrument.	Contact technical support.
LASER TOO LOW	The laser has a malfunction.	Contact technical support.
MEAS ELECTRONIC	There is a measurement error. There is a problem in the electronics unit.	Contact technical support.

Error	Description	Solution
PROC HEAD OPEN	The process head is in the open position or the process head detector has a malfunction.	Turn the process head to the closed position.
TURB TOO HIGH	The turbidity reading is higher than the measurement range of the instrument (700 FNU maximum).	Make sure that the turbidity value of the sample is within the measurement range of the instrument.
VIAL PRESENT	There is no vial in the vial compartment.	Install a vial in the vial compartment.
VIAL CLARITY	The vial or vial compartment is dirty.	Clean or dry the vial and the vial compartment.
WATER INGRESS ¹⁸	There is water in the instrument.	Immediately stop flow to the instrument. Disconnect the sensor cable. The desiccant cartridge can become hot. Only touch and remove the desiccant cartridge when it is at room temperature.

9.4 Fix water ingress

The device has a drying system to prevent condensation on the vial. If water goes into the drying system the device shows the error message "Water Ingress". The desiccant cartridge starts an irreversible water stop procedure to make sure that no water goes into the measuring unit. Make sure to use always a new desiccant cartridge, even though the desiccant cartridge has a blue indicator, to fix the water ingress.

Items to collect:

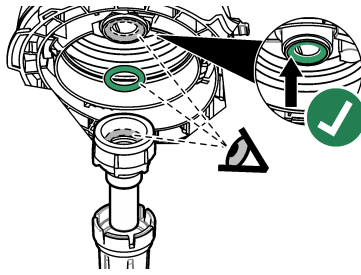
- LZY945—Microfiber cloth, vial cleaning
- LZY906—Vial replacement tool
- LZY876—Desiccant cartridge
- optional LZY918—Seal, process vial
- optional LZY917—Nut, process vial
- optional LZY834—Vial, process
- optional LZY910—Vial compartment wiper

Causes of water ingress

Note: Make sure to do a visual inspection and a leak test before the device is put back into operation.

1. The vial is broken or there is a crack on the vial.
 - a. Replace the vial.
 - b. Clean the contact surface of the vial on the O-ring and the vial nut.
 - c. Clean the contact surface of the O-ring on the vial.
 - d. Make sure that the edge of the vial and the seal are clean and with no dust.
 - e. Tighten the vial nut by hand.

¹⁸ Water drops, puddles or runlets that will not damage the instrument may be in the inner of the enclosure.



2. The green O-ring between vial and process head is missing or the position is not correct.
 - a. Make sure that the O-ring of the process head or cleaning unit is in the correct position. Use the tool LZY906 to install the vial.
 - b. Clean the contact surface of the vial on the O-ring and the vial nut.
 - c. Clean the contact surface of the O-ring on the vial.
 - d. Make sure that the edge of the vial and the seal are clean and with no dust.
 - e. Tighten the vial nut by hand.



3. Water in or on the top of the vial compartment.
 - a. Clean the vial compartment and the top of the vial compartment with a clean and dust-free cleaning cloth.
 - b. Make sure that there is no water on the process head (or automatic cleaning module).
 - c. Dry all possible spills to prevent water ingress on the vial compartment.
4. There is a strong condensation on the inner side of the process head or on the vial compartment.
 - a. Dry the water with a clean and dust-free cleaning cloth.

9.4.1 Setup after water ingress error

NOTICE

Keep water out of the vial compartment or instrument damage will occur. Before the process head (or automatic cleaning module) is installed on the instrument, make sure that there are no water leaks. Make sure that all tubing is fully seated. Make sure that the vial nut is tight.

NOTICE

Hold the process head (or automatic cleaning module) vertically when it is removed from the instrument or condensation water can fall into the instrument. If condensation water gets into the vial compartment instrument damage will occur.

NOTICE

Make sure to lift the process head (or automatic cleaning module) the sufficient distance to release the vial (approximately 10 cm (3.94 in.)) or the vial can break. If the vial breaks, water will get in the vial compartment and instrument damage will occur.

NOTICE

Do not touch or scratch the glass of the process vial. Contamination or scratches on the glass can cause measurement errors.

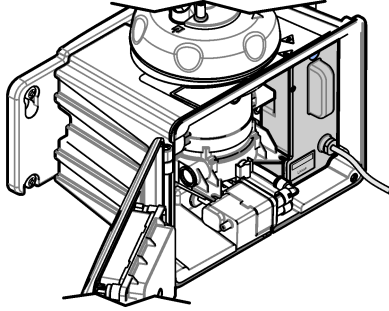
NOTICE

Although the indicator on the desiccant cartridge is blue, the cartridge is wasted after a water ingress. The water stop procedure in the desiccant cartridge can not be reset. It is necessary to use a new cartridge during the procedure FIX WATER INGRESS.

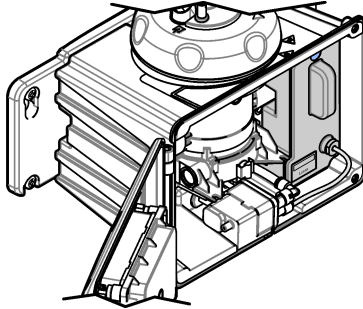
NOTICE

After completing the procedure FIX WATER INGRESS, the pump will operate for a maximum of 6 hours. Subsequently, more frequent and longer pump cycles can occur.

1. Push **Menu**.
2. Select **SENSOR SETUP>TU5x00 sc>DIAG/TEST>MAINTENANCE>FIX WATER INGRESS**.
3. Follow the steps that show on the controller.
4. Install a new desiccant cartridge during the water ingress procedure.
Make sure that the new desiccant cartridge is **not** connected to the pump.



5. The pump starts for 25 minutes to dry the pump and tubes.
6. After the drying time, dry water drips at the outlet of the pump with a dust-free cleaning cloth.
7. Connect the desiccant cartridge to the pump.



Section 10 Replacement parts and accessories

▲ WARNING



Personal injury hazard. Use of non-approved parts may cause personal injury, damage to the instrument or equipment malfunction. The replacement parts in this section are approved by the manufacturer.

Note: Product and Article numbers may vary for some selling regions. Contact the appropriate distributor or refer to the company website for contact information.

Recommended standards

Description	Quantity	Item no.
Verification standard, < 0.1 NTU, glass verification rod (solid secondary standard)	each	LZY901
StabCal 800 mNTU Standard	1 L	2788453
StabCal 10 NTU Standard	500 mL	2659949
StabCal 20 NTU Standard	1 L	2660153
StabCal 20-NTU sealed vial with RFID	each	LZY837
StabCal 20-NTU sealed vial without RFID	each	LZY899
StabCal kit, sealed vials with RFID, includes: 10, 20 and 600 NTU vials	each	LZY835
StabCal kit, sealed vials without RFID, includes: 10, 20 and 600 NTU vials	each	LZY898

Replacement parts

Description	Quantity	Item no.
Cleaning lid screws and washers, hot water, includes: Cleaning lid screws (3x) and washers (3x)	3	LZY905
Desiccant cartridge	each	LZY876
Mounting set, includes: Mounting screws (4x), tubing clip screws (2x) and tubing clips (2x)	each	LZY870
Nut, process vial	each	LZY917
Seal, automatic cleaning module	each	LZY914
Seal, process head	each	LZV969
Seal, process vial	each	LZY918
Service bracket	each	LZY873
Flow regulator kit, includes: flow regulator and tube ¼-in. OD × 0.13 m (5.11 in.)	each	LZY963
Vial with seal, process	each	LZY834
Vial replacement tool	each	LZY906
Wall mount bracket kit, includes: Wall mount bracket (two tubing clips on bracket), mounting screws (4x), tubing clips (2x) and tubing clip screws (2x)	each	LZY871

Accessories

Description	Quantity	Item no.
Automatic cleaning module	each	LQV159.99.00002
Bubble trap	each	LZY828.99.00002

Accessories (continued)

Description	Quantity	Item no.
Calibration lid	each	LZY904.98.00002
Extension cable, sensor cable, 1 m (3.3 ft)	each	6122400
Extension cable, sensor cable, 5 m (16.40 ft)	each	LZX848
Extension cable, sensor cable, 10 m (32.81 ft)	each	LZX849
Flow sensor kit, includes: flow sensor, flow sensor cap, mounting screws and 1 m (3.3 ft) of ¼ in. OD tubing	each	LQV160.99.00002
Maintenance kit for post-filter applications, includes: Case, calibration lid, micro fiber cloth, 20 NTU StablCal sealed vial, verification glass rod, vial wiper, vial compartment wiper, mobile service bracket, glass verification rod (≤ 0.1 NTU) and vial replacement tool	each	LZY907
Micro fiber cloth, vial cleaning	each	LZY945
Process head holder	each	LZY946
RFID tags, operator	2/pkg	LZQ066
RFID stickers, black ¹⁹	3/pkg	LZQ067
Syringe with tubing, calibration and verification	each	LZY953
Tubing adapter, ¼ in. to 6 mm	each	LZY954
Tubing, bubble trap to TU5x00 sc, ¼ in. OD	1 m	LZQ134
Tubing set, ULTRATURB replacement	each	LZY912
Tubing, inlet of bubble trap, 3/8 in. OD	4 m	LZY947
Tubing, inlet and outlet of TU5x00 sc, ¼ in. OD	4 m	LZY911
Vial wiper	each	LZY903
Vial compartment wiper	each	LZY910

¹⁹ Other colors are available.



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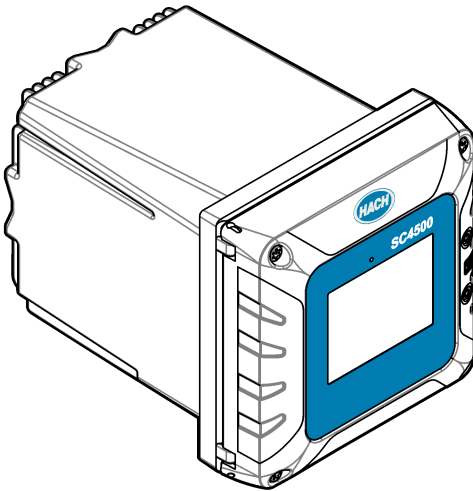
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DOC023.97.90690

SC4500

06/2024, Edition 10



Basic User Manual
Manuel d'utilisation simplifié
Manual básico del usuario
Manual básico do usuário

基本用户手册
基本取扱説明書
기본 사용 설명서

คู่มือผู้ใช้เบื้องต้น
دليل المستخدم الأساسي

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Section 1 Specifications

Specifications are subject to change without notice.

Specification	Details
Dimensions (W x H x D)	½ DIN-144 x 144 x 192 mm (5.7 x 5.7 x 7.6 in.)
Enclosure	UL50E type 4X, IEC/EN 60529-IP 66, NEMA 250 type 4X Metal enclosure with a corrosion-resistant finish
Weight	1.7 kg (3.7 lb) (Controller weight without optional expansion modules)
Pollution degree	Environment: 4; instrument: 2
Overvoltage category	II
Protection class	I, connected to protective earth
Environmental conditions	Indoor and outdoor use
Power requirements	AC controller: 100–240 VAC ±10%, 50/60 Hz; 1 A (50 VA with 8W sensor load, 100VA with 28W sensor load) DC controller: 18–28 VDC; 2.5 A (12W with 9W sensor load, 36W with 20 W sensor load)
Operating temperature	–20 to 60 °C (–4 to 140 °F) (8 W (AC)/9 W (DC) sensor load) –20 to 45 °C (–4 to 113 °F) (28 W (AC)/20 W (DC) sensor load) Linear derating between 45 and 60 °C (–1.33 W/°C)
Storage temperature	–20 to 70 °C (–4 to 158 °F)
Relative humidity	0 to 95%, non-condensing
Altitude	3000 m (9842 ft) maximum
Display	3.5-inch TFT color display with capacitive touchpad
Measurement	Two device, digital SC connectors
Relays (high voltage)	Two relays (SPDT); Wire gauge: 0.75 to 1.5 mm ² (18 to 16 AWG) AC controller Maximum switching voltage: 100–240 VAC Maximum switching current: 5 A Resistive/1 A Pilot Duty Maximum switching power: 1200 VA Resistive/360 VA Pilot Duty DC controller Maximum switching voltage: 30 VAC or 42 VDC Maximum switching current: 4 A Resistive/1 A Pilot Duty Maximum switching power: 125 W Resistive/28 W Pilot Duty
Analog inputs (optional) ³	One 0–20 mA (or 4–20 mA) analog input on each analog input module One analog sensor input on each sensor module Maximum of two analog inputs

Specification	Details
Analog outputs (optional) ³	Five 0–20 mA (or 4-20 mA) analog outputs on each analog output module ¹
Digital communication (optional) ³	Profibus DPV1 module, Modbus RS232/RS485 module, Modbus TCP, PROFINET module, EtherNet/IP™ ² module
Software module (optional)	Contact sales or technical support for information. Note: <i>Only one software module can be installed on a controller at the same time.</i>
Network connection ³	LAN version (optional): Two Ethernet connectors (10/100 Mbps), M12 female D-coding connector; Cellular version and WiFi version (optional) ⁴
USB port	Used for data download and software upload. The controller records approximately 20,000 data points for each connected sensor.
Compliance information	CE, ETL certified to UL and CSA safety standards (with all sensor types), FCC, ISED, KC, RCM, EAC, UKCA, SABS, CMIM, Morocco
Warranty	1 year (EU: 2 years)

Section 2 Online user manual

This Basic User Manual contains less information than the User Manual, which is available on the manufacturer's website.

Section 3 General information

In no event will the manufacturer be liable for damages resulting from any improper use of product or failure to comply with the instructions in the manual. The manufacturer reserves the right to make changes in this manual and the products it describes at any time, without notice or obligation. Revised editions are found on the manufacturer's website.

3.1 Safety information

The manufacturer is not responsible for any damages due to misapplication or misuse of this product including, without limitation, direct, incidental and consequential damages, and disclaims such damages to the full extent permitted under applicable law. The user is solely responsible to identify critical application risks and install appropriate mechanisms to protect processes during a possible equipment malfunction.

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in this manual.

3.1.1 Use of hazard information

▲ DANGER

Indicates a potentially or imminently hazardous situation which, if not avoided, will result in death or serious injury.

▲ WARNING

Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

¹ Refer to the module documentation for additional information.

Note: *Install only one module in one of the available slots.*

² EtherNet/IP is a trademark of OVDA Inc.

³ Dependent on controller configuration.

⁴ An external USB box WiFi is necessary for network connection on WiFi versions. An external USB box cellular is necessary for network connection on cellular versions.

⚠ CAUTION





Indicates a potentially hazardous situation that may result in minor or moderate injury.

NOTICE

Indicates a situation which, if not avoided, may cause damage to the instrument. Information that requires special emphasis.

3.1.2 Precautionary labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed. A symbol on the instrument is referenced in the manual with a precautionary statement.

	This is the safety alert symbol. Obey all safety messages that follow this symbol to avoid potential injury. If on the instrument, refer to the instruction manual for operation or safety information.
	This symbol indicates that a risk of electrical shock and/or electrocution exists.
	This symbol indicates the presence of devices sensitive to Electro-static Discharge (ESD) and indicates that care must be taken to prevent damage with the equipment.
	Electrical equipment marked with this symbol may not be disposed of in European domestic or public disposal systems. Return old or end-of-life equipment to the manufacturer for disposal at no charge to the user.

3.1.3 EMC compliance

⚠ CAUTION

This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

CE (EU)

The equipment meets the essential requirements of EMC Directive 2014/30/EU.

UKCA (UK)

The equipment meets the requirements of the Electromagnetic Compatibility Regulations 2016 (S.I. 2016/1091).

Canadian Radio Interference-Causing Equipment Regulation, ICES-003, Class A:

Supporting test records reside with the manufacturer.

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de classe A répond à toutes les exigences de la réglementation canadienne sur les équipements provoquant des interférences.

FCC Part 15, Class "A" Limits

Supporting test records reside with the manufacturer. The device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

1. The equipment may not cause harmful interference.
2. The equipment must accept any interference received, including interference that may cause undesired operation.


Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their expense. The following techniques can be used to reduce interference problems:

1. Disconnect the equipment from its power source to verify that it is or is not the source of the interference.
2. If the equipment is connected to the same outlet as the device experiencing interference, connect the equipment to a different outlet.
3. Move the equipment away from the device receiving the interference.
4. Reposition the receiving antenna for the device receiving the interference.
5. Try combinations of the above.

3.2 Intended use

The SC4500 controller is intended for use by water treatment professionals who measure multiple water quality parameters in industrial water, municipal water or waste water plants. The SC4500 controller does not treat or alter water.

3.3 Product overview

⚠ DANGER	
	<p>Chemical or biological hazards. If this instrument is used to monitor a treatment process and/or chemical feed system for which there are regulatory limits and monitoring requirements related to public health, public safety, food or beverage manufacture or processing, it is the responsibility of the user of this instrument to know and abide by any applicable regulation and to have sufficient and appropriate mechanisms in place for compliance with applicable regulations in the event of malfunction of the instrument.</p>

NOTICE
<p>Network and access point security is the responsibility of the customer that uses the wireless instrument. The manufacturer will not be liable for any damages, inclusive however not limited to indirect, special, consequential or incidental damages, that have been caused by a gap in, or breach of network security.</p>

NOTICE
<p>Perchlorate Material—Special handling may apply. Refer to www.dtsc.ca.gov/perchlorate. This perchlorate warning applies only to primary batteries (provided singly or installed on this equipment) when sold or distributed in California, USA.</p>

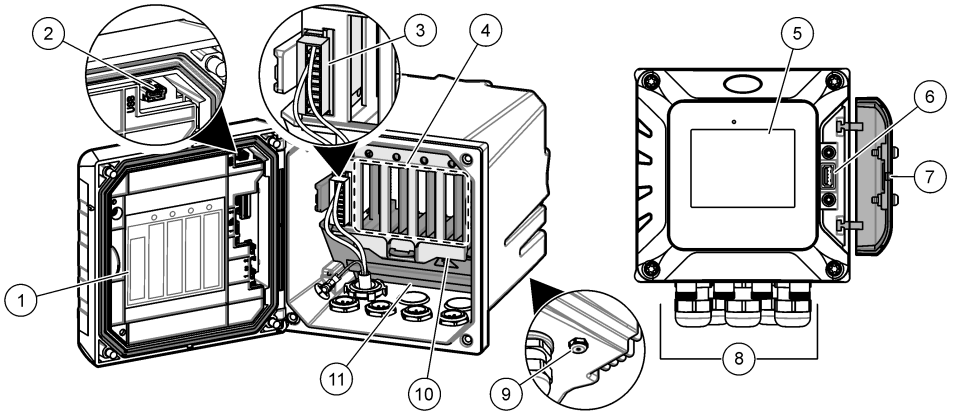
NOTICE
<p>The controller is supplied with a protection foil installed on the display. Make sure to remove the protection foil before the controller is used.</p>

The SC4500 Controller is a 2-channel controller for digital analytical devices (e.g., sensors and analyzers) and analog sensors that are connected to a digital gateway or expansion module. Refer to [Figure 1](#).

The controller shows sensor measurements and other data on the display, can transmit analog and digital signals, and can interact with and control other devices through outputs and relays. Outputs, relays, sensors and expansion modules are configured and calibrated through the user interface on the front of the controller or remotely for network connected controllers. The controller connects to Claros with a cellular network⁵, WiFi network⁵ or through LAN connection. The Prognosys diagnostic system⁵ shows the status of maintenance tasks and gives the status of the instrument condition.

The instrument display is a touchscreen. The instrument enclosure has a protective vent in the bottom. Do not cover or remove the protective vent. Replace the protective vent if damage is seen. The controller is available with optional expansion modules. Refer to the expanded user manual on the manufacturer's website for additional information.

Figure 1 Product overview



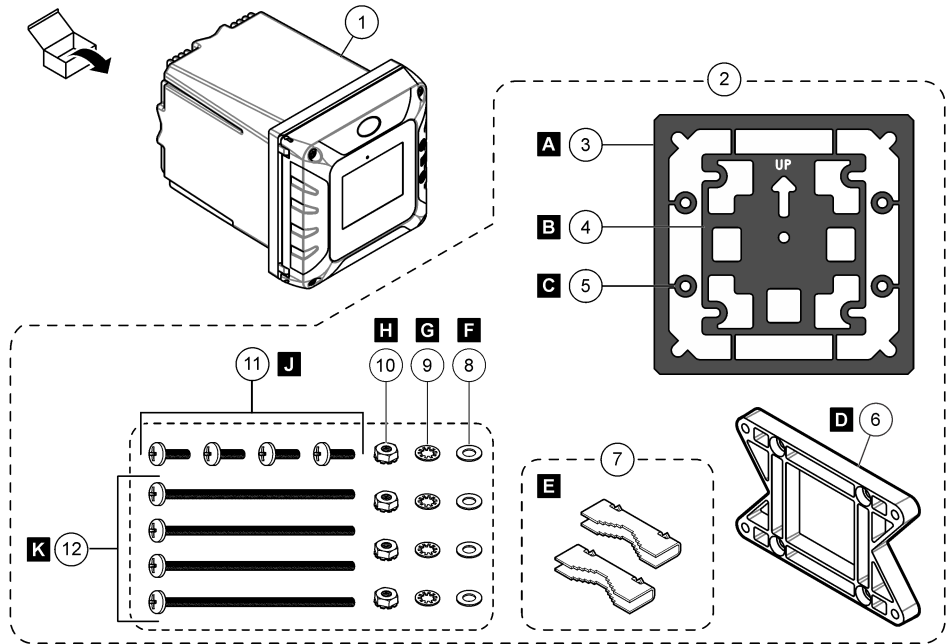
1 Label for module installation and wiring information	7 USB cover
2 USB connection for external USB box (WiFi or cellular connection)	8 Electrical connections and fittings
3 Expansion module (Slot 0) ⁵	9 Protective vent
4 Additional expansion module slots (Slots 1, 2, 3 and 4)	10 Cover for module installation
5 Touchpad display	11 High-voltage barrier
6 USB connection for data download and firmware update	

⁵ Dependent on controller configuration. The expansion modules are factory-installed based on controller configuration.

3.4 Product components

Make sure that all components have been received. Refer to [Figure 2](#). If any items are missing or damaged, contact the manufacturer or a sales representative immediately.

Figure 2 Product components



1 SC4500 controller	7 Mounting foot (mounting bracket inserts) (2x)
2 Mounting hardware	8 Flat washer, ¼-inch ID (4x)
3 Sealing gasket for panel mount, Neoprene	9 Lock washer, ¼-inch ID (4x)
4 Vibration isolation gasket for pipe mount	10 Keps hexnut, M5 x 0.8 (4x)
5 Vibration isolation washer for pipe mount (4x)	11 Pan head screws, M5 x 0.8 x 15 mm (4x)
6 Bracket for wall and pipe mounting ⁶	12 Pan head screws, M5 x 0.8 x 100 mm (4x) ⁷

Section 4 Installation

▲ DANGER



Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

⁶ A bracket for panel mounting is available as an optional accessory. Refer to the expanded user manual for replacement parts and accessories.

⁷ Used for variable diameter pipe mount installations.

4.1 Installation guidelines

⚠ DANGER



Electrical shock hazard. Externally connected equipment must have an applicable country safety standard assessment.

⚠ WARNING



Explosion hazard. This manual is only for installation of the unit in a non-hazardous location. For installation of the unit in hazardous locations, use only the instructions and approved control drawing provided in the hazardous location installation manual.

NOTICE

Do not install the controller in an environment with a caustic atmosphere without a protective enclosure. A caustic atmosphere will cause damage to electronic circuitry and components.

NOTICE

Do not install the controller outdoors in an environment that receives direct sunlight or UV radiation or damage to the controller can occur. Install the optional UV protection screen with sunroof to prevent damage from UV exposure when installed outdoors in direct sunlight.

Note: (Network and Claros version only) Make sure that your IT department has approval for the installation and commissioning of the device. Administrator rights are not necessary. The email address "No-reply@hach.com" sends the setup email and "donotreply@hach.com" sends the system notifications that are necessary for the installation. Add the two email addresses to the safe senders list to make sure to receive mails from these senders. Hach does not send a request to confirm that the sender is not a robot.

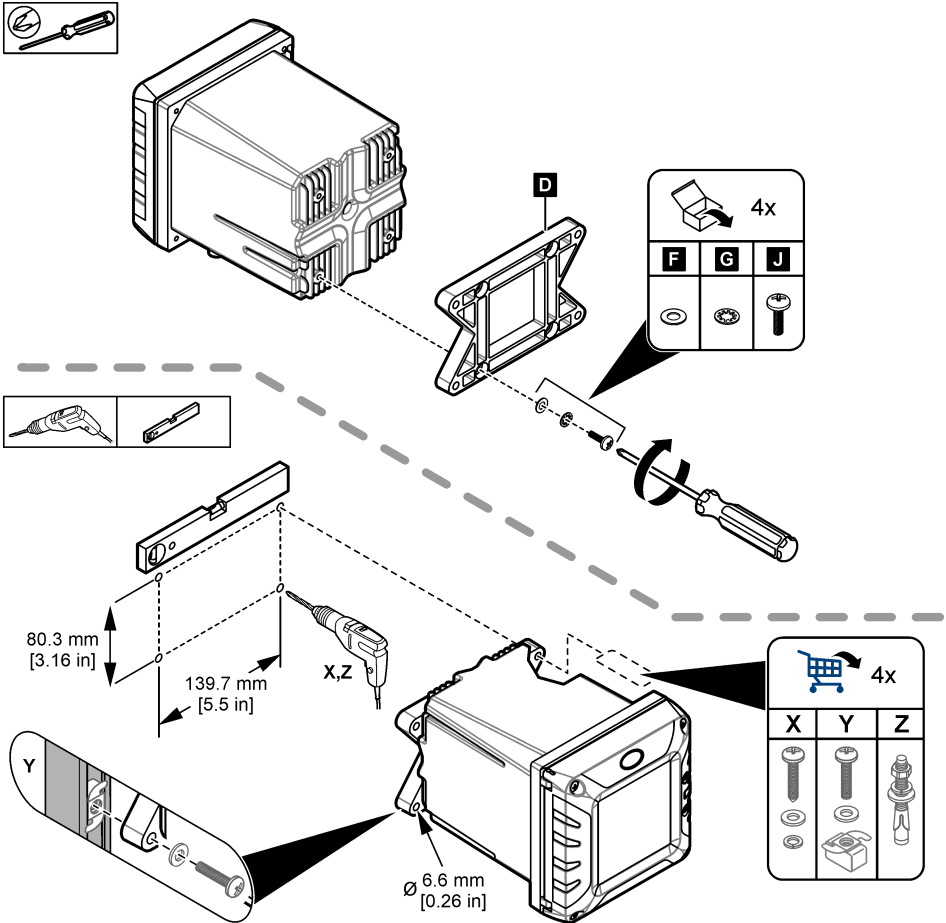
- Install the controller in a location where the power disconnect device for the controller is easily operated.
- Attach the controller upright and level on a flat, vertical surface.
- As an alternative, attach the instrument to a panel, vertical pole or horizontal pole.
- Make sure that the device is in a location where there is sufficient clearance around it to make connections and to do maintenance tasks.
- Make sure that there is a minimum of 16 cm (6.30 in.) of clearance for the controller door to open.
- Install the instrument in a location with minimum vibration.
- The optional holder for mobile phones is recommended for all installations.
- The optional sunroof or the optional UV protection screen with sunroof is recommended for all outdoor installations.
- Give protection to computers or other connected equipment that may not have equivalent environmental ratings based on the enclosure rating of the equipment.
- Obey specified ambient ratings on the internal side of panels for panel mount installations.
- Make sure that the maximum power rating is correct for the ambient temperature.

4.2 Mechanical installation

4.2.1 Attach the instrument to a wall

Attach the controller upright and level on a flat, vertical surface. Make sure that the wall mounting is able to hold 4 times the weight of the equipment. Refer to the illustrated steps in [Figure 3](#) and [Product components](#) on page 8 for the necessary mounting hardware.

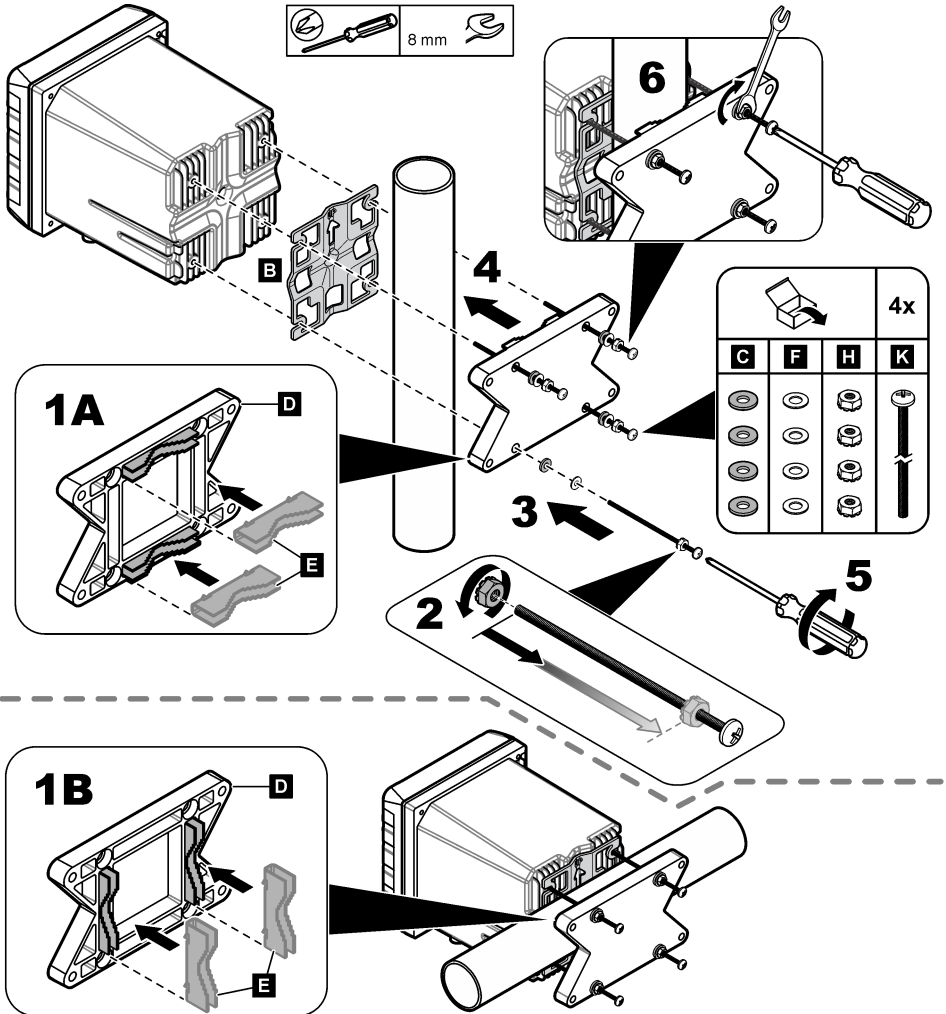
Figure 3 Wall mounting



4.2.2 Attach the instrument to a pole

Attach the controller upright to a pole or pipe (horizontal or vertical). Make sure that the pipe diameter is 19 to 65 mm (0.75 to 2.5 in.) Refer to the illustrated steps in [Figure 4](#) and [Product components](#) on page 8 for the necessary mounting hardware.

Figure 4 Pole mounting

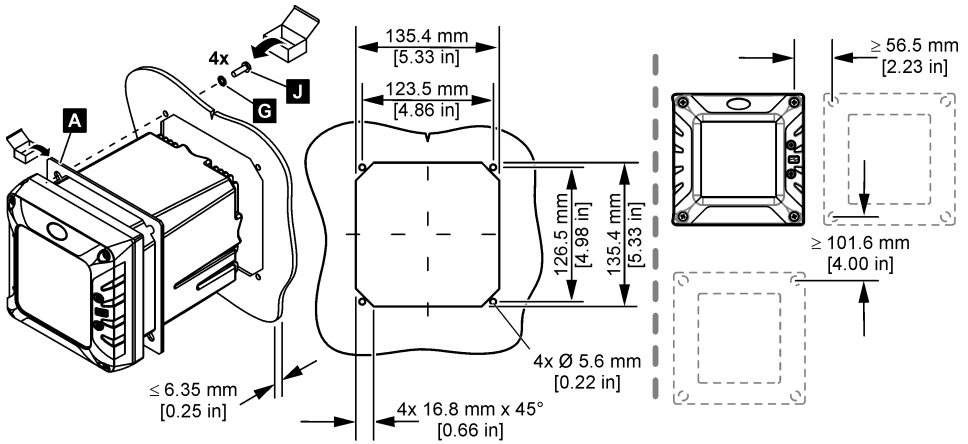


4.2.3 Install the instrument in a panel

A rectangular hole is necessary for panel installation. Use the supplied sealing gasket for panel mount as a template to cut the hole in the panel. Make sure to use the template in the up position to install the controller vertical. Refer to [Figure 5](#).

Note: If using the bracket (optional) for panel mounting, push the controller through the hole in the panel and then slide the bracket over the controller on the back side of the panel. Use the four 15 mm pan head screws (supplied) to attach the bracket to the controller and secure the controller to the panel.

Figure 5 Panel mounting dimensions



4.3 Electrical installation

4.3.1 Electrical connectors and fittings

Figure 6 shows the electrical connectors and fittings on the instrument. To keep the environmental rating of the enclosure, make sure that there is a plug in the strain relief fittings that are not used and a connector cap on the unused connectors.

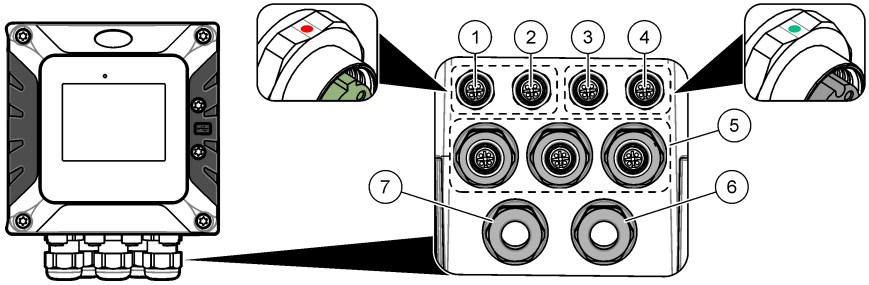
Based on the controller configuration, the controller has:

- Ethernet connectors (LAN) to give internet access to the controller through a customer network.
- Ethernet connectors for Industrial Ethernet Protocols: EtherNet/IP or PROFINET.
- Digital SC connectors for sc digital sensors, sc digital gateways and analyzers.

A color code identifies the connectors. The LAN connectors are green with a red dot. The EtherNet/IP or PROFINET connectors are yellow with a red dot. The sc digital sensor connectors are black with a green dot. Refer to Table 1 for the applicable options for each connector and fitting.

Note: The controller is supplied without strain relief fittings installed. The user must supply the necessary strain reliefs. Refer to the expanded user manual on the manufacturer's website for additional information.

Figure 6 Electrical connectors and fittings



1 Ethernet connector (optional) for LAN port 1 or EtherNet/IP or PROFINET connector	5 Strain relief fitting for USB box and expansion modules: Analog inputs/outputs, Profibus DP
2 Ethernet connector (optional) for LAN port 2 or EtherNet/IP or PROFINET connector	6 Power cord (or conduit hub) ⁹
3 Digital SC connector: Channel 1. Optional: Analog sensor connection to sensor module or analog input connection to 4-20 mA input module ⁸	7 Strain relief fitting for high voltage relay
4 Digital SC connector: Channel 2. Optional: Analog sensor connection to sensor module or analog input connection to 4-20 mA input module	

Table 1 Options for each connector and fitting

Device	1 ¹⁰	2	Option ¹¹	3	4	5	6	7
sc digital sensor, sc digital gateway or analyzer				X	X			
Analog sensor				X	X			
Sensor analog module				X	X			
4-20 mA output						X		
Profibus DP module						X		
Modbus RS232/RS485 module						X		
USB Box						X		
LAN + LAN	Green	Green	Split / Chaining					
LAN + Modbus TCP	Green	Green	Split / Chaining					
EtherNet/IP	Yellow	Yellow	IEP only					
LAN + EtherNet/IP	Green	Yellow	Mix IEP					
PROFINET	Yellow	Yellow	IEP only					
LAN + PROFINET	Green	Yellow	Mix IEP					

⁸ To connect an analog sensor or 4-20 mA input to the controller, install the applicable expansion module, if not already installed. Refer to the documentation supplied with the expansion module for additional information.

⁹ The power cord is factory-installed based on the controller configuration.

¹⁰ A color code identifies the connectors. The LAN connectors are green. The EtherNet/IP or PROFINET connectors are yellow.

¹¹ Refer to the expanded user manual on the manufacturer's website for additional information.

Table 1 Options for each connector and fitting (continued)

Device	1 ¹⁰	2	Option ¹¹	3	4	5	6	7
High voltage relay								X
Power supply							X	

4.3.2 Electrostatic discharge (ESD) considerations

NOTICE



Potential Instrument Damage. Delicate internal electronic components can be damaged by static electricity, resulting in degraded performance or eventual failure.

Refer to the steps in this procedure to prevent ESD damage to the instrument:

- Touch an earth-grounded metal surface such as the chassis of an instrument, a metal conduit or pipe to discharge static electricity from the body.
- Avoid excessive movement. Transport static-sensitive components in anti-static containers or packages.
- Wear a wrist strap connected by a wire to earth ground.
- Work in a static-safe area with anti-static floor pads and work bench pads.

4.3.3 Power connections

⚠ DANGER



Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

⚠ DANGER



Electrocution hazard. Always remove power to the instrument before making electrical connections.

If the controller does not have an installed power cord, connect power with conduit or a power cord. Refer to the sections that follow to connect power with conduit or a power cord.

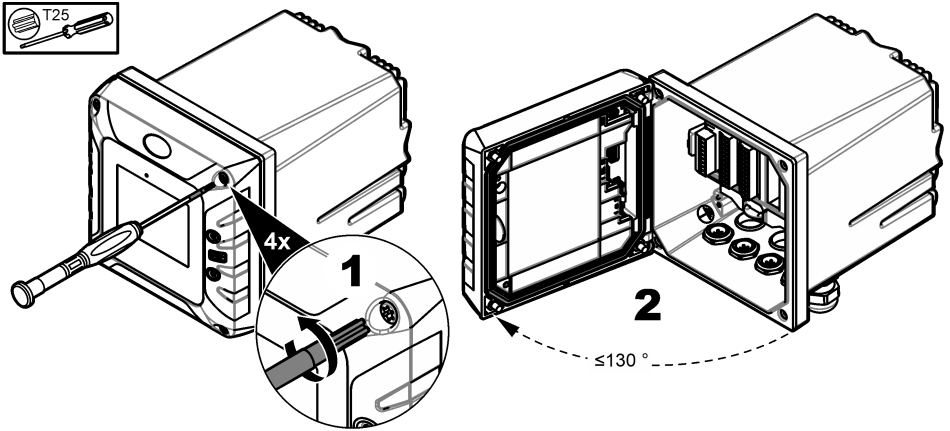
4.3.3.1 Open the controller cover

Open the controller cover to get access to the wiring connections. Refer to [Figure 7](#).

¹⁰ A color code identifies the connectors. The LAN connectors are green. The EtherNet/IP or PROFINET connectors are yellow.

¹¹ Refer to the expanded user manual on the manufacturer's website for additional information.

Figure 7 Open the controller

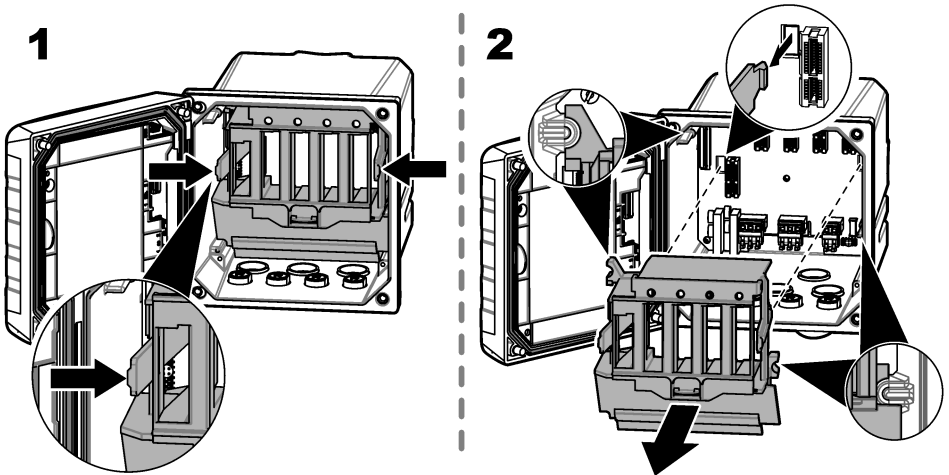


4.3.3.2 Remove the high-voltage barrier

High-voltage wiring for the controller is located behind a high-voltage barrier in the controller enclosure. Do not remove the barrier while power is supplied to the controller. Make sure that the barrier is installed before power is supplied to the controller.

Remove the high-voltage barrier to get access to the high-voltage wiring. Refer to [Figure 8](#).

Figure 8 High-voltage barrier



4.3.3.3 Wiring for power

▲ DANGER



Electrocution hazard. Protective Earth Ground (PE) connection is required.

⚠ DANGER



Electrical shock and fire hazards. Make sure to identify the local disconnect clearly for the conduit installation.

⚠ WARNING



Potential Electrocution Hazard. If this equipment is used outdoors or in potentially wet locations, a **Ground Fault Interrupt** device must be used for connecting the equipment to its mains power source.

⚠ WARNING



Electrocution hazard. The local disconnection means must disconnect all the electrical current-carrying conductors. Mains connection must keep supply polarity. The separable plug is the disconnect means for cord connected equipment.

⚠ WARNING



Electrical shock and fire hazards. Make sure that the user-supplied power cord and non-locking plug meet the applicable country code requirements.

⚠ WARNING



Explosion hazard. This manual is only for installation of the unit in a non-hazardous location. For installation of the unit in hazardous locations, use only the instructions and approved control drawing provided in the hazardous location installation manual.

NOTICE

Install the device in a location and position that gives easy access to the disconnect device and its operation.

The controller can be purchased as either a 100-240 VAC powered model or a 18-28 VDC powered model. Follow the appropriate wiring instructions for the purchased model.

Supply power to the instrument with conduit or a power cable. Make sure that a circuit breaker with sufficient current capacity is installed in the power line. The circuit breaker size is based on the wire gauge used for installation.

For installation with conduit:

- Install a local disconnect for the instrument within 3 m (10 ft) of the instrument. Put a label on the disconnect that identifies it as the main disconnect device for the instrument.
- Rated for at least 90 °C (194 °F) and applicable to the installation environment
- For permanent connections use only solid wires. Use cable dimensions between 0.75 to 1.5 mm² (18 to 16 AWG). Flexible wires must have a crimped ferrule or pin type terminal on the end.
- Connect equipment in accordance with local, state or national electrical codes.
- Connect the conduit through a conduit hub that holds the conduit securely and seals the enclosure when tightened.
- If metal conduit is used, make sure that the conduit hub is tightened so that the conduit hub connects the metal conduit to safety ground.
- The DC power source that supplies power to the DC controller must maintain voltage regulation within the specified 18-28 VDC voltage limits. The DC power source must also provide adequate protection against surges and line transients.

For installation with a power cable, make sure that the power cable is:

- Less than 3 m (10 ft) in length
- Rated sufficient for the supply voltage and current.
- Rated for at least 90 °C (194 °F) and applicable to the installation environment

- Not less than 0.75 mm² (18 AWG) with applicable insulation colors for local code requirements. Flexible wires must have a crimped ferrule or pin type terminal on the end.
- A power cable with a three-prong plug (with ground connection) that is applicable to the supply connection
- Connected through a cable gland (strain relief) that holds the power cable securely and seals the enclosure when tightened
- Does not have a locking type device on the plug

4.3.3.4 Connect conduit or a power cord

NOTICE

The manufacturer recommends the use of manufacturer-supplied electrical components, such as power cord, connectors and strain relief fittings.

NOTICE



Make sure that the cable sheath goes through the inner side of the enclosure to keep the environmental rating of the enclosure.

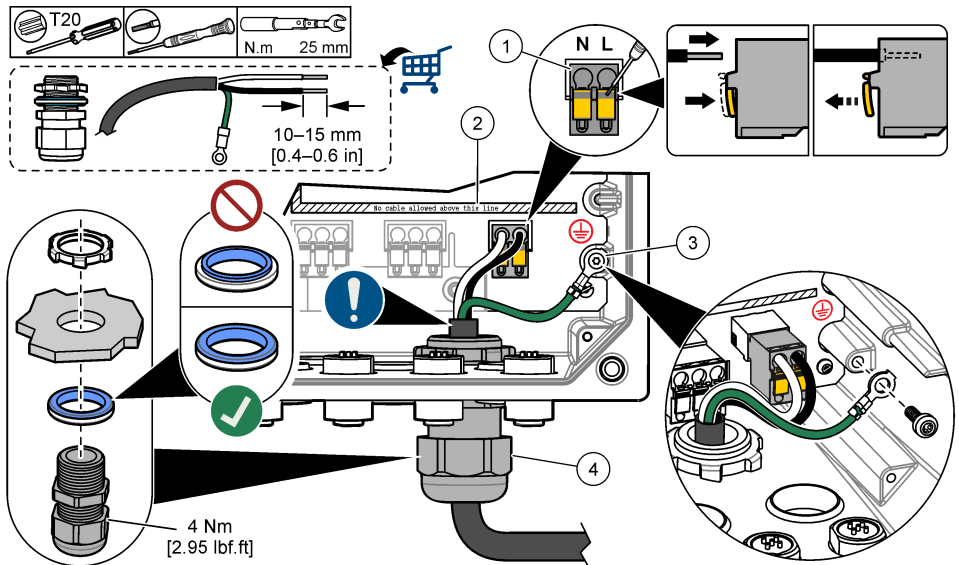
The controller can be wired for line power by hard-wiring in conduit or wiring to a power cord. Regardless of the wire used, the connections are made at the same terminals.

The power cable plug is used to connect and disconnect power to the controller. For installation in conduit, the installed local disconnect is used to connect and disconnect power to the controller.

Refer to [Figure 9](#) and [Table 2](#) or [Table 3](#) to connect conduit or a power cord. Insert each wire into the appropriate terminal until the insulation is seated against the connector with no bare wire exposed. Tug gently after insertion to make sure that there is a secure connection. If necessary, remove the connector from the PCBA for easier wiring of the terminals.

Note: Make sure that all of the cables stay below the cable limit line printed on the PCBA to prevent interferences with the high-voltage barrier. Refer to [Figure 9](#).

Figure 9 Connect conduit or a power cord



1 AC and DC power terminal	3 Protective earth ground
2 Cables limit: do not put cables above the line.	4 Conduit hub (or strain relief fitting for power cord)

Table 2 Wiring information—AC power



Terminal	Description	Color—North America	Color—EU
L	Hot (Line 1)	Black	Brown
N	Neutral (N)	White	Blue
	Protective earth ground	Green	Green with yellow stripe

Table 3 Wiring information—DC power

Terminal	Description	Color—North America	Color—EU
L	+24 VDC	Red	Red
N	24 VDC return	Black	Black
	Protective earth ground	Green	Green with yellow stripe

4.3.4 Connect the high-voltage relays

▲ DANGER



Electrocution hazard. Always remove power to the instrument before making electrical connections.

▲ WARNING



Potential Electrocution Hazard. Power and relay terminals are designed for only single wire termination. Do not use more than one wire in each terminal.

▲ WARNING



Potential fire hazard. Do not daisy-chain the common relay connections or jumper wire from the mains power connection inside the instrument.

▲ WARNING



Explosion hazard. This manual is only for installation of the unit in a non-hazardous location. For installation of the unit in hazardous locations, use only the instructions and approved control drawing provided in the hazardous location installation manual.

▲ CAUTION



Fire hazard. Relay loads must be resistive. Always limit current to the relays with an external fuse or breaker. Obey the relay ratings in the Specifications section.

NOTICE



Make sure that the cable sheath goes through the inner side of the enclosure to keep the environmental rating of the enclosure.

The instrument has two non-powered relays, each with a single-pole change-over contact. For AC controllers, the wiring compartment is not made for voltage connections more than 264 VAC.

The relay terminals are located behind a high-voltage barrier in the controller enclosure. Do not remove the barrier while power is supplied to the relay terminals. Do not supply power to the relay terminals when the barrier is not installed.

Connect each relay to a control device or an alarm device as necessary. Refer to [Figure 10](#) and [Table 4](#) to connect the relays. Refer to the expanded user manual on the manufacturer's website for additional information.

Refer to [Specifications](#) on page 3 for the relay specifications. The relays are isolated from each other and the low-voltage input/output circuitry.

The largest gauge wire the power and relay plugs are rated for 1.5 mm² (16 AWG). The relay terminals accept 0.75 to 1.5 mm² (18 to 16 AWG) wire (as determined by load application). Use wire with an insulation rating of 300 VAC or higher. Insert each wire into the appropriate terminal until the insulation is seated against the connector with no bare wire exposed. Tug gently after insertion to make sure that there is a secure connection. If necessary, remove the connector from the PCBA for easier wiring of the terminals. Flexible wires must have a crimped ferrule or a pin type terminal on the end.

Note: Make sure that all of the cables stay below the cable limit line printed on the PCBA to prevent interferences with the high-voltage barrier.

The current to the relay contacts must be 5 A (resistive only load), 1250 VA 125 W (resistive only load) or less. Make sure to have a second switch available to remove power from the relays locally in case of an emergency or for maintenance.

For AC controllers, use the relays at high voltage. For DC controllers, use the relays at low voltage. Refer to [Specifications](#) on page 3 for the relay specifications. Do not configure a combination of both high and low voltage.

Relay terminal connections to the mains circuit in permanent connection applications must have insulation rated for a minimum of 300 V, 90 °C (194 °F). Terminals connected to the mains circuit with a power cord connection must be double insulated and rated 300 V, 90 °C (194 °F) at both the inner and outer insulation levels.

Note: Put the wires for relays through the strain relief fitting for the high voltage relay. Refer to [Figure 6](#) on page 13.

Figure 10 Connect the relays

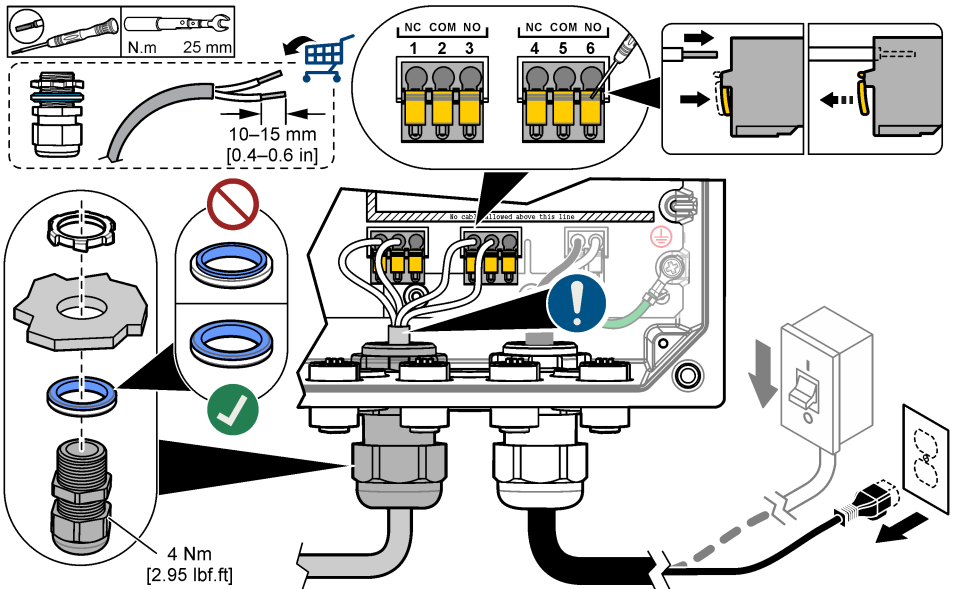


Table 4 Wiring information—relays

Terminal	Description	Terminal	Description
1	Relay 2, NC	4	Relay 1, NC
2	Relay 2, common	5	Relay 1, common
3	Relay 2, NO	6	Relay 1, NO

NC = normally closed; NO = normally open

4.3.5 Install an expansion module

⚠ WARNING



Explosion hazard. This manual is only for installation of the unit in a non-hazardous location. For installation of the unit in hazardous locations, use only the instructions and approved control drawing provided in the hazardous location installation manual.

Expansion modules for analog outputs, analog inputs, analog sensors and Profibus communication are available for the controller. Refer to the documentation supplied with the expansion module for additional information.

4.4 Close the cover

⚠ DANGER



Electrocution hazard. High voltage wiring for the controller is connected behind the high voltage barrier in the controller enclosure. The barrier must remain in place except when installing modules, or when a qualified installation technician is wiring for power, relays or analog and network cards.

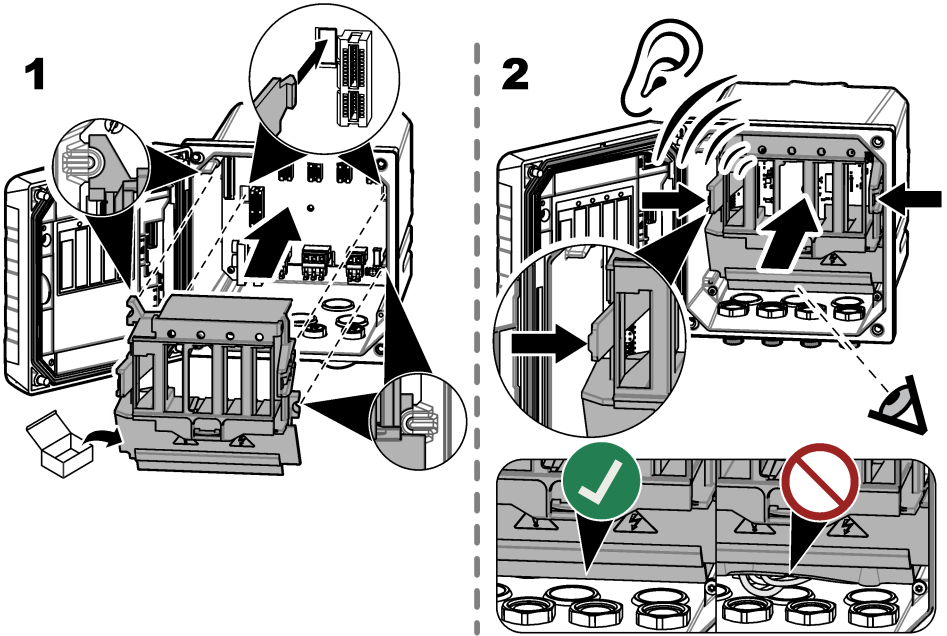
NOTICE

Close the controller cover and make sure that the cover screws are tight to keep the environmental rating of the enclosure.

After the power connections are made, install the high-voltage barrier. Make sure that the high-voltage barrier is correctly put on the enclosure guides and fixed to the main PCBA. A click sound is heard when the high-voltage barrier is correctly installed. Make sure that the lower part of the high-voltage barrier (soft rubber lip) is correctly installed and has no deformation. Refer to [Figure 11](#).

Close the controller cover. Tighten the cover screws with 2 Nm (17.70 lbf-in) torque. Refer to [Figure 7](#) on page 15.

Figure 11 Install the high voltage barrier

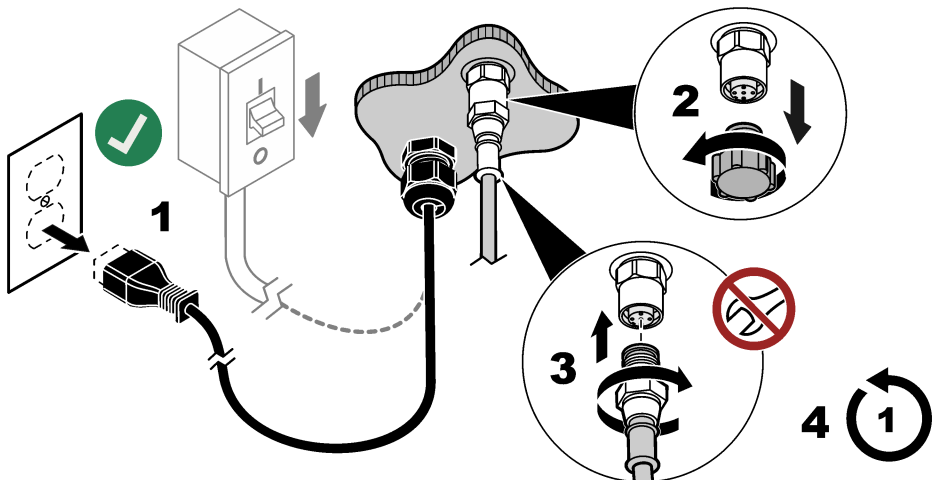


4.5 Connect measurement devices

Connect digital devices (e.g., sensors and analyzers) to the device connectors on the instrument. Refer to [Figure 12](#). Keep the device connector caps for future use.

Make sure that the device cables do not cause a trip hazard and do not have sharp bends.

Figure 12 Connect a device



Section 5 Startup

Connect the power cord to an electrical outlet with protective earth ground or set the circuit breaker for the controller to on.

5.1 Enter initial settings

At initial startup, follow the prompts on the display to set up the language, the date, the time and network information. Refer to the expanded user manual on the manufacturer's website for instructions.

Section 6 Additional information

The following additional information is available in the expanded user manual.

- User interface and navigation
- Operation
- Maintenance
- Troubleshooting
- Replacement part lists

Scan the QR codes that follow to go to the expanded user manual.



English



Italian



Spanish



German



French



Chinese



SHOP DRAWING TRANSMITTAL

Project Name:	Project #:
Submitted to:	
Submittal #:	Date:
Description:	

General Comments:

Arcadis Inc

The review of this Shop Drawing is for the sole purpose of ascertaining conformance with the general design concept and general arrangement only. This review does not constitute approval or verification of the design inherent in the Shop Drawings, and any omissions or errors therein remain the responsibility of the Contractor. The Contractor remains entirely responsible for complying with the Contract Documents, confirming all field dimensions and site conditions, for information that pertains to fabrication, techniques of construction and installation, and coordination of the Work.

Reviewed	Reviewed As Noted	Revise & Resubmit	Not Reviewed
X			
Reviewed By:	JGC	Date:	09/18/2024

No Comments



Filter Control Panel

Revision 00

This Document Contains:

- Filter Control Panel Electrical Schematics
- Filter Control Panel Drawings
- Filter Control Panel Cutsheets

Control Panel Data	
Power Supply (from load center)	575V
Rating	HOFFMAN Type 4X
Enclosure Size	36" x 30" x 10"
Contractor Installed	Yes

S15296-R0-PLC100	3
S15296-R0-PLC200	12
AB 100-C09EJ10	21
AB 100-FA11	23
AB 104-C09EJ22	25
AB 140MT-C3E-B16	27
AB 140MT-C3E-B63	28
AB 140MT-C-AFA10	29
AB 800F-ALP	30
AB 800F-NUx	32
AB 800FP-MT44	33
AB 800FP-P3	34
AB 800FP-P4	37
AB 800FP-SM32	40
AB 800FP-SM42	43
AB 800F-X01B	45
AB 800F-X10	46
AB 1489-M1C010	48
AB 1492-H6	55
AB 1492-J4	56
AB 1492-JG4	58
AB 1606-XLB90E	60
AB 1769-L24ER-QBFC1B	62
BUSSMAN MDL-1-R	88
HAMMOND HMI COVER PJHMI1412CCL	90
HOFFMAN ATEMNOF	92
HOFFMAN CMFKSS	93
HOFFMAN CSD363010SS_CP3630	94
HOFFMAN HF0516413_HG0500403	97
HOFFMAN HH05SS04004X	101

MAPLE CMT22108x2v2	105
MERSEN ATQR2	110
MERSEN TRM7	112
PANDUIT CXS70-14-C	113
SOLA STFV050-10N	114
SQD 9070TF500D5	117
SQD 9421LB7	119
SQD 9421LC46	120
SQD 9421LS13	122
SQD BDL36015	124
SQD PDC6BD6	127
SQD PK9GTA	129
WEIDMULLER 1240840000	132

NEXOM MITA CONTROL PANEL, TYPE 4X ELMVALE, ON PLC-100

JULY 2024
REVISION: 1

CHG#	BY	DATE	REVISIONS
1	RCB	8/2/24	BLOWER CONTROL RESPONSE

TITLE:	COVER SHEET
SCALE	NTS
DATE	14 JUNE
DRN BY	SKZ
CHKD BY	
DRAWING NUMBER	S15296
SHEET NO.	1 OF 11

DEFINITIONS

- WIRE GAP (WIRE NOT CONNECTED)
- TIE POINT (WIRE CONNECTED)
- FIELD WIRING
- TERMINAL - PRIMARY PANEL
- TERMINAL - SECONDARY PANEL
- TERMINAL - TERTIARY PANEL
- TERMINAL - QUATERNARY PANEL
- 1-23 NORMALLY OPEN CROSS REFERENCE
- 1-23 NORMALLY CLOSED CROSS REFERENCE

SOURCE/DESTINATION REFERENCING

- VOLTAGE/TYPE
- WIRE#
 WIRE BELOW
- VOLTAGE/TYPE WIRE#
 WIRE RIGHT
- WIRE#
 WIRE LEFT
- VOLTAGE/TYPE WIRE#
 WIRE ABOVE

CONTROL CABINET INTERIOR WIRE DETAILS: (UNLESS OTHERWISE NOTED IN SCHEMATICS)

- 3-PHASE POWER
 - PHASE A (1) BLACK #14AWG MINIMUM MTW/THHN
 - PHASE B (2) BLACK #14AWG MINIMUM MTW/THHN
 - PHASE C (3) BLACK #14AWG MINIMUM MTW/THHN
- SINGLE PHASE CONTROL
 - CONTROL RED #16AWG MINIMUM MTW/THHN
 - NEUTRAL WHT #16AWG MINIMUM MTW/THHN
- FOREIGN VOLTAGE
 - ALL ORANGE #16AWG MINIMUM MTW/THHN
- DC POWER & CONTROL
 - 24VDC BLUE #16AWG MINIMUM MTW/THHN
 - 0V (UNGROUND) BLUE #16AWG MINIMUM MTW/THHN
 - 0V (GROUND) WHITE WITH BLUE STRIPE #16AWG MINIMUM MTW/THHN
- GROUND GREEN WITH YELLOW STRIPE #14AWG MINIMUM MTW/THHN

WIRE LABEL TYPE: BRADY THT-95-498-5

NOTES:

- COLORED ELECTRICAL TAPE OR SHRINK TUBING SHALL BE WRAPPED OVER THE INSULATION ON THE ENDS OF EACH CONDUCTOR THAT DOES NOT COMPLY TO THE COLOR SCHEME ABOVE
- GROUND WIRES MUST BE CONTINUOUS COLOR FROM END TO END
- VFD OUTPUT WIRES MUST BE MTW OR XLPE TYPE - DO NOT USE THHN AT VFD MOTOR OUTPUTS

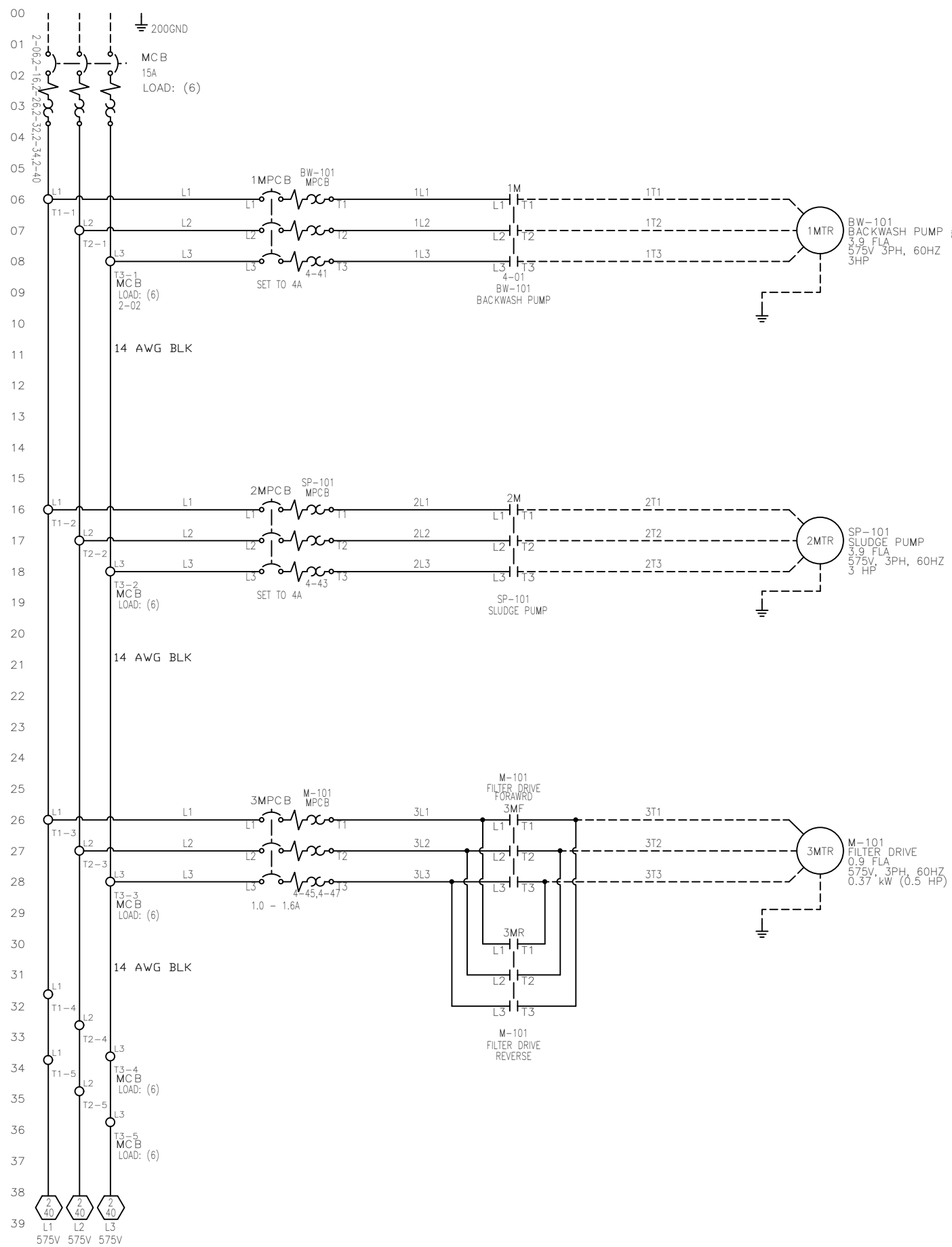
PREPARED FOR:



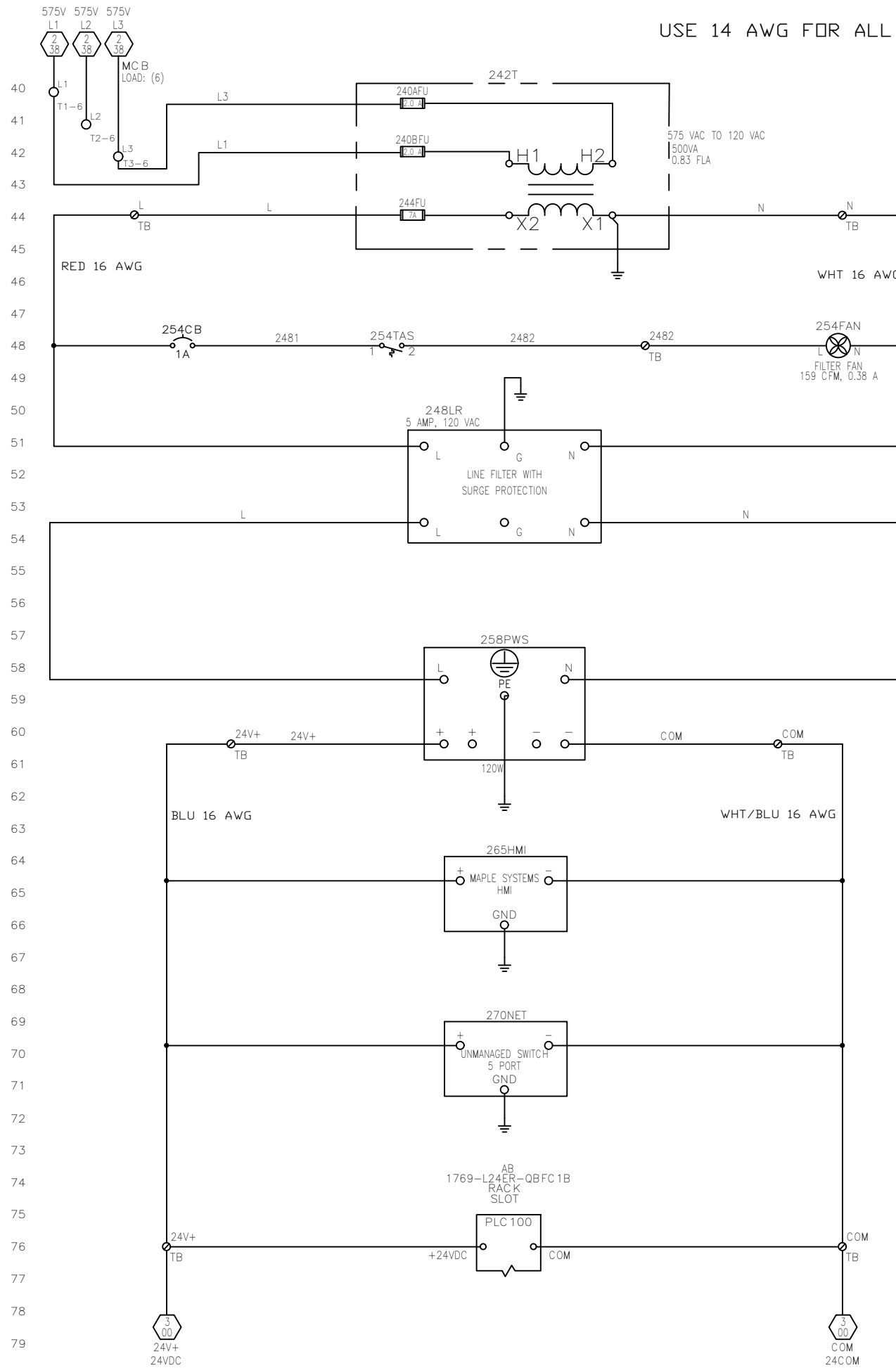
INCOMING POWER SUPPLY
575V 3 ϕ 60Hz
9.53 FLA

SHORT CIRCUIT CURRENT RATING:
5KVA RMS SYMMETRICAL, 480V MAXIMUM
UL 508A LISTED

BRANCH PROTECTION BY OTHERS
NOT LESS THAN 75" 14 AWG WIRE



USE 14 AWG FOR ALL PE WIRES.



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ANSI D
S15296
S15296-01

JOB #:
FILE:

REVISIONS

NO.	DATE	BY	REVISIONS
1	8/2/24	RCB	BLOWER CONTROL RESPONSE

TITLE: POWER DISTRIBUTION

SCALE: NTS

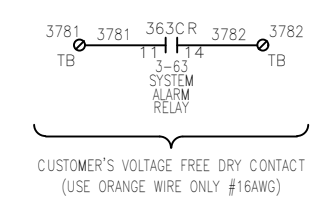
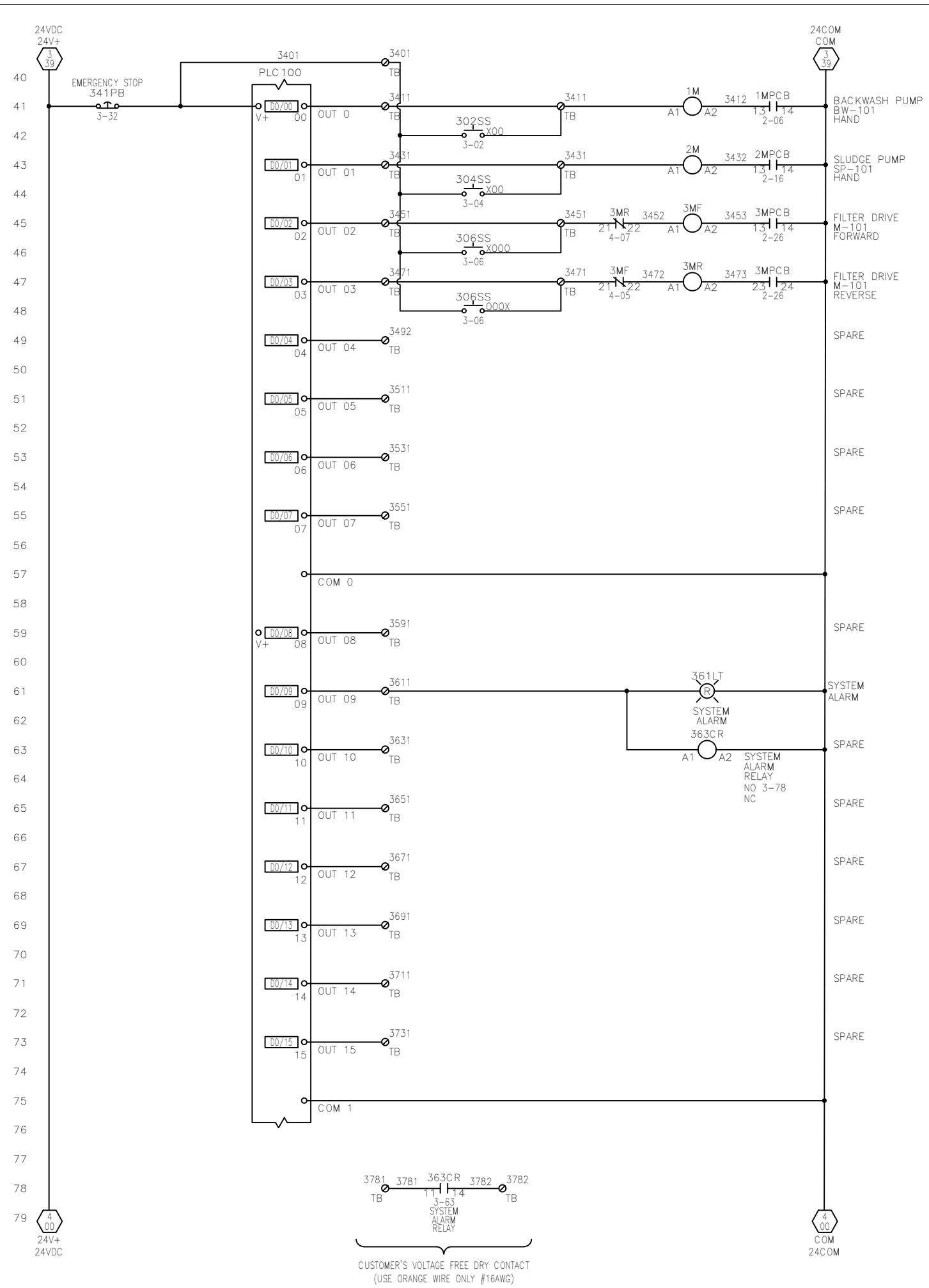
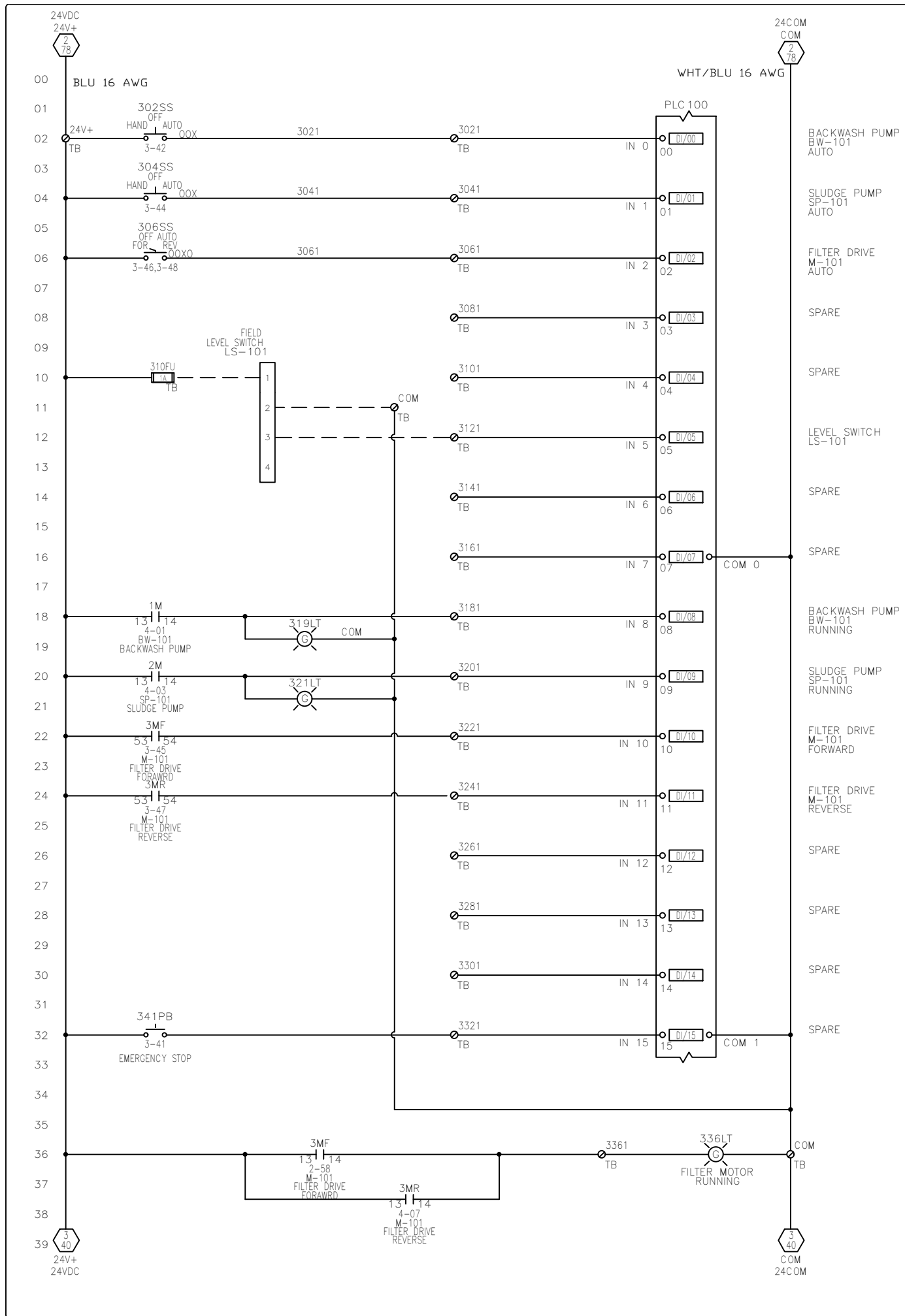
DATE: 14 JUNE

DRN BY: SKZ

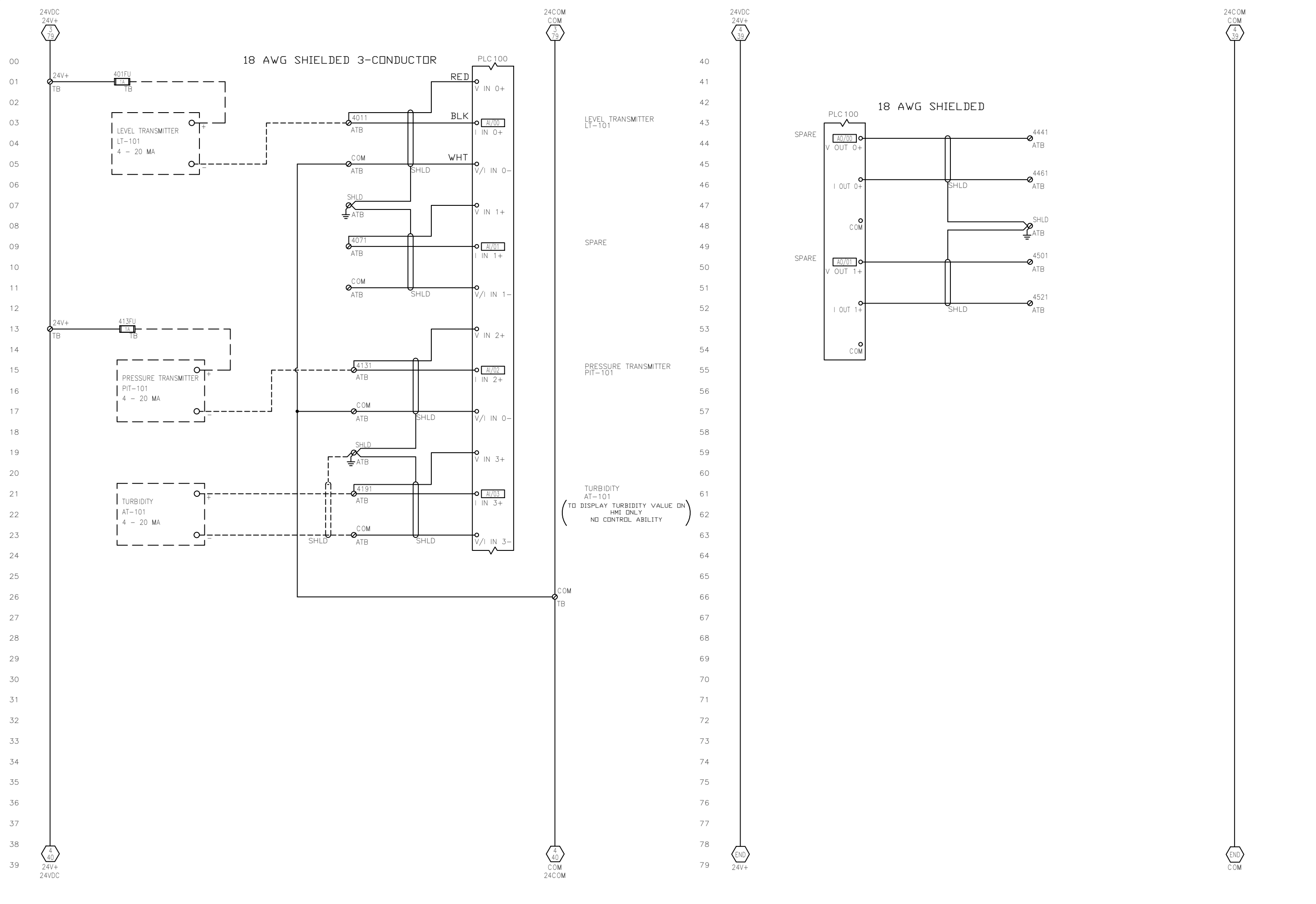
CHKD BY:

DRAWING NUMBER: S15296

SHEET NO.: 2 OF 11



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NEXTJIM ELMVALE, ON MITA CONTROL PANEL		ANSI	D
		S15296	S15296-03
JOB #:		RCB	BY:
DATE		8/2/24	DATE
REVISIONS		1	CHG#
TITLE:		PLC I/O DISCRETE	
SCALE		NTS	
DATE		14 JUNE	
DRN BY		SKZ	
CHKD BY			
DRAWING NUMBER		S15296	
SHEET NO.		3 OF 11	



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NEXDIN
 ELMVALE, ON
 MITA CONTROL PANEL

TITLE: PLC I/O ANALOG

SCALE: NTS

DATE: 14 JUNE

DRN BY: SKZ

CHKD BY:

DRAWING NUMBER: S15296

SHEET NO.: 4 OF 11

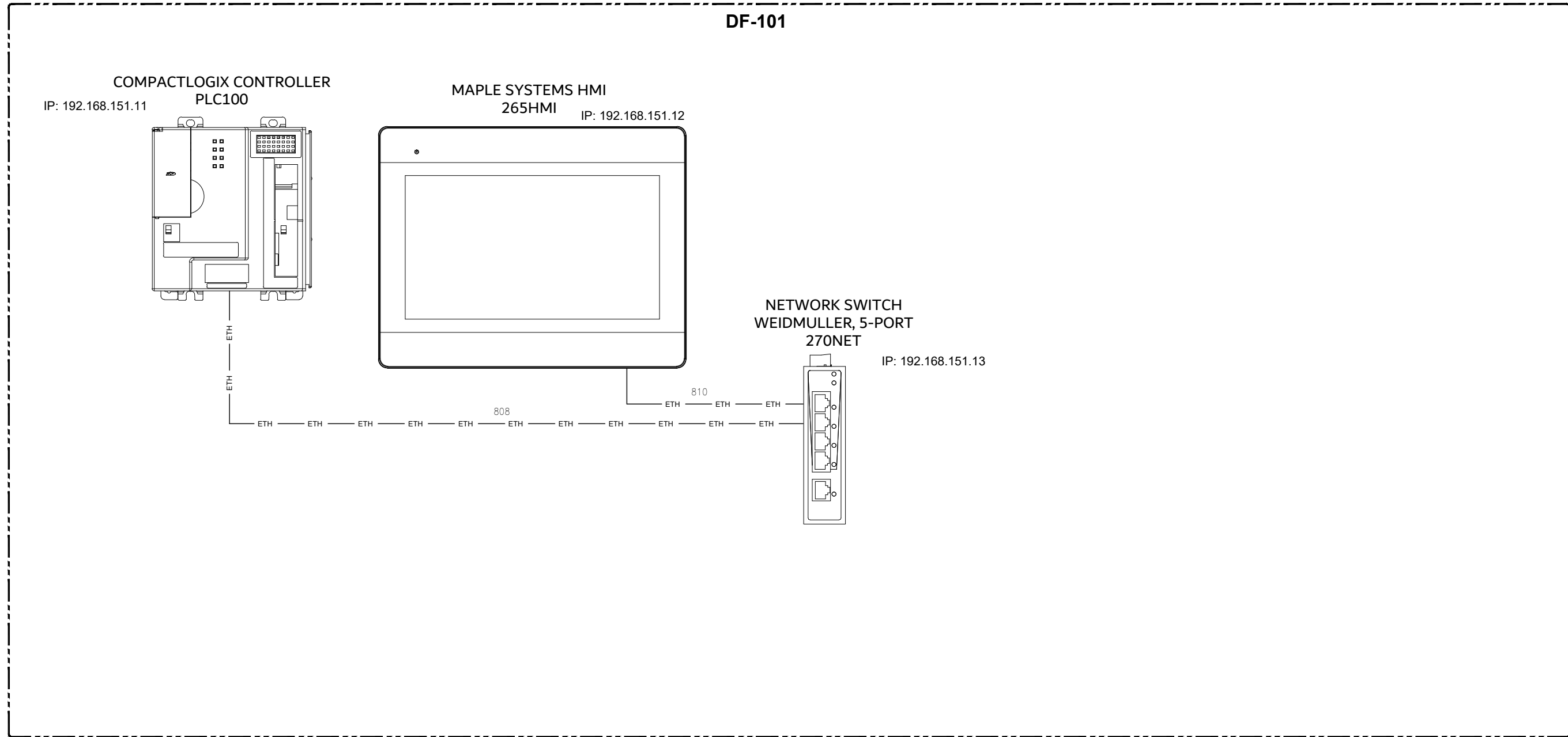
REV	DATE	BY	REVISIONS
1	8/2/24	RCB	BLOWER CONTROL RESPONSE

ANSI D S15296-04 S15296-04

JOB #: FILE:

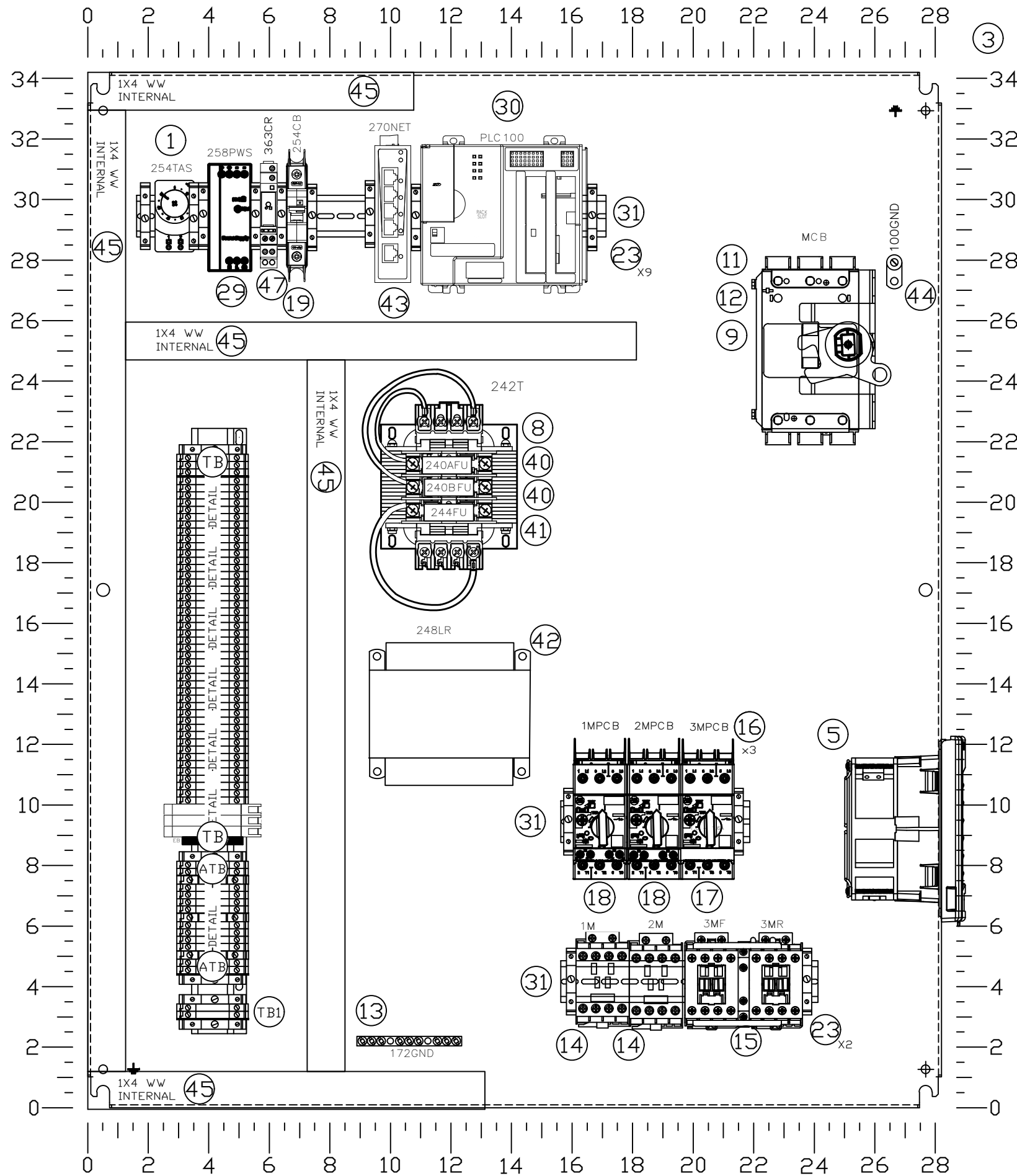
R 1

NETWORK TOPOLOGY



NOTES:
 SUBNET (ALL): 255.255.255.0
 MAXIMUM ETHERNET CABLE DISTANCE 328FT/100M
 ——— ETH ——— CAT 5E SHIELDED ETHERNET CABLE

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NEXOM ELMVALE, ON MITA CONTROL PANEL		JOB#: S15296 FILE: J13912-T1-08.dwg	R 1 D
		RCB	BY
		8/24	DATE
		1	CHG#
			DATE
			REVISIONS
			REVISIONS
			CHG#
TITLE: NETWORK TOPOLOGY			
SCALE		NTS	
DATE		14 JUNE	
DRN BY		SKZ	
CHKD BY			
DRAWING NUMBER			
S15296			
SHEET NO.			
5 OF 11			



TB		
Number	Jumper	Catalog
L	○ ○ ○	1492-J4
N	○ ○ ○	1492-J4
2482	○ ○ ○	1492-J4
EB		1492-EBJ3

26 X50

TB		
Number	Jumper	Catalog
24V+	● ○ ○	1492-J4
24V+	● ○ ○	1492-J4
24V+	● ○ ○	1492-J4
24V+	● ○ ○	1492-J4
CDM	● ○ ○	1492-J4
CDM	● ○ ○	1492-J4
CDM	● ○ ○	1492-J4
CDM	● ○ ○	1492-J4
3021	○ ○ ○	1492-J4
3041	○ ○ ○	1492-J4
3061	○ ○ ○	1492-J4
3081	○ ○ ○	1492-J4
3101	○ ○ ○	1492-J4
3121	○ ○ ○	1492-J4
3141	○ ○ ○	1492-J4
3161	○ ○ ○	1492-J4
3181	○ ○ ○	1492-J4
3201	○ ○ ○	1492-J4
3221	○ ○ ○	1492-J4
3241	○ ○ ○	1492-J4
3261	○ ○ ○	1492-J4
3281	○ ○ ○	1492-J4
3301	○ ○ ○	1492-J4
3321	○ ○ ○	1492-J4
3361	○ ○ ○	1492-J4
3401	○ ○ ○	1492-J4
3411	● ○ ○	1492-J4
3411	● ○ ○	1492-J4
3431	● ○ ○	1492-J4
3431	● ○ ○	1492-J4
3451	● ○ ○	1492-J4
3451	● ○ ○	1492-J4
3471	● ○ ○	1492-J4
3471	● ○ ○	1492-J4
3492	○ ○ ○	1492-J4
3511	○ ○ ○	1492-J4
3531	○ ○ ○	1492-J4
3551	○ ○ ○	1492-J4
3591	○ ○ ○	1492-J4
3611	○ ○ ○	1492-J4
3631	○ ○ ○	1492-J4
3651	○ ○ ○	1492-J4
3671	○ ○ ○	1492-J4
3691	○ ○ ○	1492-J4
3711	○ ○ ○	1492-J4
310FU	○ ○ ○	1492-H6
401FU	○ ○ ○	1492-H6
413FU	○ ○ ○	1492-H6
EB		1492-N37

24 X3

28 X12

21 X4

20 X2

37 X3

ATB		
Number	Jumper	Catalog
4011	○ ○ ○	1492-J4
CDM	○ ○ ○	1492-J4
SHLD	○ ○ ○	1492-JG4
4071	○ ○ ○	1492-J4
CDM	○ ○ ○	1492-J4
4131	○ ○ ○	1492-J4
CDM	○ ○ ○	1492-J4
SHLD	○ ○ ○	1492-JG4
4191	○ ○ ○	1492-J4
CDM	○ ○ ○	1492-J4
4441	○ ○ ○	1492-J4
4461	○ ○ ○	1492-J4
SHLD	○ ○ ○	1492-JG4
4501	○ ○ ○	1492-J4
4521	○ ○ ○	1492-J4
EB		1492-EBJ3

26 X12

27 X3

24 X2

23 X2

TBI		
Number	Jumper	Catalog
END	ANCHOR	1492-EAJ35
3781	○ ○ ○	1492-J4
3782	○ ○ ○	1492-J4
EB	BARRIER	1492-EBJ3
END	ANCHOR	1492-EAJ35

23 X2

24 X2

26 X2

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NEXDIM
 ELMVALE, ON
 MITA CONTROL PANEL

TITLE: SUB PANEL LAYOUT

SCALE: NTS

DATE: 14 JUNE

DRN BY: SKZ

CHKD BY:

DRAWING NUMBER: S15296

SHEET NO.: 6 OF 11

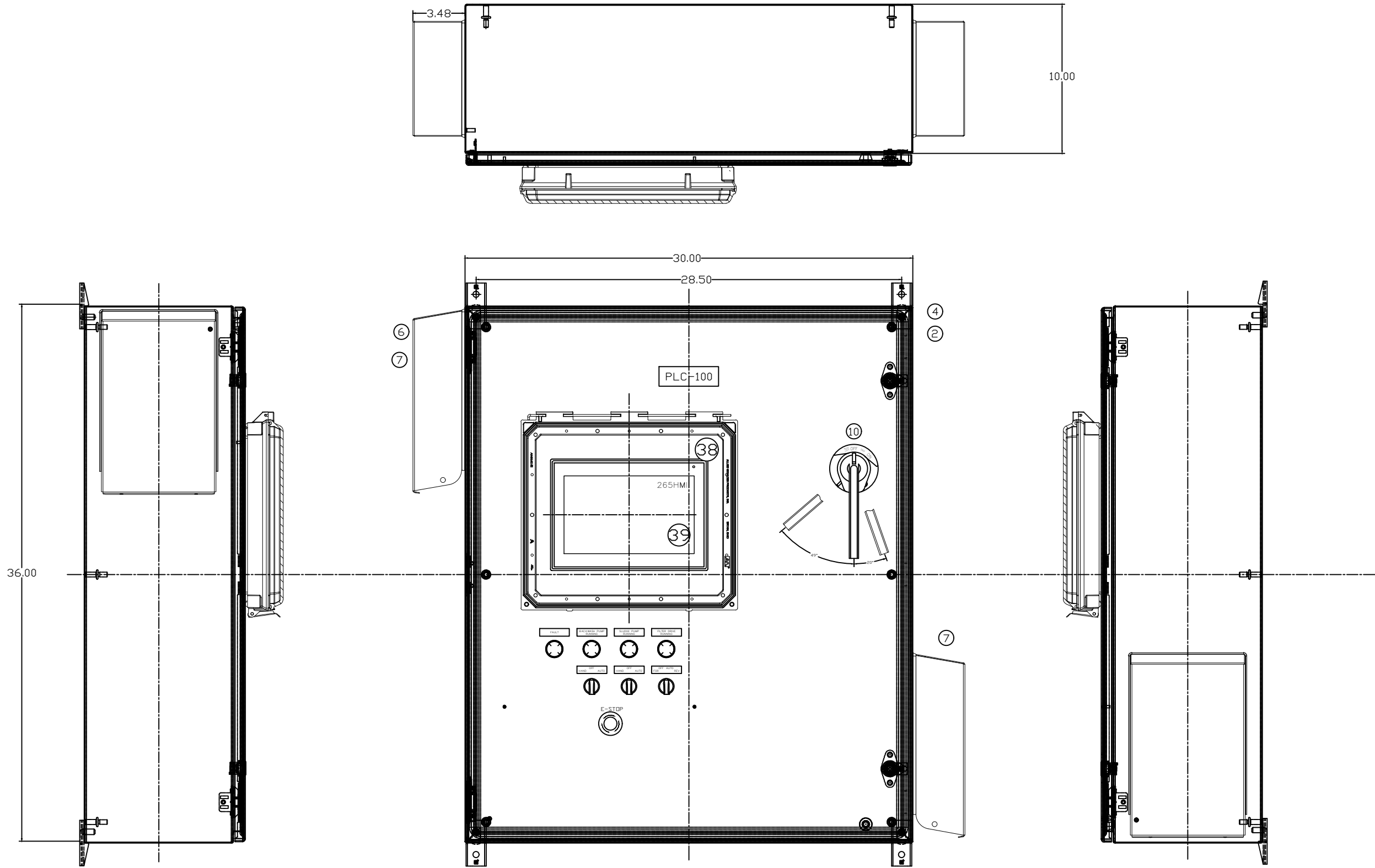
REVISIONS

NO.	DATE	BY	CHG#	REVISIONS
1	8/2/24	RCB		BLOWER CONTROL RESPONSE

JOB #: S15296-05
 FILE: S15296-05

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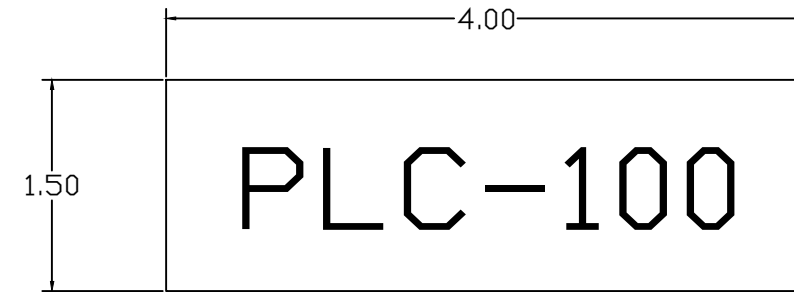
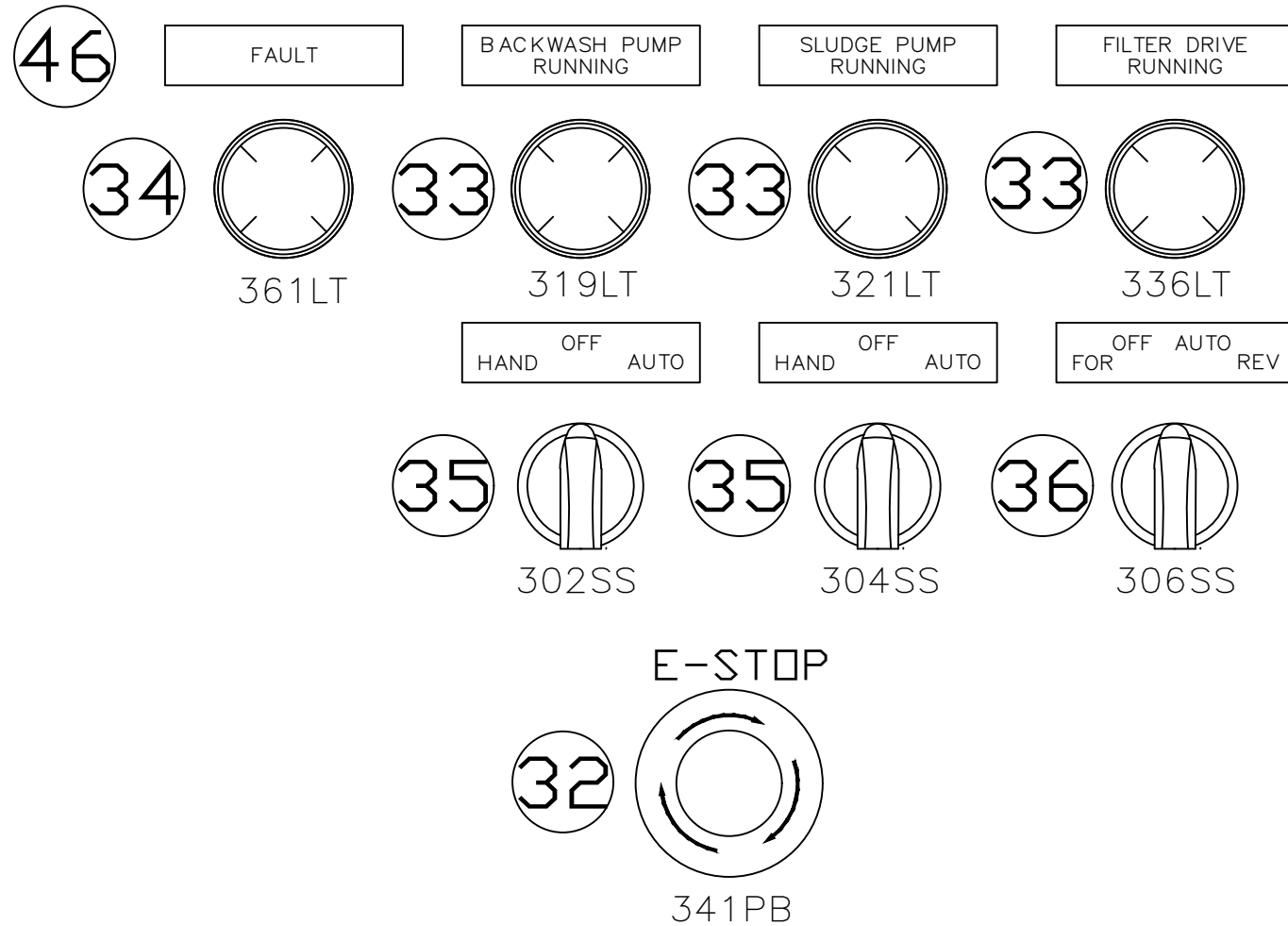
R 1



ENCLOSURE: CSD363010SS
TYPE 4X

NOTE:
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE NOTED.

OPERATOR DETAIL



SPARE PARTS BOM				
ITEM	QTY	MFG	DESCRIPTION	CATALOG
35	1	MERSEN	FUSE, CLASS CC, TIME DELAYED, 600V, 2.5 AMP	ATQR2-1/2
36	1	MERSEN	FUSE, MIDGET, TIME DELAYED, 250V, 7 AMP	TRM7
	1	AB	1769 16PT DIGITAL I/O CARD	1769-IQ16
	1	AB	PILOT LIGHT ASSEMBLY, 22MM, 120V, GREEN	800FP-P3PN5G
	1	AB	PILOT LIGHT ASSEMBLY, 22MM, 120V, RED	800FP-P4PN5R

FUSE REPLACEMENT CHART		
240AF, 240BFU	ATQR2-1/2	DR =
244FU	TRM7	DR =
310FU, 401FU, 413FU	MDL-1-R	DR =

CUSTOMER TERMINAL TORQUE CHART		
TAGS	CATALOG	TORQUE SPECIFICATION
MCB	BDL36015	14... 3/0 AWG - 89 lb-in (5 Nm)
1M 2M 3MF 3MR	100-C09EJ10	18... 12 AWG - 10.6 lb-in (1.2 Nm)
100GND	CXS70-14-C	14...10 AWG - 20 lb-in (1.7 Nm) 8...4 AWG - 25 lb-in (2.8 Nm)
172GND	PK9GTA	14...10 AWG - 20 lb-in (2.26 Nm) 8 AWG - 25 lb-in (2.82 Nm) 6...4 AWG - 35 lb-in (3.95 Nm)
TB ATB	1492-J4	9.0 lb-in (1Nm)
ATB	1492-JG4	9.0 lb-in (1Nm)
310FU 401FU 413FU	1492-H6	30...12 AWG - 7.1 LB-IN (0.8 Nm)

AFFIX TO INNER DOOR

EA ENHANCED AUTOMATION (262) 783-5970 www.enhancedautomation.com
 W136 N5239 Campbell Court
 Menomonee Falls, WI 53051-7042 **SP**

Custom Built for: NEXDM-TYPE 4X-07/2024
 Voltage Rating: 575V 3 ϕ 60Hz Total FLA: 9.53 A
 Ampere or HP of Largest Motor: 3.9A
 Other Voltage Sources: NONE
 Wiring Diagram: J15296-PLC100 ID#: J15296-PLC100
 Suitable For Use On A Circuit Capable Of Delivering Not
 More Than 14 kA rms Symmetrical @575 V Maximum

FIELD TERMINAL TEMPERATURE RATING: ENCLOSURE OPENINGS:
 FIELD WIRING FOR POWER CIRCUITS USE 75 DEG C RATED COPPER WIRE, UNLESS NOTED
 TO MAINTAIN THE ENVIRONMENTAL RATING OF THIS ENCLOSURE, INSTALL IN THE OPENINGS ONLY LISTED OR RECOGNIZED CONTROL DEVICES WITH THE SAME ENVIRONMENTAL RATING AS THE ENCLOSURE IN COMPLIANCE WITH THE INSTALLATION INSTRUCTIONS OF THE DEVICE.
 FIELD WIRING FOR CONTROL CIRCUITS USE 60 DEG C RATED COPPER WIRE, UNLESS NOTED

Industrial Control Panel Assembly
WARNING: Alterations or Disassembly Voids all Warranties

EA ENHANCED AUTOMATION
 Engineers - Integrator - Manufacturer
 www.enhancedautomation.com

NEXDM
 ELMVALE, ON
 MITA CONTROL PANEL

S15296
 J14503-04

ANSI D

JOB #:
 FILE:

RCB BY
 DATE

1 BLOWER CONTROL RESPONSE 8/2/24
 REVISIONS

DATE
 BY
 CHG#

REVISIONS

TITLE:
 ENCLOSURE
 DETAIL

SCALE NTS

DATE 14 JUNE

DRN BY SKZ

CHKD BY

DRAWING NUMBER
 S15296

SHEET NO.
 8 OF 11

R 1

BILL OF MATERIALS

ITEM	QTY	SUB	MFG	DESCRIPTION	CATALOG
1	1		HOFFMAN	ENCLOSURE, ACCESSORY, TEMP CONTROL SWITCH, 2A	ATEMND
2	1		HOFFMAN	MOUNTING FEET, SS	CMFKSS
3	1		HOFFMAN	SUBPANEL, 34.5x28.2, WHITE, STEEL	CP3630
4	1		HOFFMAN	ENCLOSURE, SINGLE DOOR, 36.00x30.00x10.00, METALLIC, STAINLESS STEEL, TYPE 4X	CSD363010SS
5	1		HOFFMAN	INHAUSTFAN, 5 IN, BLACK, 35CFM, 120VAC	HF0516413
6	1		HOFFMAN	VENT GRILLE, 5IN, BLACK	HG0500403
7	2		HOFFMAN	RAINHOOD, NEMA 4X, 5'	HH05SS04004X
8	1		SQD	CONTRD TRANSFORMER, W/FUSES, 550/575/600VAC IN, 500 VA, 110/115/120VAC OUT	9070TF500D5
9	1	*1	SQD	CIRCUIT BREAKER OPERATING MECHANISM, B FRAME	9421LB7
		*1	SQD	CIRCUIT BREAKER, LONG SHAFT	9421LS13
10	1		SQD	CIRCUIT BREAKER, OPERATING HANDLE, STANDARD, TYPE 4X	9421LC46
11	1		SQD	CIRCUIT BREAKER, 3 POLE, 600Y/347V AC, 25kA @ 600Y/347, 15A	BDL36015
12	1		SQD	CIRCUIT BEAKER, DISTRIBUTION CONNECTOR, 6 LOAD, 125A	PDC6BD6
13	1		SQD	GROUND BAR, 9-POINT	PK9GTA
14	2		AB	CONTACTOR, 9 AMP, 3-POLE, 1 N.O. AUX, 24VDC COIL	100-C09EJ10
15	1	*1	AB	REVERSING CONTACTOR, 9 AMP, 2ND/2NC AUX 24VDC	104-C09EJ22
15		*2	AB	CONTACTOR, AUX CONTACT, FRONT MOUNTED, I.N.O, INC.	100-FA11
16	3		AB	MPCB, ACCESSORY, UL SPACING ADAPTER, C-FRAME	140MT-C-TE
17	1	*1	AB	MPCB, STANDARD MAGNETIC TRIP, C FRAME, 1 1.6 A	140MT-C3E-B16
		*1	AB	MPCB, AUX CONTACT, FRONT, 1 N.O.	140MT-C-AFA10
18	2	*1	AB	MPCB, STANDARD MAGNETIC TRIP, C FRAME, 4 6.3 A	140MT-C3E-B63
		*1	AB	MPCB, AUX CONTACT, FRDNT, 1 N.O.	140MT-C-AFA10
19	1		AB	CIRCUIT BREAKER, 1 POLE , TRIP CURVE C, 1A	1489-MIC010
20	5		AB	JUMPER, 2 POLE, J4 TERMINALS	1492-CJLJ6-2
21	3		AB	JUMPER, 4 POLE, J4 TERMINALS	1492-CJLJ6-4
22	1		AB	ALUMINUM RAISED DIN RAIL (35mm x 7.5mm x 57.4mm HIGH)	1492-DR6
23	16		AB	TB, END ANCHOR	1492-EAJ35
24	3		AB	TB, END BARRIER	1492-EBJ3
25	3	*1	AB	TB, FUSE, 30-12AWG, 12A, 300V, NON-INDICATION	1492-H6
		*1	CEMBRE	TERMINAL MARKER, 8x10mm	41096
26	62	*1	AB	TB, SINGLE, 22-10AWG, 35A, 600V, GRAY	1492-J4
		*2	CEMBRE	TERMINAL MARKER, 6x12mm	46392
27	3	*1	AB	TB, GROUND, 22-10AWG, 35A, 600V, GREEN	1492-JG4
		*2	CEMBRE	TERMINAL MARKER, 6x12mm	46392
28	1		AB	END BARRIER, 1492-H. FUSE TERMINAL	1492-N37
29	1		AB	POWER SUPPLY, 1-PHASE, 100...240V AC IN, 90 W, 24...28V DC OUT	1606-XLB90E
30	1		AB	COMPACTLOGIX 5370 L2 CONTROLLER, 16 DC IN, 16 DC OUT, UP TO 4 1769 I/O EXPANSION MODULES.	1769-L24ER-QBFC1B
31	3		AB	ZINC/STEEL DIN RAIL EN 50022 (35mm x 7.5mm)	199-DR1
32	1	*1	AB	PUSH-PULL, TWIST, RED, OPERATOR 40MM	800FP-MT44
		*1	AB	800F PLASTIC LATCH	800F-ALP
		*1	AB	60MM E-STOP, LEGEND	800F-15YS
		*1	AB	CONTACT BLOCK, NORMALLY CLOSED	800F-X01
		*1	AB	CONTACT BLOCK, NORMALLY OPEN	800F-X10
33	3	*1	AB	PILOT LIGHT, GREEN, 22M	800FP-P3
		*1	AB	MOUNTING LATCH, PLASTIC	800F-ALP
		*1	AB	LED MODULE, UNIVERSAL, GREEN	800F-NUG
34	1	*1	AB	PILOT LIGHT, RED, 22M	800FP-P4
		*1	AB	MOUNTING LATCH, PLASTIC	800F-ALP
		*1	AB	LED MODULE, UNIVERSAL, RED	800F-NUR
35	2	*1	AB	SELECTOR SWITCH, 3-POS, MAINTAINED	800FP-SM32
		*1	AB	MOUNTING LATCH, PLASTIC	800F-ALP
		*2	AB	CONTACT BLOCK, NORMALLY OPEN	800F-X10
36	1	*1	AB	SELECTOR SWITCH, 4-POS, MAINTAINED	800FP-SM42
		*1	AB	MOUNTING LATCH, PLASTIC	800F-ALP
		*2	AB	CONTACT BLOCK, NORMALLY OPEN	800F-X10
		*1	AB	CONTACT BLOCK, EARLY BREAK NORMALLY CLOSED	800F-X01B
37	3		BUSSMANN	FUSE, MINIATURE, TIME DELAY, SUPPLEMENTAL, 250V, 1A	MDL-1-R
38	1		HAMMOND	HMI COVER, 14IN X 12IN, CLEAR WINDOW, SNAP LATCH	PJHM11412CCL
39	1		MAPLE SYSTEMS	HMI, 10.1", ADVANCED HMI, 2 ETHERNET,1 USB, 2 SERIAL, WIFI CAPABLE	CMT2108X2V2
40	2		MERSEN	FUSE, CLASS CC, TIME DELAYED, 600V, 2 AMP	ATQR2
41	1		MERSEN	FUSE, MIDGET, TIME DELAYED, 250V, 7 AMP	TRM7
42	1		SDLA	IN-LINE FILTER AND SURGE PROTECTION	STFV050-10N
43	1		WEIDMULLER	SWITCH, UNMANAGED, 5 ETHERNET PORTS	1240840000
44	1		PANDUIT	GROUND LUG, 14 4 AWG	CXS70-14-C
45	5	*1	PANDUIT	WIRING DUCT, SLOTTED,WHITE, 1X4 IN	G1X4WH6
		*1	PANDUIT	WIRING DUCT, COVER, WHITE, 1 IN	C1WH6
46	1		EA	LAMACOID	CUSTOM
47	1		AB	RELAY, SLIM, DPDT, 10A, 110/125VAC/DC COIL	700-HL12U1



NEXDIN
ELMVALE, ON
MITA CONTROL PANEL

REV	DATE	BY	DESCRIPTION
1	8/2/24	RCB	BLOWER CONTROL RESPONSE

TITLE: **BILL OF MATERIALS**

SCALE: NTS

DATE: 14 JUNE

DRN BY: SKZ

CHKD BY:

DRAWING NUMBER: S15296

SHEET NO.: 9 OF 11

R 1

ANSI D

S15296
J14503-06

JOB #:

FILE:

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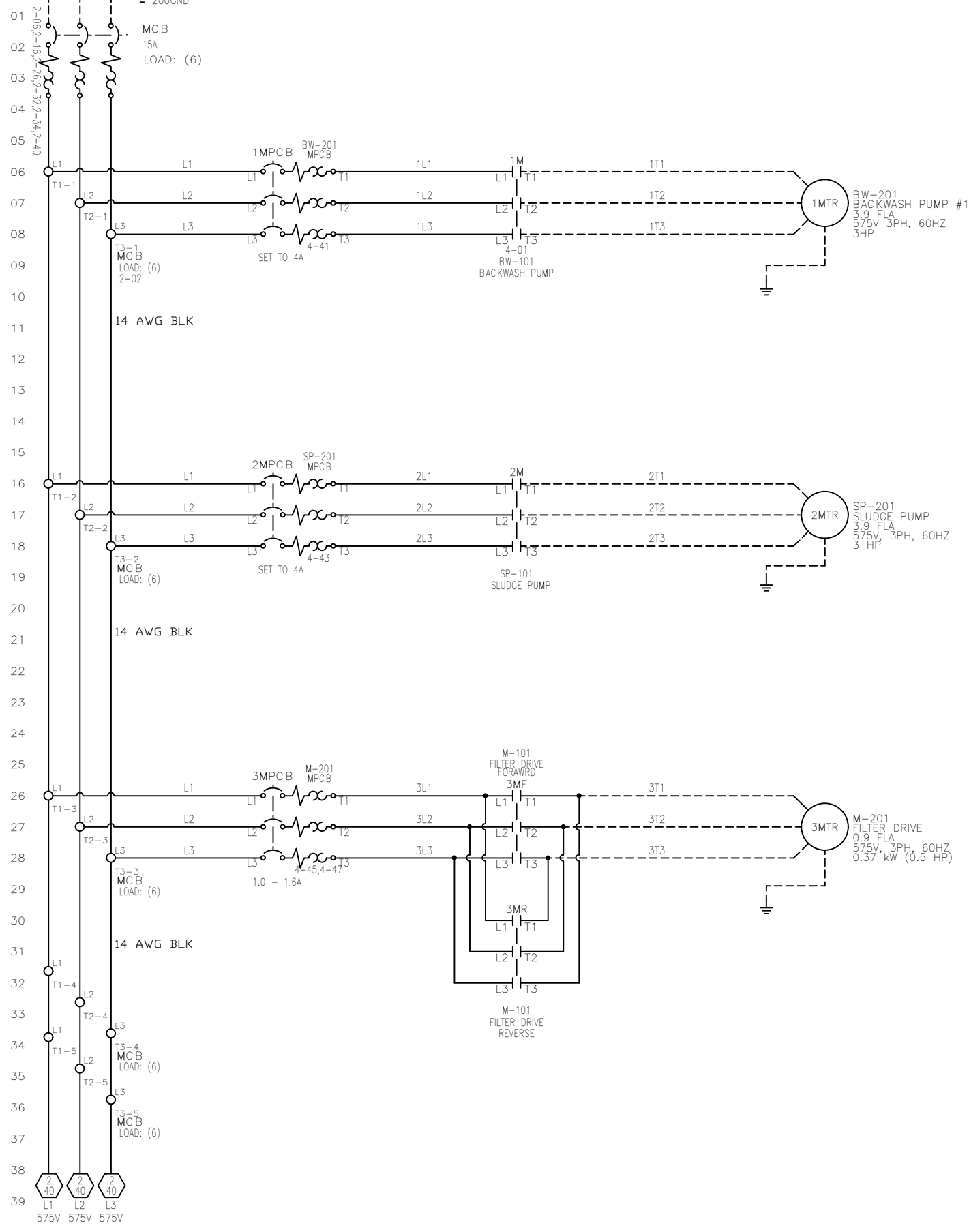
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DATE

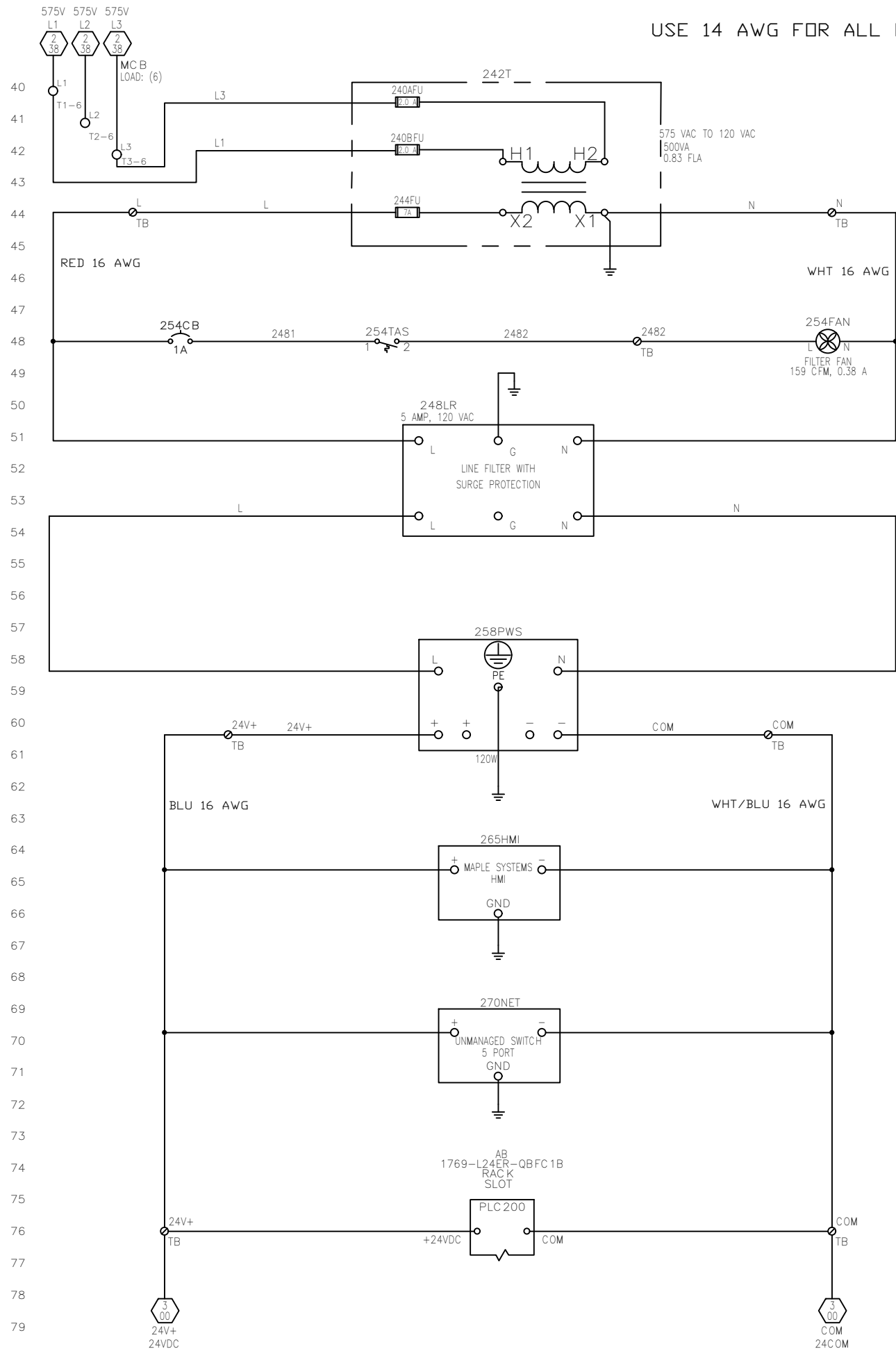
INCOMING POWER SUPPLY
575V 3 ϕ 60Hz
9.53 FLA

SHORT CIRCUIT CURRENT RATING:
5KVA RMS SYMMETRICAL, 480V MAXIMUM
UL 508A LISTED

BRANCH PROTECTION BY OTHERS
NOT LESS THAN 75" 14 AWG WIRE



USE 14 AWG FOR ALL PE WIRES.



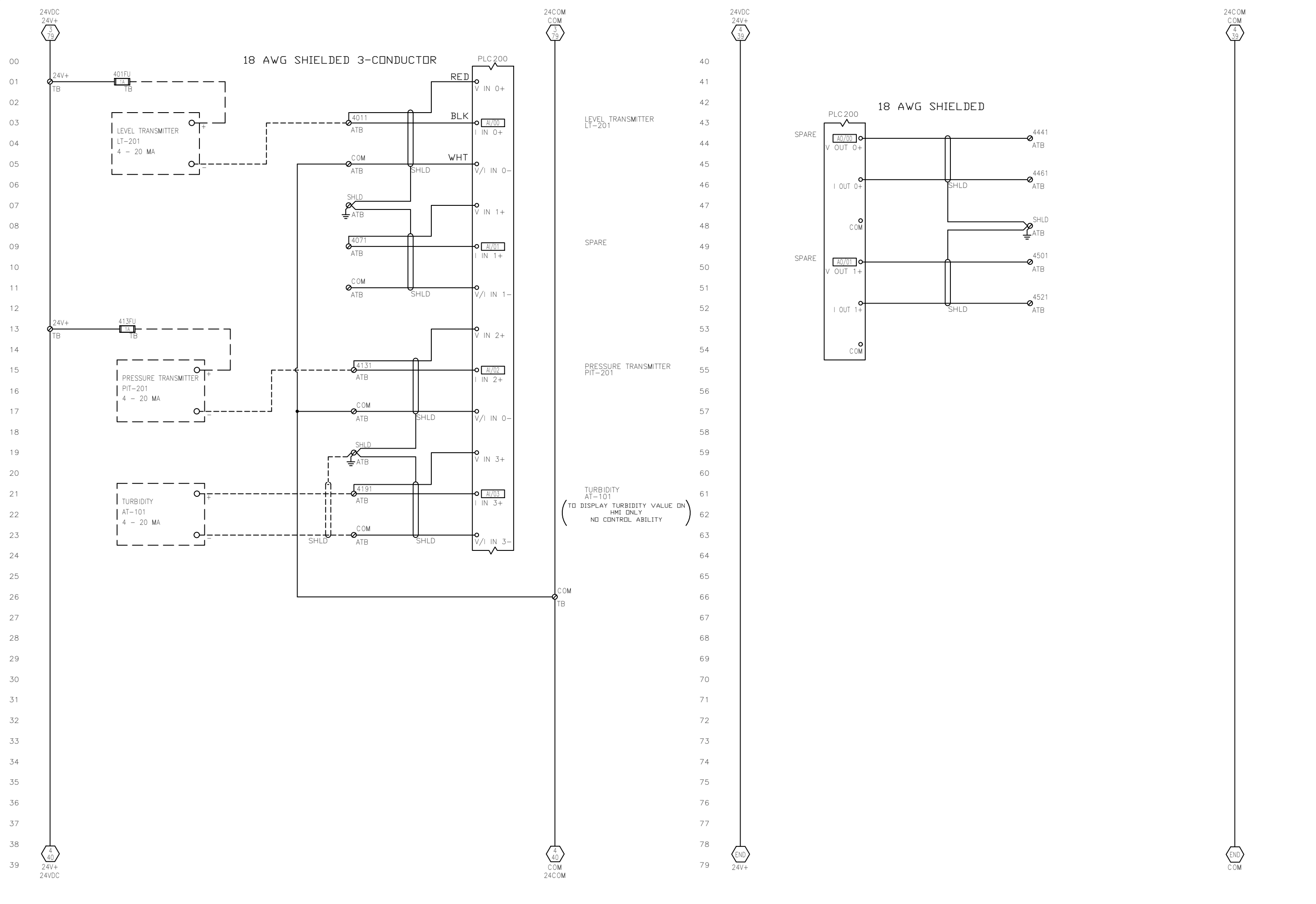
ENHANCED AUTOMATION
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NEXDIN
ELMVALE, ON
MITA CONTROL PANEL

NO.	DATE	BY	REVISIONS
1	8/2/24	RCB	BLOWER CONTROL RESPONSE

TITLE: POWER DISTRIBUTION
SCALE: NTS
DATE: 14 JUNE
DRN BY: SKZ
CHKD BY:
DRAWING NUMBER: S15296
SHEET NO.: 2 OF 11

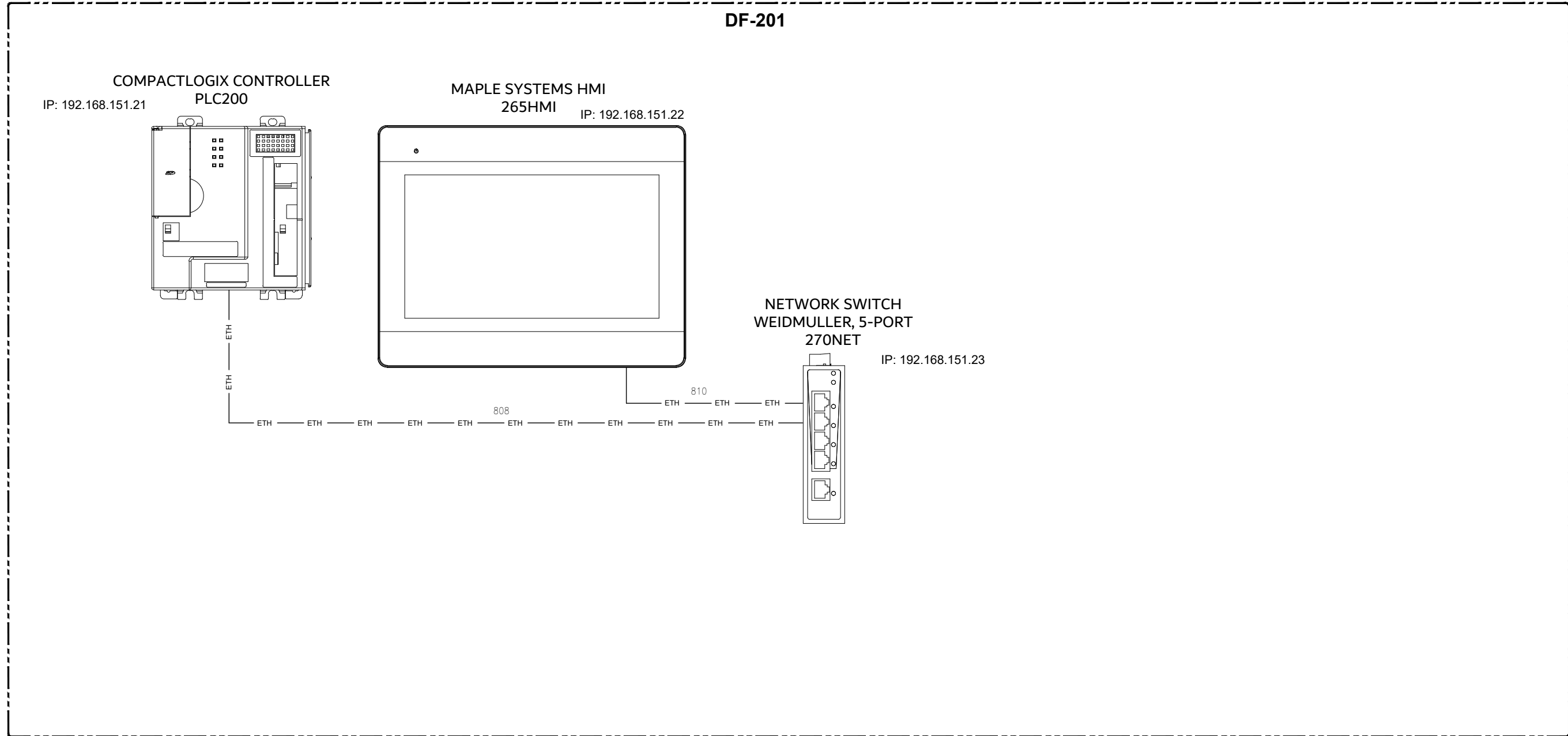
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JOB#: S15296-01
FILE:



 <small>Engineers - Integrator - Manufacturer</small> <small>www.enhancedautomation.com</small>			R 1
		S15296-04	S15296-04
NEXDIN ELMVALE, ON MITA CONTROL PANEL		JOB #: S15296-04	FILE:
		DATE:	BY:
BLOWER CONTROL RESPONSE		8/2/24	RCB
		DATE:	BY:
REVISIONS		1	CHG#
		DATE:	BY:
TITLE: PLC I/O ANALOG		SCALE: NTS	DATE: 14 JUNE
DRN BY: SKZ		CHKD BY:	DRAWING NUMBER: S15296
SHEET NO. 4 OF 11		REVISIONS	CHG#

NETWORK TOPOLOGY

DF-201



NOTES: SUBNET (ALL): 255.255.255.0

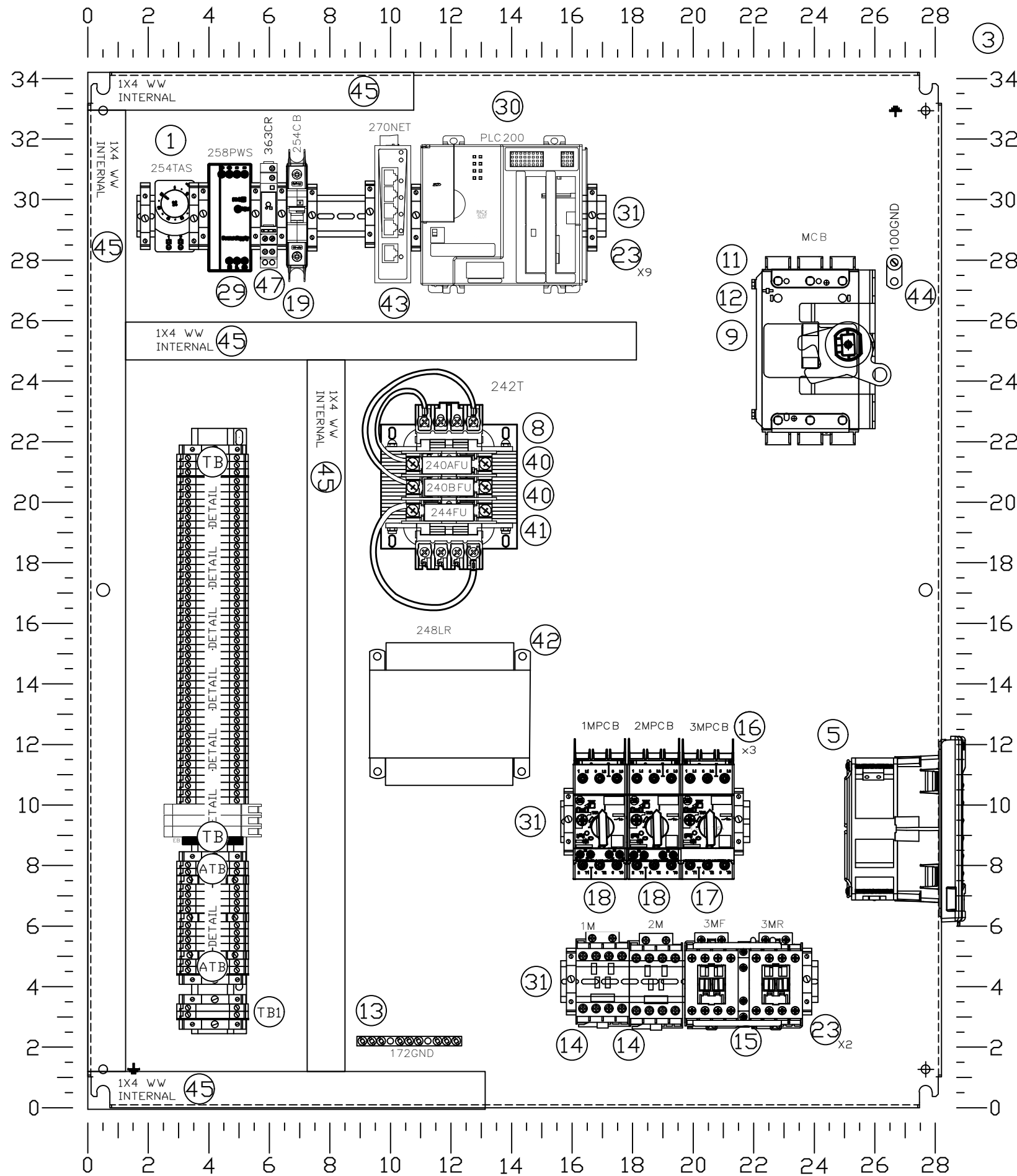
MAXIMUM ETHERNET CABLE DISTANCE 328FT/100M

——— ETH ——— CAT 5E SHIELDED ETHERNET CABLE

NEXOM ELWALE, ON MITA CONTROL PANEL	JOB#: S15296	R 1	D
	FILE: J13912-T1-08.dwg		

NO.	REVISIONS	DATE	BY	RCB
1	BLOWER CONTROL RESPONSE	8/2/24		

TITLE: NETWORK TOPOLOGY	
SCALE	NTS
DATE	14 JUNE
DRN BY	SKZ
CHKD BY	
DRAWING NUMBER	S15296
SHEET NO.	5 OF 11



TB		
Number	Jumper	Catalog
L	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
N	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
2482	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
EB		1492-EBJ3

ATB		
Number	Jumper	Catalog
4011	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
CDM	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
SHLD	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-JG4
4071	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
CDM	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
4131	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
CDM	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
SHLD	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-JG4
4191	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
CDM	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
4441	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
4461	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
SHLD	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-JG4
4501	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
4521	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
EB		1492-EBJ3

TB		
Number	Jumper	Catalog
24V+	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
24V+	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
24V+	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
24V+	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
CDM	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
CDM	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
CDM	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
CDM	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3021	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3041	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3061	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3081	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3101	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3121	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3141	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3161	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3181	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3201	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3221	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3241	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3261	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3281	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3301	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3321	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3361	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3401	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3411	<input checked="" type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
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3471	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3471	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3492	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3511	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3531	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
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3591	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3611	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3631	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3651	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3671	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3691	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3711	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
310FU	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-H6
401FU	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-H6
413FU	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-H6
EB		1492-N37

TB1		
Number	Jumper	Catalog
END	ANCHDR	1492-EAJ35
3781	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
3782	<input type="radio"/> <input type="radio"/> <input type="radio"/>	1492-J4
EB	BARRIER	1492-EBJ3
END	ANCHDR	1492-EAJ35

ENHANCED AUTOMATION
 Engineers - Integrator - Manufacturer
 www.enhancedautomation.com

NEXDIM
 ELMVALE, ON
 MITA CONTROL PANEL

TITLE: SUB PANEL LAYOUT

SCALE: NTS

DATE: 14 JUNE

DRN BY: SKZ

CHKD BY:

DRAWING NUMBER: S15296

SHEET NO.: 6 OF 11

REVISIONS

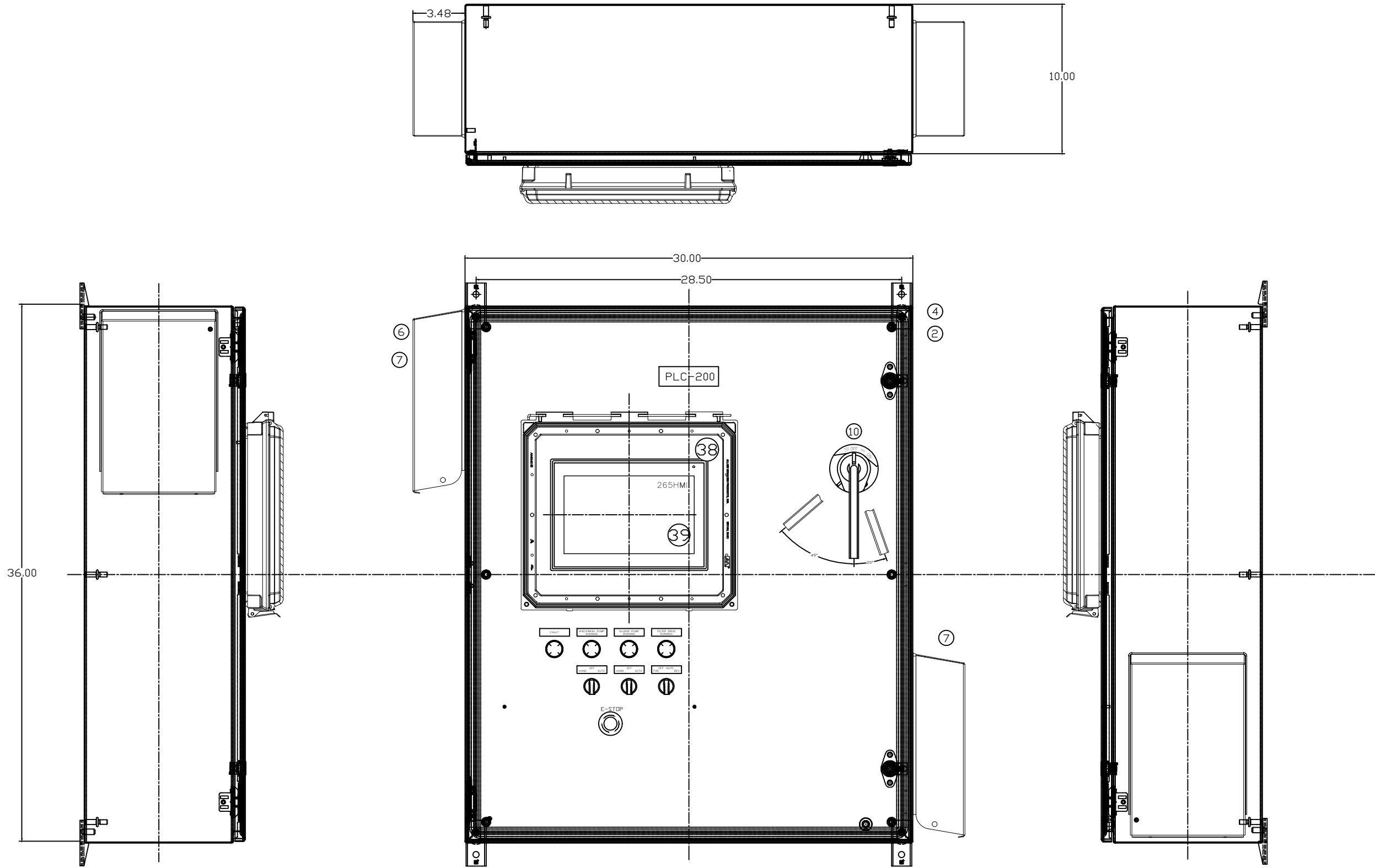
CHG#	DATE	BY	REVISIONS
1	8/2/24	RCB	BLOWER CONTROL RESPONSE

ANSI D

JOB #: S15296-05

FILE: S15296-05

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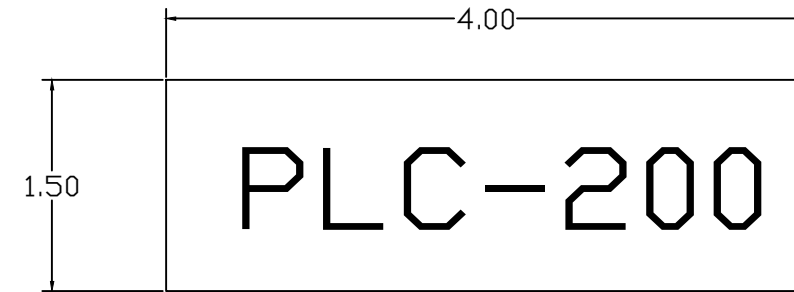
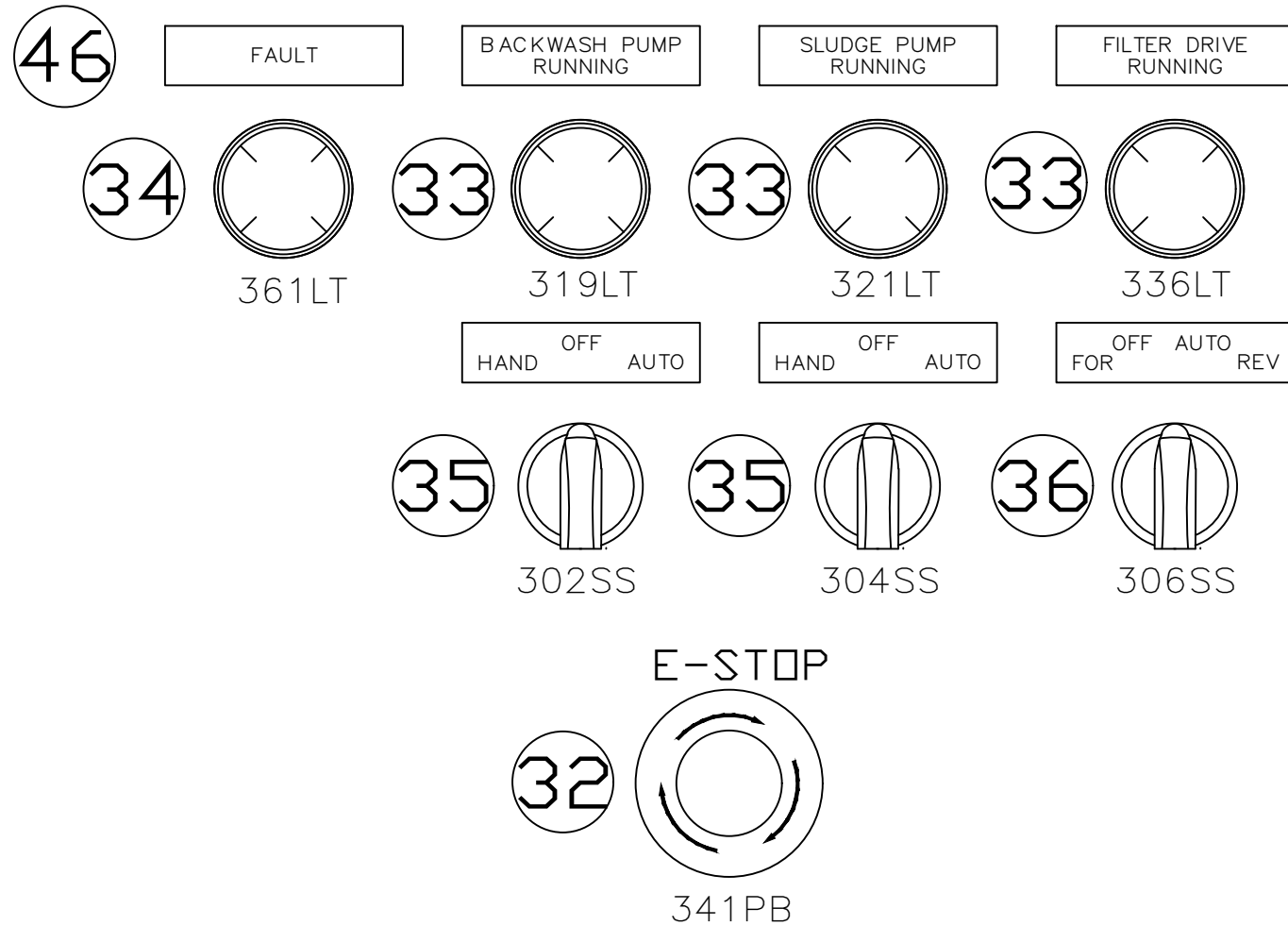


ENCLOSURE: CSD363010SS
TYPE 4X

NOTE:
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE NOTED.

 <small>ENGINEERS - INTEGRATOR - MANUFACTURER</small> <small>www.enhancedautomation.com</small>		NEXDIN ELMVALE, ON MITA CONTROL PANEL	S15296 S15296-06	ANSI D	R 1
TITLE:	ENCLOSURE LAYOUT				
SCALE:	NTS				
DATE:	14 JUNE				
DRN BY:	SKZ				
CHKD BY:					
DRAWING NUMBER:	S15296				
SHEET NO.:	7 OF 11				
REVISIONS	DATE	BY	CHG#	DATE	BY
1	8/2/24	RCB			
BLOWER CONTROL RESPONSE					
JOB #:					
FILE:					

OPERATOR DETAIL



SPARE PARTS BOM				
ITEM	QTY	MFG	DESCRIPTION	CATALOG
35	1	MERSEN	FUSE, CLASS CC, TIME DELAYED, 600V, 2.5 AMP	ATQR2-1/2
36	1	MERSEN	FUSE, MIDGET, TIME DELAYED, 250V, 7 AMP	TRM7
	1	AB	1769 16PT DIGITAL I/O CARD	1769-IQ16
	1	AB	PILOT LIGHT ASSEMBLY, 22MM, 120V, GREEN	800FP-P3PN5G
	1	AB	PILOT LIGHT ASSEMBLY, 22MM, 120V, RED	800FP-P4PN5R

FUSE REPLACEMENT CHART		
240AF, 240BFU	ATQR2-1/2	DR =
244FU	TRM7	DR =
310FU, 401FU, 413FU	MDL-1-R	DR =

CUSTOMER TERMINAL TORQUE CHART		
TAGS	CATALOG	TORQUE SPECIFICATION
MCB	BDL36015	14... 3/0 AWG - 89 lb-in (5 Nm)
1M 2M 3MF 3MR	100-C09EJ10	18... 12 AWG - 10.6 lb-in (1.2 Nm)
100GND	CXS70-14-C	14...10 AWG - 20 lb-in (1.7 Nm) 8...4 AWG - 25 lb-in (2.8 Nm)
172GND	PK9GTA	14...10 AWG - 20 lb-in (2.26 Nm) 8 AWG - 25 lb-in (2.82 Nm) 6...4 AWG - 35 lb-in (3.95 Nm)
TB ATB	1492-J4	9.0 lb-in (1Nm)
ATB	1492-JG4	9.0 lb-in (1Nm)
310FU 401FU 413FU	1492-H6	30...12 AWG - 7.1 LB-IN (0.8 Nm)

AFFIX TO INNER DOOR

EA ENHANCED AUTOMATION (262) 783-5970 www.enhancedautomation.com
 W136 N5239 Campbell Court
 Menomonee Falls, WI 53051-7042 **SP**

Custom Built for: NEXDOM-TYPE 4X-07/2024
 Voltage Rating: 575V 3 ϕ 60Hz Total FLA: 9.53 A
 Ampere or HP of Largest Motor: 3.9A
 Other Voltage Sources: NONE
 Wiring Diagram: J15296-PLC200 ID#: J15296-PLC200
 Suitable For Use On A Circuit Capable Of Delivering Not
 More Than 14 kA rms Symmetrical @575 V Maximum

FIELD TERMINAL TEMPERATURE RATING: ENCLOSURE OPENINGS:
 TO MAINTAIN THE ENVIRONMENTAL RATING OF THIS ENCLOSURE, INSTALL IN THE OPENINGS ONLY LISTED OR RECOGNIZED CONTROL DEVICES WITH THE SAME ENVIRONMENTAL RATING AS THE ENCLOSURE IN COMPLIANCE WITH THE INSTALLATION INSTRUCTIONS OF THE DEVICE.
 FIELD WIRING FOR POWER CIRCUITS USE 75 DEG C RATED COPPER WIRE, UNLESS NOTED
 FIELD WIRING FOR CONTROL CIRCUITS USE 60 DEG C RATED COPPER WIRE, UNLESS NOTED

Industrial Control Panel Assembly
WARNING: Alterations or Disassembly Voids all Warranties

REV	DATE	BY	REVISIONS
1	8/2/24	RCB	BLOWER CONTROL RESPONSE

BILL OF MATERIALS

ITEM	QTY	SUB	MFG	DESCRIPTION	CATALOG
1	1		HOFFMAN	ENCLOSURE, ACCESSORY, TEMP CONTROL SWITCH, 2A	ATEMND
2	1		HOFFMAN	Mounting Feet, SS	CMFKSS
3	1		HOFFMAN	SUBPANEL, 34.5x28.2, WHITE, STEEL	CP3630
4	1		HOFFMAN	ENCLOSURE, SINGLE DOOR, 36.00x30.00x10.00, METALLIC, STAINLESS STEEL, TYPE 4X	CSD363010SS
5	1		HOFFMAN	INHAUSTFAN, 5 IN, BLACK, 35CFM, 120VAC	HF0516413
6	1		HOFFMAN	VENT GRILLE, 5IN, BLACK	HG0500403
7	2		HOFFMAN	RAINHOOD, NEMA 4X, 5'	HH05SS04004X
8	1		SQD	CONTROL TRANSFORMER, W/FUSES, 550/575/600VAC IN, 500 VA, 110/115/120VAC OUT	9070TF500D5
9	1	*1	SQD	CIRCUIT BREAKER OPERATING MECHANISM, B FRAME	9421LB7
		*1	SQD	CIRCUIT BREAKER, LONG SHAFT	9421LS13
10	1		SQD	CIRCUIT BREAKER, OPERATING HANDLE, STANDARD, TYPE 4X	9421LC46
11	1		SQD	CIRCUIT BREAKER, 3 POLE, 600Y/347V AC, 25kA @ 600Y/347, 15A	BDL36015
12	1		SQD	CIRCUIT BEAKER, DISTRIBUTION CONNECTOR, 6 LOAD, 125A	PDC6BD6
13	1		SQD	GROUND BAR, 9-POINT	PK9GTA
14	2		AB	CONTACTOR, 9 AMP, 3-POLE, 1 N.O. AUX, 24VDC COIL	100-C09EJ10
15	1	*1	AB	REVERSING CONTACTOR, 9 AMP, 2NO/2NC AUX 24VDC	104-C09EJ22
15		*2	AB	CONTACTOR, AUX CONTACT, FRONT MOUNTED, 1N.O, 1NC.	100-FA11
16	3		AB	MPCB, ACCESSORY, UL SPACING ADAPTER, C-FRAME	140MT-C-TE
17	1	*1	AB	MPCB, STANDARD MAGNETIC TRIP, C FRAME, 1 1.6 A	140MT-C3E-B16
		*1	AB	MPCB, AUX CONTACT, FRONT, 1 N.O.	140MT-C-AFA10
18	2	*1	AB	MPCB, STANDARD MAGNETIC TRIP, C FRAME, 4 6.3 A	140MT-C3E-B63
		*1	AB	MPCB, AUX CONTACT, FRONT, 1 N.O.	140MT-C-AFA10
19	1		AB	CIRCUIT BREAKER, 1 POLE, TRIP CURVE C, 1A	1489-MIC010
20	5		AB	JUMPER, 2 POLE, J4 TERMINALS	1492-CJLJ6-2
21	3		AB	JUMPER, 4 POLE, J4 TERMINALS	1492-CJLJ6-4
22	1		AB	ALUMINUM RAISED DIN RAIL (35mm x 7.5mm x 57.4mm HIGH)	1492-DR6
23	16		AB	TB, END ANCHOR	1492-EAJ35
24	3		AB	TB, END BARRIER	1492-EBJ3
25	3	*1	AB	TB, FUSE, 30-12AWG, 12A, 300V, NON-INDICATION	1492-H6
		*1	CEMBRE	TERMINAL MARKER, 8x10mm	41096
26	62	*1	AB	TB, SINGLE, 22-10AWG, 35A, 600V, GRAY	1492-J4
		*2	CEMBRE	TERMINAL MARKER, 6x12mm	46392
27	3	*1	AB	TB, GROUND, 22-10AWG, 35A, 600V, GREEN	1492-JG4
		*2	CEMBRE	TERMINAL MARKER, 6x12mm	46392
28	1		AB	END BARRIER, 1492-H. FUSE TERMINAL	1492-N37
29	1		AB	POWER SUPPLY, 1-PHASE, 100..240V AC IN, 90 W, 24..28V DC OUT	1606-XLB90E
30	1		AB	COMPACTLOGIX 5370 L2 CONTROLLER, 16 DC IN, 16 DC OUT, UP TO 4 1769 I/O EXPANSION MODULES.	1769-L24ER-QBFC1B
31	3		AB	ZINC/STEEL DIN RAIL EN 50022 (35mm x 7.5mm)	199-DR1
32	1	*1	AB	PUSH-PULL, TWIST, RED, OPERATOR 40MM	800FP-MT44
		*1	AB	800F PLASTIC LATCH	800F-ALP
		*1	AB	60MM E-STOP, LEGEND	800F-15YS
		*1	AB	CONTACT BLOCK, NORMALLY CLOSED	800F-X01
		*1	AB	CONTACT BLOCK, NORMALLY OPEN	800F-X10
33	3	*1	AB	PILOT LIGHT, GREEN, 22M	800FP-P3
		*1	AB	Mounting Latch, Plastic	800F-ALP
		*1	AB	LED MODULE, UNIVERSAL, GREEN	800F-NUG
34	1	*1	AB	PILOT LIGHT, RED, 22M	800FP-P4
		*1	AB	Mounting Latch, Plastic	800F-ALP
		*1	AB	LED MODULE, UNIVERSAL, RED	800F-NUR
35	2	*1	AB	SELECTOR SWITCH, 3-PDS, MAINTAINED	800FP-SM32
		*1	AB	Mounting Latch, Plastic	800F-ALP
		*2	AB	CONTACT BLOCK, NORMALLY OPEN	800F-X10
36	1	*1	AB	SELECTOR SWITCH, 4-PDS, MAINTAINED	800FP-SM42
		*1	AB	Mounting Latch, Plastic	800F-ALP
		*2	AB	CONTACT BLOCK, NORMALLY OPEN	800F-X10
		*1	AB	CONTACT BLOCK, EARLY BREAK NORMALLY CLOSED	800F-X01B
37	3		BUSSMANN	FUSE, MINIATURE, TIME DELAY, SUPPLEMENTAL, 250V, 1A	MDL-1-R
38	1		HAMMOND	HMI COVER, 14IN X 12IN, CLEAR WINDOW, SNAP LATCH	PJHMI1412CCL
39	1		MAPLE SYSTEMS	HMI, 10.1", ADVANCED HMI, 2 ETHERNET, 1 USB, 2 SERIAL, WIFI CAPABLE	CMT2108X2V2
40	2		MERSEN	FUSE, CLASS CC, TIME DELAYED, 600V, 2 AMP	ATQR2
41	1		MERSEN	FUSE, MIDGET, TIME DELAYED, 250V, 7 AMP	TRM7
42	1		SOLA	IN-LINE FILTER AND SURGE PROTECTION	STFV050-10N
43	1		WEIDMULLER	SWITCH, UNMANAGED, 5 ETHERNET PORTS	1240840000
44	1		PANDUIT	GROUND LUG, 14 4 AWG	CXS70-14-C
45	5	*1	PANDUIT	WIRING DUCT, SLOTTED, WHITE, 1X4 IN	G1X4WH6
		*1	PANDUIT	WIRING DUCT, COVER, WHITE, 1 IN	C1WH6
46	1		EA	LAMACOID	CUSTOM
47	1		AB	RELAY, SLIM, DPDT, 10A, 110/125VAC/DC COIL	700-HLT12U1



NEXDM
ELMVALE, ON
MITA CONTROL PANEL

REV	DATE	BY	DESCRIPTION
1	8/2/24	RCB	BLOWER CONTROL RESPONSE

TITLE: **BILL OF MATERIALS**

SCALE: NTS

DATE: 14 JUNE

DRN BY: SKZ

CHKD BY:

DRAWING NUMBER: S15296

SHEET NO.: 9 OF 11

R 1

ANSI D

S15296
J14503-06

JOB #:
FILE:

Product Selection: 100-C/104-C Contactors

- Compact sizes from 4...55 kW/5...75 Hp (9...97 A)
- Common accessories for all contactor sizes
- Front and side mounting of auxiliary contacts
- Electronic and pneumatic timing modules
- Space-saving coil-mounted control modules
- Reversible coil terminations (line or load side)
- All devices can be attached to 35 mm DIN mounting Rail



100-C Contactor



104-C Reversing Contactor

The Bulletin 100-C/104-C IEC contactor family, along with a wide range of common accessories and Bulletin 193 solid-state overload relays, provides the most compact and flexible starter component system available and are made of environmentally friendly materials.

3-Pole AC- and DC-Operated Contactors

Rated Operational Current I_e [A] 40 °C (104 °F)		Ratings for Switching AC Motors: AC-2, AC-3, AC-4										Auxiliary Contacts		Cat. No. ⁽¹⁾
		3-phase kW (50 Hz) [V]				Hp (60 Hz)						N.O.	N.C.	
		230	400/415	500	690	1-Phase [V]		3-Phase [V]						
AC-3	AC-1					115	230	200	230	460	575			
9	32	3	4	4	4	1/2	1-1/2	2	2	5	7-1/2	1	0	100-C09 ⁽²⁾
												0	1	100-C09 ⁽²⁾
12	32	4	5.5	5.5	5.5	1/2	2	3	3	7-1/2	10	1	0	100-C12 ⁽²⁾
												0	1	100-C12 ⁽²⁾
16	32	5.5	7.5	7.5	7.5	1	3	5	5	10	15	1	0	100-C16 ⁽²⁾
												0	1	100-C16 ⁽²⁾
23	32	7.5	11	13	10	2	3	5	7-1/2	15	15	1	0	100-C23 ⁽²⁾
												0	1	100-C23 ⁽²⁾
30	65	10	15	15	15	2	5	7-1/2	10	20	25	0	0	100-C30 ⁽³⁾
												1	0	100-C30 ⁽³⁾
												0	1	100-C30 ⁽³⁾
37	65	11	18.5/20	20	18.5	3	5	10	10	25	30	0	0	100-C37 ⁽³⁾
												1	0	100-C37 ⁽³⁾
												0	1	100-C37 ⁽³⁾
43	85	13	22	25	22	3	7-1/2	10	15	30	30	0	0	100-C43 ⁽³⁾
												1	0	100-C43 ⁽³⁾
												0	1	100-C43 ⁽³⁾
55	85	15	30	30	30	5	10	15	20	40	40	0	0	100-C55 ⁽³⁾
												1	0	100-C55 ⁽³⁾
												0	1	100-C55 ⁽³⁾
60	100	18.5	32	37	32	5	10	15	20	40	50	0	0	100-C60 ⁽³⁾
												1	0	100-C60 ⁽³⁾
												0	1	100-C60 ⁽³⁾
72	100	22	40	45	40	5	15	20	25	50	60	0	0	100-C72 ⁽³⁾
												1	0	100-C72 ⁽³⁾
												0	1	100-C72 ⁽³⁾
85	100	25	45	55	45	7-1/2	15	25	30	60	60	0	0	100-C85 ⁽³⁾
												1	0	100-C85 ⁽³⁾
												0	1	100-C85 ⁽³⁾
97	130	30	55	55	55	10	20	30	30	75	75	0	0	100-C97 ⁽³⁾
												1	0	100-C97 ⁽³⁾
												0	1	100-C97 ⁽³⁾

(1) The ⁽²⁾ symbol represents the coil voltage code – see [Coil Voltage Codes on page 19](#).

(2) N.C. auxiliary contact meets mechanically linked performance per IEC 60947-5-1, Annex L.

(3) N.C. auxiliary contact meets mirror contact performance per IEC 60947-4-1, Annex F.

Coil Voltage Codes

Select a coil voltage code from the table below to complete the Cat. No.
 Example: 120V, 60 Hz: Cat. No. 100-C09⊗10 becomes Cat. No.100-C09D10.

Hz	AC Voltages [V]										
	24	110	120	200... 220	208... 240	230	240	277	400... 415	440	480
50 Hz	—	D	—	L	—	—	T	—	G	B	—
60 Hz	—	—	D	—	L	—	—	T	—	G	B
50/60 Hz	KJ	—	—	—	—	KF	—	—	—	—	—

Cat. No.	Description	DC Voltages [V]								
		12	24	36...48	48...72	72	110	110...125	220	220...250
100-C09...C55	Electronic with Integrated Diode	EQ	EJ	EW	EY	—	—	ED	—	EA
100-C60...C97	with Integrated Diode	—	DJ	—	—	DG	DD	—	DA	—

Coil Terminal Position

All contactors are delivered with the coil terminals located on the line side.

For load-side coil terminations, insert a “U” prior to the coil voltage code.
 Ordering example: Cat. No. 100-C09UD10.



Cat. No.100-C09⊗10 Line Side



Cat. No.100-C09U⊗10 Load Side

Assignment of Contacts

Table valid for: AC / DC = 0.85...1.1 x U_s, T_{amb} = -25 °C...+60 °C (-13...140 °F), normal position (horizontal rail mounting)

Device Combinations in Accordance with IEC 60947-1 / -4-1

Auxiliary Contact Blocks		100-C Contactors (AC and DC Control)							
Cat. No.	Circuit Diagram	Control	100-C09_⊗10 100-C12_⊗10 100-C16_⊗10 100-C23_⊗10 	100-C09_⊗01 100-C12_⊗01 100-C16_⊗01 100-C23_⊗01 	100-C30_⊗00 100-C37_⊗00 100-C43_⊗00 100-C55_⊗00 100-C60_⊗00 100-C72_⊗00 100-C85_⊗00 100-C97_⊗00 	100-C09_⊗400 100-C12_⊗400 100-C16_⊗400 100-C23_⊗400 100-C40_⊗400 100-C90_⊗400 	100-C09_⊗300 100-C12_⊗300 100-C16_⊗300 100-C23_⊗300 	100-C09_⊗200 100-C12_⊗200 100-C16_⊗200 100-C23_⊗200 100-C40_⊗200 100-C90_⊗200 	

Side Mounting ⁽¹⁾

100-SB01		AC/DC	10 + 01 = 11	01 + 01 = 02 ⁽²⁾	00 + 01 = 01	00 + 01 = 01	00 + 01 = 01	00 + 01 = 01
100-SB10		AC/DC	10 + 10 = 20 ⁽²⁾	01 + 10 = 11	00 + 10 = 10	00 + 10 = 10	00 + 10 = 10	00 + 10 = 10
100-SB02		AC/DC	10 + 02 = 12 ⁽²⁾	—	00 + 02 = 02	00 + 02 = 02	00 + 02 = 02	00 + 02 = 02
100-SB11		AC/DC	10 + 11 = 21 ⁽²⁾	01 + 11 = 12 ⁽²⁾	00 + 11 = 11	00 + 11 = 11	00 + 11 = 11	00 + 11 = 11

Product Details and Certifications

Cross Reference RA Part Number: 100-FA11 B

 **Product: 100-FA11**

Description: Auxiliary Contact Block, Front Mounting, 1 N.O. 1 N.C.



Representative Photo Only (actual product may vary based on configuration sections)

ACCESSORY SELECTION



Bulletin Number	100-F Contact Block Accessories
Accessory Selection	Individual Accessory Selection

DIMENSIONS AND WEIGHT


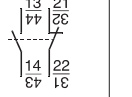
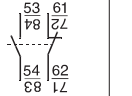
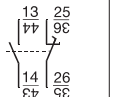
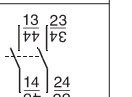
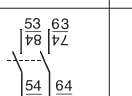
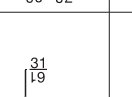
Weight (Kg / Lbs)	0.00 / 0.00
---------------------	-------------

Auxiliary Contacts

1

	Description			For Use With NEMA Sizes	Cat. No.	Bifurcated Auxiliary Contact Cat. No.
		N.O.	N.C.			
	Auxiliary Contact Blocks for Front Mounting* - 2- and 4-pole - Quick and easy mounting without tools - Electronic-compatible contacts down to 17V, 5 mA - Mechanically linked performance between N.O. and N.C. poles and to the main contactor poles (except for L types) - Models with equal function with several terminal numbering choices L = Late break N.C./early make N.O.	0	2	0...3	100-FA02	100-FAB02
		1	1		100-FA11	100-FAB11
		2	0		100-FA20	100-FAB20
		1L	1L		100-FBL11	—
		0	4		100-FA04	100-FAB04
		1	3		100-FA13	100-FAB13
		2	2		100-FA22	100-FAB22
		3	1		100-FA31	100-FAB31
		4	0		100-FA40	100-FAB40
		1+1L	1+1L		100-FAL22	—
	Auxiliary Contact Blocks for Side Mounting with Sequence Terminal Designations* - 1- and 2-pole - Two-way numbering for right or left mounting on the contactor - Quick and easy mounting without tools - Electronic-compatible contacts down to 17V, 10 mA - Mirror contact performance to the main contactor poles L = Late break N.C./early make N.O.	0	1	0...3	100-SB01	—
		1	0		100-SB10	—
		0	2		100-SB02	—
		1	1		100-SB11	—
		2	0		100-SB20	—
		1L	1L		100-SBL11	—



* Max. number of auxiliary contacts that may be mounted:
 AC coil contactors — max. 4 N.O. contacts on the front of the contactor, 2 N.O. contacts on the side, 4 N.C. front or side, 6 total.
 DC coil contactors — max. 4 N.O. contacts on the front of the contactor or max 2 N.O. contacts on the side, 4 N.C. front or side, 4 total.

	Description			Connection Diagram	For Use With NEMA Sizes	Cat. No.
		No. of N.O. Contacts	No. of N.C. Contacts			
	Auxiliary Contacts Side mounted With sequence terminal designations	1	1		4...5 Left/Right inside mounting	100-DS1-11
		1	1		4...5 Left/Right outside mounting	100-DS2-11
		1	1L		4...5 Left/Right inside mounting	100-DS1-L11
		2	0			100-DS1-20
		2	0		4...5 Left/Right outside mounting	100-DS2-20
		1	1		4...5 Left/Right inside mounting	100-DS1-B11

Auxiliary Contacts

- Electronic-compatible auxiliary contacts
- Ideal for use when switching low-power control circuits
- With IEC sequence terminal designations
- Contact ratings:
 AC-12, 250V, 0.1 A
 AC-15, DC-13, 3...125V, 1...100 mA



4-Pole AC- and DC-Operated Contactors

Rated Operational Current I_e [A]		Ratings for switching AC motors - AC-2, AC-3										Contact Configuration, Main Poles		Cat. No.			
		3-phase kW (50 Hz) ⁽¹⁾				Hp (60 Hz)											
		230V	400/415V	500V	690V	1-Phase		3-Phase ⁽¹⁾									
115V	230V					200V	230V	460V	575V	N.O.	N.C.						
40 °C (104 °F)		AC-3		AC-1													
9	32	3	4	4	4	1/2	1-1/2	2	2	5	7-1/2	4	0	100-C09⊗400			
												3	1	100-C09⊗300			
												2	2	100-C09⊗200			
12	32	4	5.5	5.5	5.5	1/2	2	3	3	7-1/2	10	4	0	100-C12⊗400			
												3	1	100-C12⊗300			
												2	2	100-C12⊗200			
16	32	5.5	7.5	7.5	7.5	1	3	5	5	10	10	4	0	100-C16⊗400			
												3	1	100-C16⊗300			
												2	2	100-C16⊗200			
23	32	7.5	11	13	10	2	3	5	7-1/2	15	15	4	0	100-C23⊗400			
												3	1	100-C23⊗300			
												2	2	100-C23⊗200			
37	75	11	18.5/20	20	18.5	3	5	10	10	25	30	4	0	100-C40⊗400			
												2	2	100-C40⊗200			
85	130	25	45	55	45	7-1/2	15	25	30	60	50	4	0	100-C90⊗400			
												2	2	100-C90⊗200			

(1) Three-phase ratings apply only to contactors with at least three N.O. power poles.

⊗ Coil voltage code and terminal position— see [page 19](#).

Reversing AC- and DC-Operated Contactors

Rated Operational Current I_e [A]		Ratings for switching AC motors - AC-2, AC-3, AC-4										Auxiliary Contacts per Contactor		Cat. No.			
		3-phase kW (50 Hz)				Hp (60 Hz)											
		230V	400/415V	500V	690V	1-Phase		3-Phase									
115V	230V					200V	230V	460V	575V	N.O.	N.C. ⁽¹⁾						
40 °C (104 °F)		AC-3		AC-1													
9	32	3	4	4	4	1/2	1-1/2	2	2	5	7-1/2	1	1	104-C09⊗22			
12	32	4	5.5	5.5	5.5	1	2	3	3	7-1/2	10	1	1	104-C12⊗22			
16	32	5.5	7.5	7.5	7.5	1	3	5	5	10	15	1	1	104-C16⊗22			
23	32	7.5	11	13	10	2	3	5	7-1/2	15	20	1	1	104-C23⊗22			
30	65	10	15	15	15	2	5	7-1/2	10	20	25	0	1	104-C30⊗02			
												1	1	104-C30⊗22			
37	65	11	18.5/20	20	18.5	3	5	10	10	25	30	0	1	104-C37⊗02			
												1	1	104-C37⊗22			
43	85	13	22	25	22	3	7.5	10	15	30	30	0	1	104-C43⊗02			
												1	1	104-C43⊗22			
55	85	15	30	30	30	5	10	15	20	40	40	0	1	104-C55⊗02			
												1	1	104-C55⊗22			
60	100	18.5	32	37	32	5	10	15	20	40	50	0	1	104-C60⊗02			
												1	1	104-C60⊗22			
72	100	22	40	45	40	5	15	20	25	50	60	0	1	104-C72⊗02			
												1	1	104-C72⊗22			
85	100	25	45	55	45	7-1/2	15	25	30	60	60	0	1	104-C85⊗02			
												1	1	104-C85⊗22			
97	130	30	55	55	55	10	15	30	30	75	75	0	1	104-C97⊗02			
												1	1	104-C97⊗22			

(1) The N.C. auxiliary contact is supplied as part of the mechanical/electrical interlock.

⊗ Coil voltage code and terminal position— see [page 19](#).

Coil Voltage Codes

The Cat. No. as listed is incomplete. Select a coil voltage code from the table below to complete the Cat. No. Example: 120V, 60 Hz: Cat. No. 100-C09⊗10 becomes Cat. No.100-C09D10.

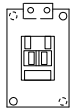
AC Voltages [V]	24	110	120	200... 220	208... 240	230	240	277	400... 415	440	480
50 Hz	—	D	—	L	—	—	T	—	G	B	—
60 Hz	—	—	D	—	L	—	—	T	—	G	B
50/60 Hz	KJ	—	—	—	—	KF	—	—	—	—	—

DC Voltages [V]		12	24	36...48	48...72	72	110	110...125	220	220...250
100-C09...C55	Electronic with Integrated Diode	EQ	EJ	EW	EY	—	—	ED	—	EA
100-C60...C97	with Integrated Diode	—	DJ	—	—	DG	DD	—	DA	—

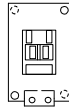
Coil Terminal Position

All contactors are delivered with the coil terminals located on the line side.

For load-side coil terminations, insert a “U” prior to the coil voltage code. Ordering example: Cat. No. 100-C09UD10.



Cat. No.100-C09⊗10 Line Side



Cat. No.100-C09U⊗10 Load Side



140MT MPCBs and MCPs

[140MT-C3E-B16](#)

MPCB, Standard Magnetic Trip (Fixed at 14 x Ie), 1 - 1.6 A, Std. Performance, Frame Size C

Product Details

SYSTEM VOLTAGE DATA	
Supply Voltage	480V 60Hz
Maximum Available Fault Current (at the Breaker)	0 kA
CIRCUIT BREAKER	
Circuit Breaker Type	Motor Protection Circuit Breaker
Adj. Thermal Current Range (A)	1 - 1.6A
Frame Size	Frame Size C
Breaking Capacity	Standard Breaking Capacity
Application	Standard Magnetic Trip (Fixed at 14 x Ie)
ASSEMBLY	
Factory or User Assembled?	Factory Assembled
OPTIONS	
Side Mount Shunt Trip and Undervoltage Release	None
Front Mount Auxiliary and Trip Contacts	None
Side Mount Auxiliary and Trip Contacts	None

Supporting Documentation and Downloads

- [Installation Instructions](#)

Rockwell Automation

140MT MPCBs and MCPs

140MT-C3E-B63

MPCB, Standard Magnetic Trip (Fixed at 14 x I_e), 4 - 6.3 A, Std. Performance, Frame Size C

Product Details




SYSTEM VOLTAGE DATA	
Supply Voltage	480V 60Hz
Maximum Available Fault Current (at the Breaker)	0 kA
CIRCUIT BREAKER	
Circuit Breaker Type	Motor Protection Circuit Breaker
Adj. Thermal Current Range (A)	4 - 6.3A
Frame Size	Frame Size C
Breaking Capacity	Standard Breaking Capacity
Application	Standard Magnetic Trip (Fixed at 14 x I _e)
ASSEMBLY	
Factory or User Assembled?	Factory Assembled
OPTIONS	
Side Mount Shunt Trip and Undervoltage Release	None
Front Mount Auxiliary and Trip Contacts	None
Side Mount Auxiliary and Trip Contacts	None

Supporting Documentation and Downloads

- [Installation Instructions](#)

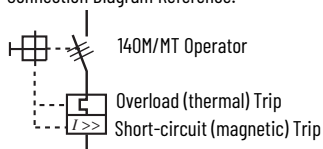
Accessories

Table 34 - Auxiliary Contacts

Description	Operator Position ⁽¹⁾			Term. No.	Contact Description	Connection Diagram ⁽²⁾	For Use With	Cat. No.	
	OFF	ON	Tripped						
  Front-Mounted Auxiliary Contact • 1-pole or 2-pole • No additional space required • Only one per device	0	X	0	13-14	N.O. Aux		140MT-C, D 140UT-D	140MT-C-AFA10	
								140M-F	140M-C-AFA10
	X	0	X	11-12	N.C. Aux		140M-F	140M-C-AFA01	
	0	X	0	13-14	N.O. Aux		140MT-C, D 140UT-D	140MT-C-AFA11	
	X	0	X	21-22	N.C. Aux				
	0	X	0	13-14	N.O. Aux		140M-F	140M-C-AFA11	
	X	0	X	21-22	N.C. Aux				
	0	X	0	13-14	N.O. Aux		140MT-C, D 140UT-D	140MT-C-AFA20	
	0	X	0	23-24	N.O. Aux				
	0	X	0	13-14	N.O. Aux		140M-F	140M-C-AFA20	
	0	X	0	23-24	N.O. Aux				
	X	0	X	11-12	N.C. Aux		140M-F	140M-C-AFA02	
X	0	X	21-22	N.C. Aux					
 Right Side-Mounted Auxiliary Contact • 2-pole • Adds 9 mm to the width of the device • One per device • Not suitable for UL 489 applications	0	X	0	33-34	N.O. Aux		140MT-C, D 140UT-D	140MT-C-ASA20	
	0	X	0	43-44	N.O. Aux				
	0	X	0	33-34	N.O. Aux		140M-F	140M-C-ASA20	
	0	X	0	43-44	N.O. Aux				
	X	0	X	31-32	N.C. Aux		140MT-C, D 140UT-D	140MT-C-ASA02	
	X	0	X	41-42	N.C. Aux				
	X	0	X	31-32	N.C. Aux		140M-F	140M-C-ASA02	
	X	0	X	41-42	N.C. Aux				
	0	X	0	33-34	N.O. Aux		140MT-C, D 140UT-D	140MT-C-ASA11	
	X	0	X	41-42	N.C. Aux				
	0	X	0	33-34	N.O. Aux		140M-F	140M-C-ASA11	
	X	0	X	41-42	N.C. Aux				


(1) X = Contact Closed; 0 = Contact Open

(2) Connection Diagram Reference:



Product Details and Certifications

Cross Reference RA Part Number: 800F-ALP A

 **Product: 800F-ALP**
Description: Plastic Latch



Representative Photo Only (actual product may vary based on configuration selections)

LATCH DATA

Latch Style	Plastic Latch
Packaging	Standard Pack,Quantity:10

CERTIFICATIONS AND APPROVALS

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For UL Certifications Directory:

<http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm>

Back-of-Panel Components, Continued

Other



	Description	Pkg. Quantity	Cat. No.	
 Cat. No. 800F-ALM	Metal Mounting Latch These are zinc-plated, metal die cast mounting latches. Note: Sold only in multiples of 10. Order (quantity of) 10 to receive one package of 10 pieces.	10	800F-ALM	
	Note: Sold only in multiples of 100. Order (quantity of) 100 to receive one package of 100 pieces.	100	800F-ALM-BP	
 Cat. No. 800F-ALP	Plastic Mounting Latch Note: Sold only in multiples of 10. Order (quantity of) 10 to receive one package of 10 pieces.	10	800F-ALP	
	Note: Sold only in multiples of 100. Order (quantity of) 100 to receive one package of 100 pieces.	100	800F-ALP-BP	
	Description	Contact Type	Pkg. Quantity	Cat. No.
 Cat. No. 800F-X10	Contact Block Note: Sold only in multiples of 10. Order (quantity of) 10 to receive one package of 10 pieces. Latch not included.	N.O.	10	800F-X10
		N.C.		800F-X01
		N.O. low voltage — QuadCONNECT™		800F-X10V
		N.C. low voltage — QuadCONNECT™		800F-X01V
		N.O.L.M.		‡ 800F-X10N
		N.O.E.M.		800F-X10E
		N.O.E.E.M.		‡ 800F-X10M
		N.C.L.B.		800F-X01L
		N.C.E.B.		* 800F-X01B
		Self-Monitoring		* 800F-X01S
		Dual circuit of 2 N.O.		* 800F-X20D
		Dual circuit of 2 N.C.		* 800F-X02D
		Dual circuit of 1 N.O.-1 N.C.		* 800F-X11D
		N.O. with stab terminals		800F-X10T
		N.C. with stab terminals		800F-X01T
		N.O. spring-clamp		800F-Q10
		N.C. spring-clamp		800F-Q01
		N.O. spring-clamp low-voltage — QuadConnect™		800F-Q10V
		N.C. spring-clamp low-voltage — QuadConnect™		800F-Q01V
		N.O.E.M. spring-clamp		800F-Q10E
		N.C.L.B. spring clamp		800F-Q01L
		N.C.E.B. spring-clamp		* 800F-Q01B
		Ring lug N.O.		‡§ 800F-R10
		Ring lug N.C.		‡§ 800F-R01
		Note: Sold only in multiples of 100. Order (quantity of) 100 to receive one package of 100 pieces. Latch not included.		N.O.
N.C.	800F-X01-BP			



4-Emergency Stop Devices

- ‡ For use with **Cat. No. 800FP-CB_** and **Cat. No. 800FP-CC_** operators.
- ‡ For use with **Cat. No. 800FP-CC_** operators.
- * Only for use with 4-position selector switch, 4-position toggle switch, or 3-position push-pull operator.
- * Cannot stack.
- ‡ Cannot be used in a composite catalog number.
- § Replacement screws are available (**Cat. No. 800F-ARS1**)

Table 26 - Power Modules (Continued)

	Description	Voltage	Pkg. Qty.	Cat. No.
 Cat. No. 800F-N3G	Integrated LED Module For use with all illuminated devices. For best results, LED should match lens color. For amber, yellow, and blue operators use white LED. Note: Sold in multiples of 10. Order (quantity of) 10 to receive one package of 10 pieces. Latch not included.	24...120V AC/DC	10	800F-NUx ⁽¹⁾⁽²⁾
		24V AC/DC		800F-N3x ⁽¹⁾
		120V AC		800F-N5x ⁽¹⁾
		240V AC		800F-N7x ⁽¹⁾
		24V AC/DC spring-clamp		800F-Q3x ⁽¹⁾
		120V AC spring-clamp		800F-Q5x ⁽¹⁾
		240V AC spring-clamp		800F-Q7x ⁽¹⁾
		24V AC/DC ring lug		800F-R3x ⁽¹⁾⁽²⁾⁽³⁾
 Cat. No. 800F-BN3R	Base-mounted Integrated LED Module Base-mounted modules can be used in plastic or metal enclosures. For best illumination results, LED should match lens color. Note: Sold in multiples of 10. Order (quantity of) 10 to receive one package of 10 pieces. Latch not included.	24V AC/DC	10	800F-BN3x ⁽¹⁾
		120V AC		800F-BN5x ⁽¹⁾
		240V AC		800F-BN7x ⁽¹⁾


(1) To complete the cat. no., replace the x with one of the following letters for the desired color: R = Red, G = Green, W = White.

(2) Cannot be used in a composite catalog number.

(3) Replacement screws are available (Cat. No. 800F-ARS1)

Product Details and Certifications

Cross Reference RA Part Number: 800FP-P'

 **Product: 800FP-P'**

Description: 800F Pilot Light - Round Plastic (IP66, 4/4X/13, IP66), Round Lens, Standard Pack (Qty. 1)



Representative Photo Only (actual product may vary based on configuration selections)

PILOT LIGHT DATA

Operator Construction	Round Plastic (Type 4/4X/13, IP66)
Lens Cap	Round
Packaging	Standard Pack, Quantity:1

BACK OF PANEL DATA

Part Numbers	No Back of Panel Part Numbers
Back of Panel Components	No Contact Block Selection

CERTIFICATIONS AND APPROVALS

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For UL Certifications Directory:

<http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm>

22.5 mm Push Buttons

Quick Selection

Quick Selection Components

Operator Style	Description	Color	Construction	Pkg. Quantity	Cat. No.
 <p>Flush Operator Cat. No. 800FP-F3</p>	Non-illuminated, flush push button	Black	Plastic	1	800FP-F2
	Non-illuminated, flush push button	Green			800FP-F3
	Non-illuminated, extended push button	Red			800FP-E4
	Non-illuminated, flush push button	Black	Metal		800FM-F2
	Non-illuminated, flush push button	Green			800FM-F3
	Non-illuminated, extended push button	Red			800FM-E4
 <p>Flush Operator Cat. No. 800FM-LF4</p>	Illuminated, flush push button	Green	Plastic	1	800FP-LF3
	Illuminated, extended push button	Red			800FP-LE4
	Illuminated, flush push button	Yellow			800FP-LF5
	Illuminated, flush push button	Green	Metal		800FM-LF3
	Illuminated, extended push button	Red			800FM-LE4
	Illuminated, flush push button	Yellow			800FM-LF5
 <p>Diffused Pilot Light Cat. No. 800FP-P7</p>	Diffused pilot light	Green	Plastic	1	800FP-P3
		Red			800FP-P4
		Yellow			800FP-P5
		Green	Metal		800FM-P3
		Red			800FM-P4
		Yellow			800FM-P5
 <p>Selector Switch Cat. No. 800FP-SM32</p>	Non-illuminated, 2-position, maintained selector switch	Black	Plastic	1	800FP-SM22
	Non-illuminated, 3-position, maintained selector switch				800FP-SM32
	Non-illuminated, 3-position, spring return from both positions selector switch				800FP-SB32
	Non-illuminated, 2-position, maintained selector switch		Metal		800FM-SM22
	Non-illuminated, 3-position, maintained selector switch				800FM-SM32
	Non-illuminated, 3-position, spring return from both positions selector switch				800FM-SB32
 <p>40 mm Trigger Action Twist-to-Release Mushroom Cat. No. 800FP-MT44</p>	Non-illuminated, 40 mm twist-to-release maintained mushroom (plastic)	Red	Plastic	1	800FP-MT44
	Non-illuminated, 40 mm push-pull maintained mushroom				800FP-MP44
	Non-illuminated, 40 mm twist-to-release maintained mushroom (metal)		Metal		800FM-MT44
	Non-illuminated, 40 mm push-pull maintained mushroom				800FM-MP44
Back of Panel	Description			Pkg. Quantity	Cat. No.
 <p>Power Module with Latch Cat. No. 800F-MN3G</p>	Metal latch			10	800F-ALM
	Plastic latch				800F-ALP
	Normally open contact block				800F-X10
	Normally closed contact block				800F-X01
	Integrated LED module with plastic latch — Red LED			1	* 800F-PNxR
	Integrated LED module with plastic latch — Green LED				* 800F-PNxG
	Integrated LED module with plastic latch — White LED				* 800F-PNxW
	Integrated LED module with metal latch — Red LED				* 800F-MNxR
	Integrated LED module with metal latch — Green LED				* 800F-MNxG
	Integrated LED module with metal latch — White LED				* 800F-MNxW



* To complete the cat. no., replace the x with one of the following voltage codes: 3 = 24V, 5 = 120V, 7 = 240V.

Pilot Light Operators*



Plastic Pilot Light
 Cat. No. 800FP-P7

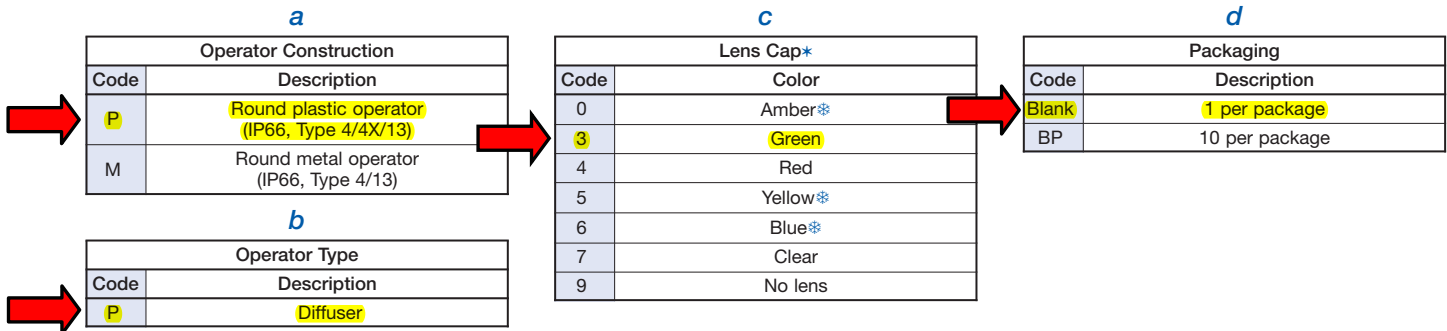


Metal Pilot Light
 Cat. No. 800FM-P4

Color	Pkg. Quantity	Plastic	Metal
		Cat. No.	Cat. No.
Green	1	800FP-P3	800FM-P3
Red		800FP-P4	800FM-P4
Yellow		800FP-P5	800FM-P5

800F P - P ' '


a
b
c
d



* For custom laser-engraved pilot light, order pilot light with applicable lens cap color plus custom laser-engraved diffuser on page 10-115.
 * When using LED for illumination, a white LED is recommended.

Product Details and Certifications

Cross Reference RA Part Number: 800FP-P4

 **Product: 800FP-P4**

Description: 800F Pilot Light - Round Plastic (IP66, 4/4X/13, IP66), Standard Pack (Qty. 1)



Representative Photo Only (actual product may vary based on configuration selections)

PILOT LIGHT DATA

Operator Construction	Round Plastic (Type 4/4X/13, IP66)
Lens Cap	Blue
Packaging	Standard Pack, Quantity:1

BACK OF PANEL DATA

Part Numbers	No Back of Panel Part Numbers
Back of Panel Components	No Contact Block Selection

CERTIFICATIONS AND APPROVALS

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For UL Certifications Directory:

<http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm>

Bulletin 800F
22.5 mm Push Buttons
 Quick Selection

Quick Selection
 Components

Operator Style	Description	Color	Construction	Pkg. Quantity	Cat. No.
 Flush Operator Cat. No. 800FP-F3	Non-illuminated, flush push button	Black	Plastic	1	800FP-F2
	Non-illuminated, flush push button	Green			800FP-F3
	Non-illuminated, extended push button	Red			800FP-E4
	Non-illuminated, flush push button	Black	Metal		800FM-F2
	Non-illuminated, flush push button	Green			800FM-F3
	Non-illuminated, extended push button	Red			800FM-E4
 Flush Operator Cat. No. 800FM-LF4	Illuminated, flush push button	Green	Plastic	1	800FP-LF3
	Illuminated, extended push button	Red			800FP-LE4
	Illuminated, flush push button	Yellow			800FP-LF5
	Illuminated, flush push button	Green	Metal		800FM-LF3
	Illuminated, extended push button	Red			800FM-LE4
	Illuminated, flush push button	Yellow			800FM-LF5
 Diffused Pilot Light Cat. No. 800FP-P7	Diffused pilot light	Green	Plastic	1	800FP-P3
		Red			800FP-P4
		Yellow			800FP-P5
		Green	Metal		800FM-P3
		Red			800FM-P4
		Yellow			800FM-P5
 Selector Switch Cat. No. 800FP-SM32	Non-illuminated, 2-position, maintained selector switch	Black	Plastic	1	800FP-SM22
	Non-illuminated, 3-position, maintained selector switch				800FP-SM32
	Non-illuminated, 3-position, spring return from both positions selector switch				800FP-SB32
	Non-illuminated, 2-position, maintained selector switch		Metal		800FM-SM22
	Non-illuminated, 3-position, maintained selector switch				800FM-SM32
	Non-illuminated, 3-position, spring return from both positions selector switch				800FM-SB32
 40 mm Trigger Action Twist-to-Release Mushroom Cat. No. 800FP-MT44	Non-illuminated, 40 mm twist-to-release maintained mushroom (plastic)	Red	Plastic	1	800FP-MT44
	Non-illuminated, 40 mm push-pull maintained mushroom				800FP-MP44
	Non-illuminated, 40 mm twist-to-release maintained mushroom (metal)		Metal		800FM-MT44
	Non-illuminated, 40 mm push-pull maintained mushroom				800FM-MP44
Back of Panel	Description			Pkg. Quantity	Cat. No.
 Power Module with Latch Cat. No. 800F-MN3G	Metal latch			10	800F-ALM
	Plastic latch				800F-ALP
	Normally open contact block				800F-X10
	Normally closed contact block				800F-X01
	Integrated LED module with plastic latch — Red LED			1	* 800F-PNxR
	Integrated LED module with plastic latch — Green LED				* 800F-PNxG
	Integrated LED module with plastic latch — White LED				* 800F-PNxW
	Integrated LED module with metal latch — Red LED				* 800F-MNxR
	Integrated LED module with metal latch — Green LED				* 800F-MNxG
	Integrated LED module with metal latch — White LED				* 800F-MNxW



* To complete the cat. no., replace the x with one of the following voltage codes: 3 = 24V, 5 = 120V, 7 = 240V.

Pilot Light Operators*



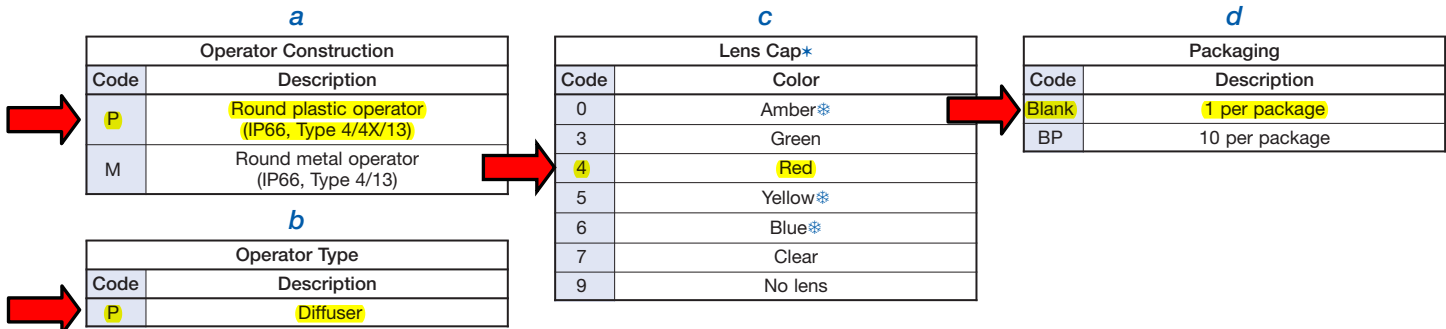
Plastic Pilot Light
 Cat. No. 800FP-P7



Metal Pilot Light
 Cat. No. 800FM-P4

Color	Pkg. Quantity	Plastic	Metal
		Cat. No.	Cat. No.
Green	1	800FP-P3	800FM-P3
Red		800FP-P4	800FM-P4
Yellow		800FP-P5	800FM-P5


800F P - P 4
 a b c d



* For custom laser-engraved pilot light, order pilot light with applicable lens cap color plus custom laser-engraved diffuser on page 10-115.
 * When using LED for illumination, a white LED is recommended.

Product Details and Certifications

Cross Reference RA Part Number: 800FP-SM32 A

 **Product: 800FP-SM32**

Description: 800F 3 Position Selector Switch - Plastic, Maintained, Black, Standard Knob, Standard Orientation, Standard Pack (Qty. 1)



Representative Photo Only (actual product may vary based on configuration selections)

SELECTOR SWITCH DATA

Operator Construction	Round Plastic (Type 4/4X/13, IP66)
Operator Type	Selector Switch - Standard Knob
Operator Function	Maintained, 3 Position
Knob Color	Black
Orientation	Standard
Packaging	Standard Pack, Quantity:1

BACK OF PANEL DATA

Mounting Style	No Contact Blocks
Part Numbers	No Back of Panel Part Numbers
Target Table Selections	Cam and Contact Blocks

CERTIFICATIONS AND APPROVALS

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For UL Certifications Directory:

<http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm>

22.5 mm Push Buttons

Quick Selection

Quick Selection Components

Operator Style	Description	Color	Construction	Pkg. Quantity	Cat. No.
 <p>Flush Operator Cat. No. 800FP-F3</p>	Non-illuminated, flush push button	Black	Plastic	1	800FP-F2
	Non-illuminated, flush push button	Green			800FP-F3
	Non-illuminated, extended push button	Red			800FP-E4
	Non-illuminated, flush push button	Black	Metal		800FM-F2
	Non-illuminated, flush push button	Green			800FM-F3
	Non-illuminated, extended push button	Red			800FM-E4
 <p>Flush Operator Cat. No. 800FM-LF4</p>	Illuminated, flush push button	Green	Plastic	1	800FP-LF3
	Illuminated, extended push button	Red			800FP-LE4
	Illuminated, flush push button	Yellow			800FP-LF5
	Illuminated, flush push button	Green	Metal		800FM-LF3
	Illuminated, extended push button	Red			800FM-LE4
	Illuminated, flush push button	Yellow			800FM-LF5
 <p>Diffused Pilot Light Cat. No. 800FP-P7</p>	Diffused pilot light	Green	Plastic	1	800FP-P3
		Red			800FP-P4
		Yellow			800FP-P5
		Green	Metal		800FM-P3
		Red			800FM-P4
Yellow	800FM-P5				
 <p>Selector Switch Cat. No. 800FP-SM32</p>	Non-illuminated, 2-position, maintained selector switch	Black	Plastic	1	800FP-SM22
	Non-illuminated, 3-position, maintained selector switch				800FP-SM32
	Non-illuminated, 3-position, spring return from both positions selector switch				800FP-SB32
	Non-illuminated, 2-position, maintained selector switch		Metal		800FM-SM22
	Non-illuminated, 3-position, maintained selector switch				800FM-SM32
	Non-illuminated, 3-position, spring return from both positions selector switch				800FM-SB32
 <p>40 mm Trigger Action Twist-to-Release Mushroom Cat. No. 800FP-MT44</p>	Non-illuminated, 40 mm twist-to-release maintained mushroom (plastic)	Red	Plastic	1	800FP-MT44
	Non-illuminated, 40 mm push-pull maintained mushroom				800FP-MP44
	Non-illuminated, 40 mm twist-to-release maintained mushroom (metal)		Metal		800FM-MT44
	Non-illuminated, 40 mm push-pull maintained mushroom				800FM-MP44
Back of Panel	Description			Pkg. Quantity	Cat. No.
 <p>Power Module with Latch Cat. No. 800F-MN3G</p>	Metal latch			10	800F-ALM
	Plastic latch				800F-ALP
	Normally open contact block				800F-X10
	Normally closed contact block				800F-X01
	Integrated LED module with plastic latch — Red LED			1	* 800F-PNxR
	Integrated LED module with plastic latch — Green LED				* 800F-PNxG
	Integrated LED module with plastic latch — White LED				* 800F-PNxW
	Integrated LED module with metal latch — Red LED				* 800F-MNxR
	Integrated LED module with metal latch — Green LED				* 800F-MNxG
	Integrated LED module with metal latch — White LED				* 800F-MNxW

* To complete the cat. no., replace the x with one of the following voltage codes: 3 = 24V, 5 = 120V, 7 = 240V.

3-Position Selector Switch Operators, Non-Illuminated

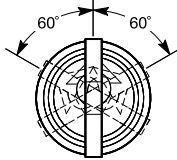


Standard Knob
 Cat. No. 800FP-SM32



Knob Lever
 Cat. No. 800FM-HM32

Switching Angle



Target Table and Operator Position (60° Switching Angle)				
Contact Type*	Position on Mounting Latch			
N.O.	Left	X	O	O
	Right	O	O	X
	Center	X	O	X
	Center CL‡	X	O	O
	Center CR‡	O	O	X
N.C.	Left	O	X	X
	Right	X	X	O
	Center	O	X	O
	Center CL‡	O	X	X
	Center CR‡	X	X	O

Note: X = Closed/O = Open

* Contact selection is limited to the following options, consult your local Rockwell Automation sales office or Allen-Bradley distributor for other options.

Color	Operator Type			Pkg. Quantity	Standard Knob		Knob Lever	
					Plastic	Metal	Plastic	Metal
					Cat. No.	Cat. No.	Cat. No.	Cat. No.
Black with White Insert				1	800FP-SM32	800FM-SM32	800FP-HM32	800FM-HM32
					800FP-SB32	800FM-SB32	800FP-HB32	800FM-HB32

800F -

a *b* *c* *d* *e* *f*

10

Operator Construction	
Code	Description
P	Round plastic operator (IP66, Type 4/4X/13)
M	Round metal operator (IP66, Type 4/13)

Operator Type	
Code	Description
S	Standard knob
H	Knob lever*

Operator Function	
Code	Type
M3	Maintained
L3	Spring return from left
R3	Spring return from right
B3	Spring return from left and right

Knob/Insert Color		
Code	Knob Color	Insert Color
2	Black	White

Orientation	
Code	Description
Blank	Standard
N	90° offset*

Operation	
Code	Description
Blank	Standard
CL	Center left‡
CR	Center right‡

* 30 mm hole spacing will not work if knob lever is used. See page 10-125 for recommended operator panel spacing.

* For use in vertical mount enclosures.

‡ The center contact block can have the same target output as the left or right contact block, by specifying center left (CL) or center right (CR) option.

Product Details and Certifications

Cross Reference RA Part Number: 800FP-SM(2

 Product: **800FP-SM(2**

Description: 800FÁ Position Selector Switch - Plastic, Maintained, Black, Standard Knob, Standard Orientation, Standard Pack (Qty. 1)



Representative Photo Only (actual product may vary based on configuration selections)

SELECTOR SWITCH DATA

Operator Construction	Round Plastic (Type 4/4X/13, IP66)
Operator Type	Selector Switch - Standard Knob
Operator Function	Maintained, I Position
Knob Color	Black
Orientation	Standard
Packaging	Standard Pack, Quantity:1

BACK OF PANEL DATA

Mounting Style	No Contact Blocks
Part Numbers	No Back of Panel Part Numbers
Target Table Selections	Cam and Contact Blocks

CERTIFICATIONS AND APPROVALS

UR

CSA

CE

CCC

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<http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm>

4-Position Selector Switch Operators, Non-Illuminated



Standard Knob
 Cat. No. 800FP-SM42

Target Table and Operator Position*					
Contact Type§	Position on Mounting Latch				
N.O.	Left	O	O	X	O
	Right	X	O	O	O
	Center	X	O	X	O
	Center CL	O	O	X	O
	Center CR	X	O	O	O
N.C.E.B.	Left	O	O	O	X
	Right	O	X	O	O
	Center CL	O	O	O	X
	Center CR	O	X	O	O
N.C.L.B.	Left	X	X	O	X
	Right	O	X	X	X
	Center	O	X	O	X
	Center CL	X	X	O	X
	Center CR	O	X	X	X

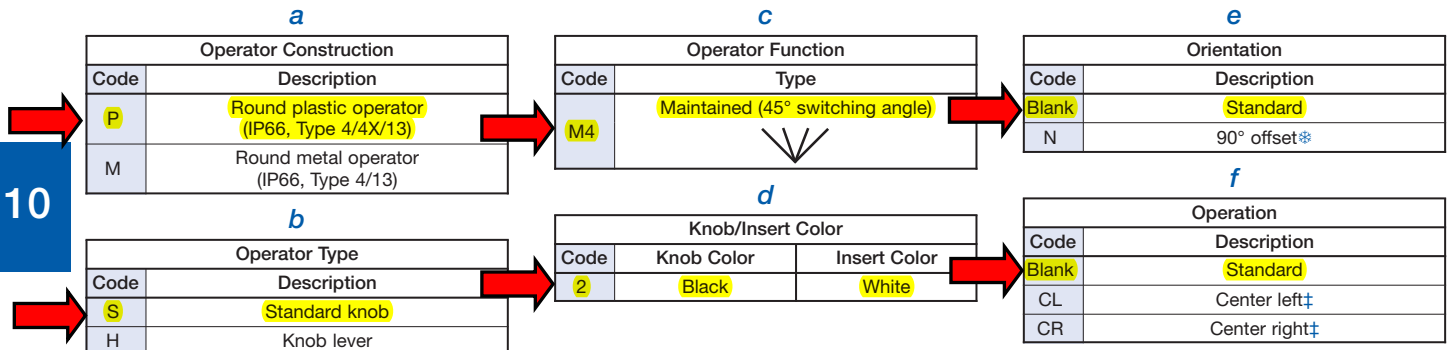
Note: X = Closed/O = Open

§ Contact selection is limited to the following options, consult your local Rockwell Automation sales office or Allen-Bradley distributor for other options.

Color	Standard Knob — Maintained		Pkg. Quantity
	Plastic	Metal	
	Cat. No.	Cat. No.	
Black with White Insert	800FP-SM42	800FM-SM42	1



800F -

a *b* *c* *d* *e* *f*




* Must use N.O., N.C.E.B., or N.C.L.B. contact blocks only. Cannot use N.C. or N.O.E.M. contact blocks with 4-position selector switch.
 † For use in vertical mount enclosures.
 ‡ The center contact block can have the same target output as the left or right contact block, by specifying center left (CL) or center right (CR) option.

Table 25 - Contact Blocks

	Description	Contact Type	Pkg. Qty.	Cat. No.
 <p>Cat. No. 800F-X10</p>	<p>Contact Block Note: Sold only in multiples of 10. Order (quantity of) 10 to receive one package of 10 pieces. Latch not included.</p>	N.O.	10	800F-X10
		N.C.		800F-X01
		N.O. low-voltage — QuadConnect		800F-X10V
		N.C. low-voltage — QuadConnect		800F-X01V
		N.O.L.M.		800F-X10N ⁽¹⁾
		N.O.E.M.		800F-X10E
		N.O.E.E.M.		800F-X10M ⁽²⁾
		N.C.L.B.		800F-X01L
		N.C.E.B.		800F-X01B ⁽³⁾
		Self-Monitoring		800F-X01S ⁽⁴⁾
		Dual-circuit of 2 N.O.		800F-X20D ⁽⁴⁾
		Dual-circuit of 2 N.C.		800F-X02D ⁽⁴⁾
		Dual-circuit of 1 N.O.-1 N.C.		800F-X11D ⁽⁴⁾
		N.O. spring-clamp		800F-Q10
		N.C. spring-clamp		800F-Q01
Ring lug N.O.	800F-R10 ^{(5) (6)}			
Ring lug N.C.	800F-R01 ^{(5) (6)}			
<p>Note: Sold only in multiples of 100. Order (quantity of) 100 to receive one package of 100 pieces. Latch not included.</p>	N.O.	100	800F-X10-BP	
	N.C.		800F-X01-BP	
 <p>Cat. No. 800F-BX01</p>	<p>Base-mounted Contact Block Base-mounted contact blocks can be used in plastic or metal enclosures. Note: Sold only in multiples of 10. Order (quantity of) 10 to receive one package of 10 pieces. Latch not included.</p>	N.O.	10	800F-BX10
		N.C.		800F-BX01

- (1) For use with Cat. No. 800FP-CB_ and Cat. No. 800FP-CC_ operators.
- (2) For use with Cat. No. 800FP-CC_ operators.
- (3) Only for use with 4-position selector switch, 4-position toggle switch, or 3-position push-pull operator.
- (4) Cannot stack.
- (5) Cannot be used in a composite catalog number.
- (6) Replacement screws are available (Cat. No. 800F-ARS1)

Table 26 - Power Modules

	Description	Voltage	Pkg. Qty.	Cat. No.
 <p>Cat. No. 800F-D3C</p>	<p>Incandescent Module For use with pilot lights, push buttons, and momentary mushroom operators. Note: Sold in multiples of 10. Order (quantity of) 10 to receive one package of 10 pieces. Latch not included.</p>	No bulb	10	800F-D0C
		6V AC/DC		800F-D1C
		12V AC/DC		800F-D2C
		24V AC/DC		800F-D3C
		48V AC/DC		800F-D4C
		120V AC/DC		800F-D5C

Product Details and Certifications

Cross Reference RA Part Number: 800F-X10 A

 **Product: 800F-X10**

Description: 22.5mm PB No Latch, Screw Contact Block, 1 N.O.



Representative Photo Only (actual product may vary based on configuration selections)

CONTACT BLOCK DATA

Latch Style	No Latch
Contact Block(s) Termination Style	Screw Contact Block
Contact Blocks	1 N.O.
Packaging	Standard Pack,Quantity:10

CERTIFICATIONS AND APPROVALS

UR

CSA

CE

CCC




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22.5 mm Push Buttons

Quick Selection

Quick Selection Components

Operator Style	Description	Color	Construction	Pkg. Quantity	Cat. No.
 <p>Flush Operator Cat. No. 800FP-F3</p>	Non-illuminated, flush push button	Black	Plastic	1	800FP-F2
	Non-illuminated, flush push button	Green			800FP-F3
	Non-illuminated, extended push button	Red			800FP-E4
	Non-illuminated, flush push button	Black	Metal		800FM-F2
	Non-illuminated, flush push button	Green			800FM-F3
	Non-illuminated, extended push button	Red			800FM-E4
 <p>Flush Operator Cat. No. 800FM-LF4</p>	Illuminated, flush push button	Green	Plastic	1	800FP-LF3
	Illuminated, extended push button	Red			800FP-LE4
	Illuminated, flush push button	Yellow			800FP-LF5
	Illuminated, flush push button	Green	Metal		800FM-LF3
	Illuminated, extended push button	Red			800FM-LE4
	Illuminated, flush push button	Yellow			800FM-LF5
 <p>Diffused Pilot Light Cat. No. 800FP-P7</p>	Diffused pilot light	Green	Plastic	1	800FP-P3
		Red			800FP-P4
		Yellow			800FP-P5
		Green	Metal		800FM-P3
		Red			800FM-P4
Yellow	800FM-P5				
 <p>Selector Switch Cat. No. 800FP-SM32</p>	Non-illuminated, 2-position, maintained selector switch	Black	Plastic	1	800FP-SM22
	Non-illuminated, 3-position, maintained selector switch				800FP-SM32
	Non-illuminated, 3-position, spring return from both positions selector switch				800FP-SB32
	Non-illuminated, 2-position, maintained selector switch		Metal		800FM-SM22
	Non-illuminated, 3-position, maintained selector switch				800FM-SM32
	Non-illuminated, 3-position, spring return from both positions selector switch				800FM-SB32
 <p>40 mm Trigger Action Twist-to-Release Mushroom Cat. No. 800FP-MT44</p>	Non-illuminated, 40 mm twist-to-release maintained mushroom (plastic)	Red	Plastic	1	800FP-MT44
	Non-illuminated, 40 mm push-pull maintained mushroom				800FP-MP44
	Non-illuminated, 40 mm twist-to-release maintained mushroom (metal)		Metal		800FM-MT44
	Non-illuminated, 40 mm push-pull maintained mushroom				800FM-MP44
Back of Panel	Description			Pkg. Quantity	Cat. No.
 <p>Power Module with Latch Cat. No. 800F-MN3G</p>	Metal latch			10	800F-ALM
	Plastic latch				800F-ALP
	Normally open contact block				800F-X10
	Normally closed contact block				800F-X01
	Integrated LED module with plastic latch — Red LED			1	* 800F-PNxR
	Integrated LED module with plastic latch — Green LED				* 800F-PNxG
	Integrated LED module with plastic latch — White LED				* 800F-PNxW
	Integrated LED module with metal latch — Red LED				* 800F-MNxR
	Integrated LED module with metal latch — Green LED				* 800F-MNxG
Integrated LED module with metal latch — White LED			* 800F-MNxW		

* To complete the cat. no., replace the x with one of the following voltage codes: **3** = 24V, **5** = 120V, **7** = 240V.

Product Details and Certifications

Cross Reference RA Part Number: PN-D165230

 **Product: 1489-M1C010**

Description: Bulletin 1489 Miniature Circuit Breaker, Standard Configuration,
AC, 1 Pole Configuration, Trip C, 1.0 Amps



Representative Photo Only (actual product may vary based on configuration sections)

CIRCUIT BREAKER DATA

Bulletin Number	1489 Miniature Circuit Breaker
Voltage Type	Standard Configuration, AC
Number of Poles	1 Poles Configuration
Trip Curve	Trip Curve C
Rated Current (A)	1.0 Amps

CERTIFICATIONS AND APPROVALS

UL
CSA
EN IEC
CE
VDE
CCC
RoHS

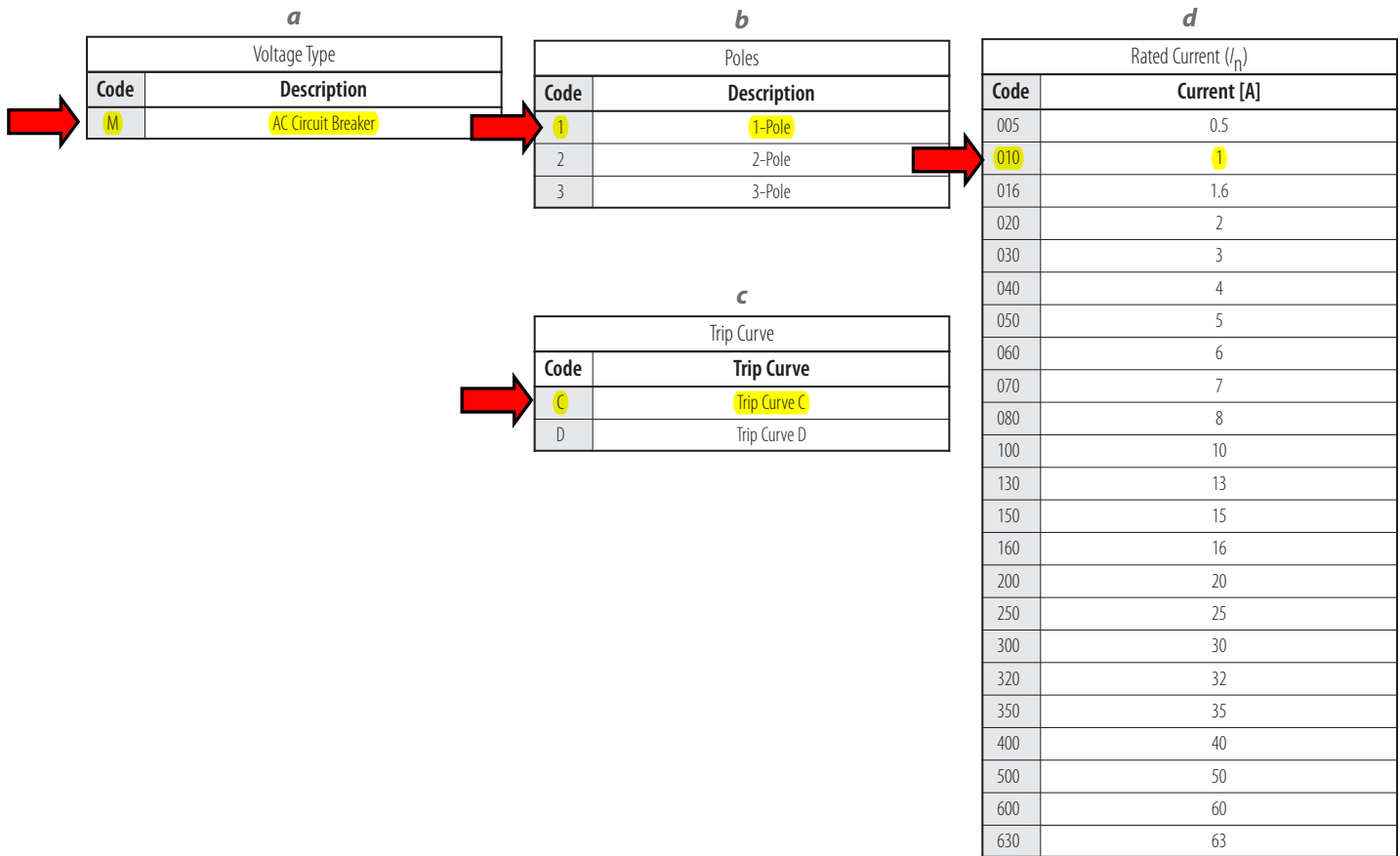
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Catalog Number Explanation



Note: Examples given in this section are for reference purposes. This basic explanation should not be used for product selection; some combinations may not produce a valid catalog number.

➔ 1489 - $\frac{M}{a}$ $\frac{1}{b}$ $\frac{C}{c}$ $\frac{010}{d}$



Product Selection

1-Pole Circuit Breakers

Photo/Wiring Diagram	UL/CSA Max. Voltage	IEC/EN Max. Voltage	Continuous Current Rating (I_n) [A]	Trip Curve C Inductive 5...10 I_n Cat. No.	Trip Curve D Highly Inductive 10...20 I_n Cat. No.
  1-pole	277V AC, 48V DC	230V AC	0.5	1489-M1C005	1489-M1D005
			1	1489-M1C010	1489-M1D010
			1.6	1489-M1C016	1489-M1D016
			2	1489-M1C020	1489-M1D020
			3	1489-M1C030	1489-M1D030
			4	1489-M1C040	1489-M1D040
			5	1489-M1C050	1489-M1D050
			6	1489-M1C060	1489-M1D060
			7	1489-M1C070	1489-M1D070
			8	1489-M1C080	1489-M1D080
			10	1489-M1C100	1489-M1D100
			13	1489-M1C130	1489-M1D130
			15	1489-M1C150	1489-M1D150
			16	1489-M1C160	1489-M1D160
			20	1489-M1C200	1489-M1D200
			25	1489-M1C250	1489-M1D250
			30	1489-M1C300	1489-M1D300
			32	1489-M1C320	1489-M1D320
			35	1489-M1C350	1489-M1D350
			40	1489-M1C400	1489-M1D400
50	1489-M1C500	1489-M1D500			
60	1489-M1C600	1489-M1D600			
63	1489-M1C630	1489-M1D630			



Specifications

Electrical Ratings					
Poles	1, 2, 3				
Tripping characteristics	C, D				
Rated current (I_n)	0.5...63 A				
Rated frequency [f]	50/60 Hz				
Rated insulation voltage U_i per IEC/EN 60664-1	250V AC (phase to ground) 440V AC (phase to phase)				
Overvoltage category	III				
Pollution degree	3				
Data per UL/CSA					
Rated voltage	AC	1-pole	C Curve	0.5...40 A	277V AC
				50...63 A	240V AC
		D Curve		0.5...35 A	277V AC
				40...63 A	240V AC
	2-, 3-pole	C Curve		0.5...40 A	480Y/277V AC
				50...63 A	240V AC
		D Curve		0.5...35 A	480Y/277V AC
				40...63 A	240V AC
DC	1-pole			48V DC	
	2-pole			96V DC (2-pole in series)	
Rated interrupting capacity per UL 489				10 kA	
Reference temperature for tripping characteristics				40 °C	
Electrical endurance				6,000 operations (AC and DC); 1 cycle (1s - ON, 9s - OFF)	
Data per IEC/EN 60947-2					
Rated operational voltage (U_e)	1-pole		230V AC		
	2-, 3-pole		400 V AC		
Highest supply or utilization voltage (U_{max})	AC	1-pole	253/440V AC		
		2-, 3-pole	440V AC		
	DC ★	1-pole	48V DC		
		2-pole	96V DC		
Min. operating voltage				12V AC, 12V DC	
Rated ultimate short-circuit breaking capacity (I_{CU})				15 kA	
Rated service short-circuit breaking capacity (I_{CS})				≤40 A: 11.25 kA >40 A: 7.5 kA	
Rated impulse withstand voltage U_{imp} . (1.2/50μs)				4 kV (test voltage 6.2kV at sea level, 5kV at 2,000m)	
Dielectric test voltage				2 kV (50/60Hz, 1 min.)	
Reference temperature for tripping characteristics				30 °C	
Electrical endurance				$I_n < 30A$:20,000 ops.(AC) $I_n \geq 30A$:10,000 ops. (AC) 1,000 ops. (DC)	
1 cycle (2s - ON, 13s - OFF, $I_n \leq 32A$),					
1 cycle (2s - ON, 28s - OFF, $I_n > 32A$)					

★ Self-declared IEC DC ratings.

Mechanical Data		
Housing	Insulation group II, RAL 7035	
Indicator window	red ON/green OFF	
Protection degree per EN 60529	IP20, IP40 in enclosure with cover	
Mechanical endurance	20,000 operations	
Shock resistance per IEC/EN 60068-2-27	25 g - 2 shocks - 13 ms	
Vibration resistance per IEC/EN 60068-2-6	5g - 20 cycles at 5...150...5 Hz with load 0.8 In	
Environmental		
Environmental conditions (damp heat) per IEC/EN 60068-2-30	28 cycles with 55°C/90-96% and 25°C/95-100%	
Ambient temperature ★	-25...+55 °C	
Storage temperature	-40...+70 °C	
Installation		
Terminal	Dual terminal	
Cross-section of conductors♣ – solid, stranded (front/back terminal slot)	mm ²	35/35 mm ²
	AWG	18...4/18...10 AWG
Cross-section of conductors – flexible	mm ²	25/10 mm ²
Multi-wire rating per UL, CSA	AWG	1 wire, 18...4 AWG
	AWG	2 wires‡, 18...10 AWG
Cross-section of bus bars (back terminal slot)	mm ²	10 mm ²
Tightening torque	N·m	2.8 N·m
	in·lb	AWG 18...16: 8.85 in·lb, AWG 14...10: 17.7 in·lb, AWG 8...4:39.8 in·lb
Screwdriver	No. 2 Pozidrive	
Mounting	DIN Rail (EN 60715, 35 mm) with fast clip	
Mounting position	Any	
Supply	Optional	
Approximate Dimensions and Weight		
Pole dimensions (H x D x W)	111 x 69 x 17.5 mm (4.37 x 2.72 x .69")	
Pole weight	125 g (4.4 oz.)	
Combination with Auxiliary Elements		
Auxiliary contact	Yes	
Signal contact	Yes	
Shunt trip	Yes	

♣ 35 mm self-declared, not included in IEC/EN approval.

★ Refer to the ambient temperature derating tables.

‡ Wires must be of like size and stranding. Only one wire per terminal slot.

Power Loss Due to Current

Rated Current [A]	Power Loss Per Pole [W]	Rated Current [A]	Power Loss Per Pole [W]
0.5	1.4	15	2.4
1	1.4	16	2.5
1.6	1.8	20	2.5
2	1.8	25	3.2
3	1.6	30	3.5
4	1.8	32	3.7
5	1.9	35	4.1
6	2.0	40	4.5
7	1.1	50	4.5
8	1.5	60	4.9
10	2.1	63	5.4
13	2.3	—	—



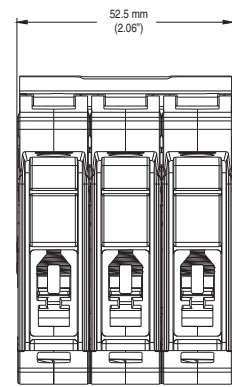
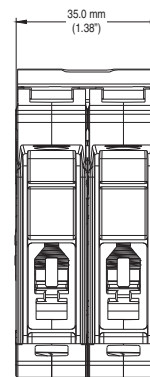
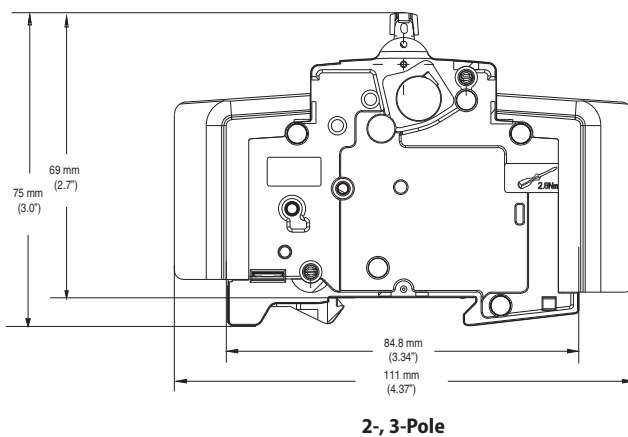
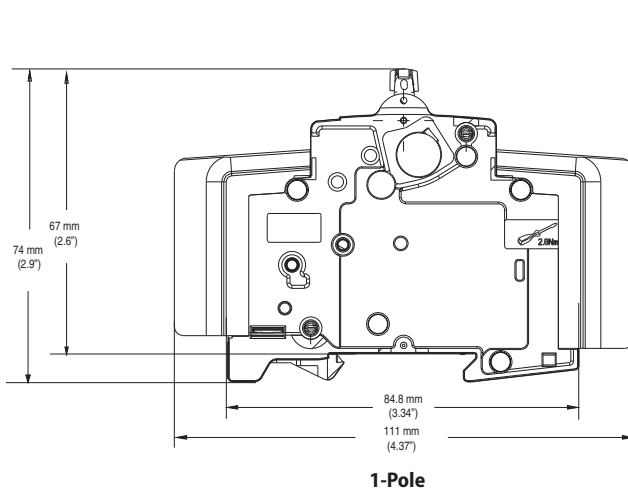
Zero-stack Derating

The installation of several miniature circuit breaker side by side with rated current on all poles requires a correction factor to the rated current (not required if spacers are used).

No. of Adjacent Devices	Factor
1	1
2,3	0.9
4,5	0.8
≥6	0.75

Approximate Dimensions

Note: Dimensions are shown in millimeters (inches). Dimensions are not intended for manufacturing purposes.



Ambient Temperature Derating

The Bulletin 1489-M circuit breakers are rated in RMS amperes at a 40 °C (104 °F) ambient temperature per UL 489/CSA C22.2 No. 5. This temperature is used as the ambient temperature external to an industrial enclosure. If a circuit breaker is applied in a temperature that exceeds the 40 °C (104 °F) ambient rating, then the circuit breaker should be derated using the table below. For IEC 60947-2 standard, the products carry an ambient rating of 30 °C. Follow standard IEC application considerations for temperature rating in different ambient temperatures.

Note: Application below 0° C is for non-condensing atmosphere. Care should be taken for applications below 0 °C. These devices are not certified to operate correctly in the presence of ice.

Bulletin 1489-M

Temperature Derating, UL

Reference temperature = 40 °C



Current Rating [A]	Ambient temperature (°C)									
	-25	-20	-10	0	10	20	30	40	50	55
0.5	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5
1	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1	1.0	0.9
1.6	2.0	2.0	1.9	1.8	1.8	1.7	1.7	1.6	1.5	1.5
2	2.5	2.4	2.4	2.3	2.2	2.1	2.1	2	1.9	1.9
3	3.7	3.7	3.6	3.4	3.3	3.2	3.1	3	2.9	2.8
4	5.0	4.9	4.7	4.6	4.4	4.3	4.1	4	3.9	3.8
5	6.2	6.1	5.9	5.7	5.6	5.4	5.2	5	4.8	4.7
6	7.4	7.3	7.1	6.9	6.7	6.4	6.2	6	5.8	5.7
7	8.7	8.6	8.3	8.0	7.8	7.5	7.3	7	6.7	6.6
8	9.9	9.8	9.5	9.2	8.9	8.6	8.3	8	7.7	7.6
10	12.4	12.2	11.9	11.5	11.1	10.7	10.4	10	9.6	9.4
13	16.1	15.9	15.4	14.9	14.4	14.0	13.5	13	12.5	12.3
15	18.6	18.3	17.8	17.2	16.7	16.1	15.6	15	14.4	14.2
16	19.8	19.6	19.0	18.4	17.8	17.2	16.6	16	15.4	15.1
20	24.8	24.4	23.7	23.0	22.2	21.5	20.7	20	19.3	18.9
25	31.0	30.6	29.6	28.7	27.8	26.9	25.9	25	24.1	23.6
30	37.2	36.7	35.6	34.4	33.3	32.2	31.1	30	28.9	28.3
32	39.7	39.1	37.9	36.7	35.6	34.4	33.2	32	30.8	30.2
35	43.4	42.8	41.5	40.2	38.9	37.6	36.3	35	33.7	33.1
40	49.6	48.9	47.4	45.9	44.4	43.0	41.5	40	38.5	37.8
50	62.0	61.1	59.3	57.4	55.6	53.7	51.9	50	48.2	47.2
60	74.4	73.3	71.1	68.9	66.7	64.4	62.2	60	57.8	56.7
63	78.2	77.0	74.7	72.3	70.0	67.7	65.3	63	60.7	59.5

Bulletin 1489-M

Temperature Derating, IEC

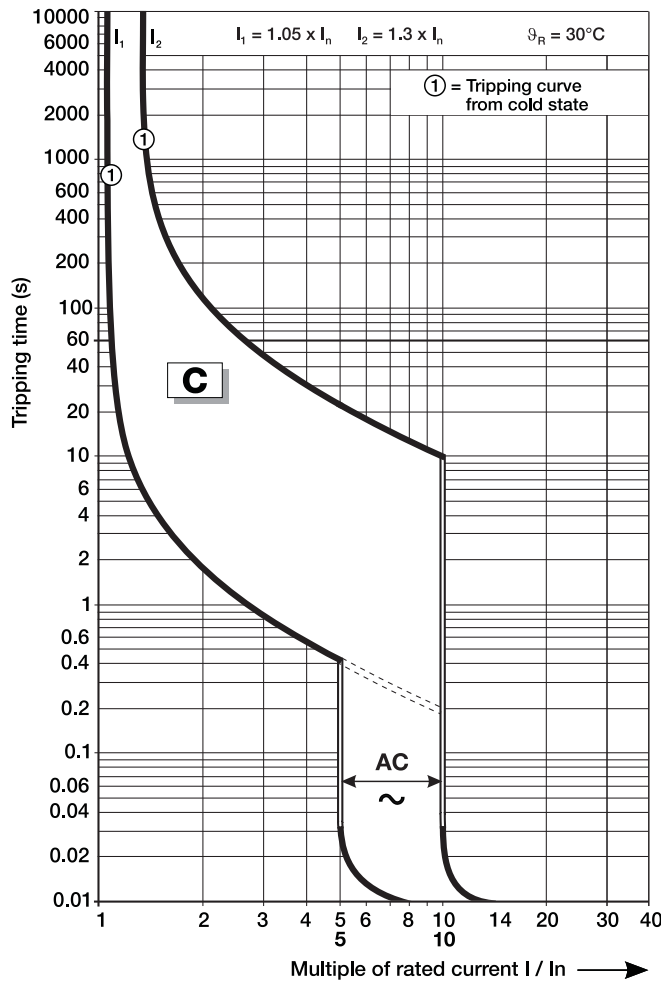
Reference temperature = 30 °C



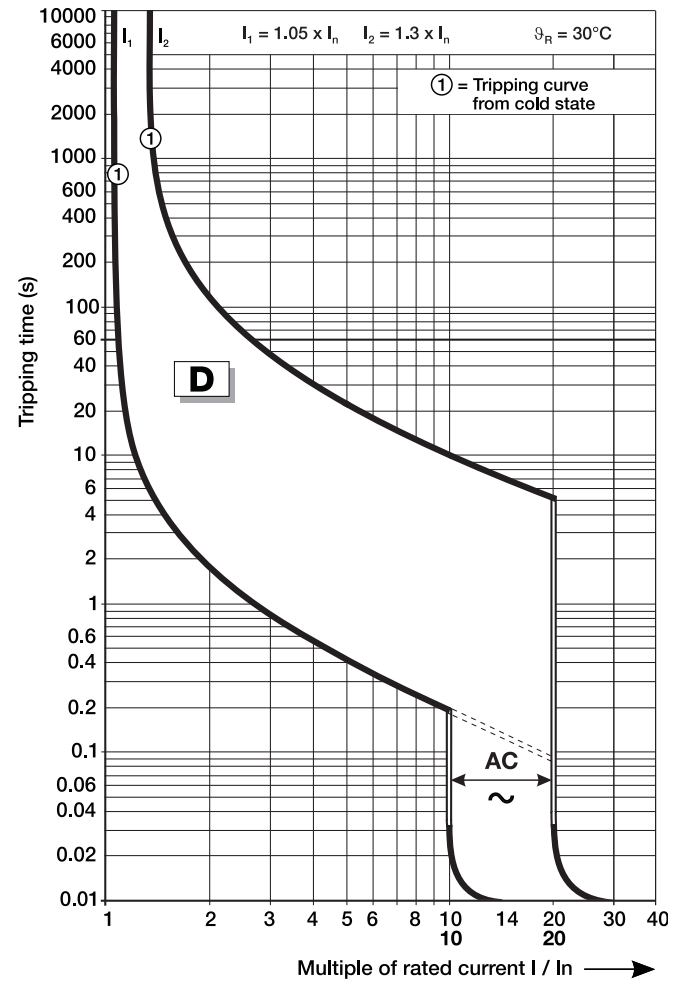
Current Rating [A]	Ambient temperature (°C)									
	-25	-20	-10	0	10	20	30	40	50	55
0.5	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5
1	1.2	1.2	1.1	1.1	1.1	1.0	1	1.0	0.9	0.9
1.6	1.9	1.8	1.8	1.7	1.7	1.6	1.6	1.6	1.5	1.5
2	2.3	2.3	2.2	2.2	2.1	2.1	2	1.9	1.9	1.9
3	3.5	3.5	3.4	3.3	3.2	3.1	3	2.9	2.8	2.8
4	4.7	4.6	4.5	4.4	4.2	4.1	4	3.9	3.8	3.7
5	5.8	5.8	5.6	5.5	5.3	5.2	5	4.9	4.7	4.6
6	7.0	6.9	6.7	6.5	6.4	6.2	6	5.8	5.6	5.6
7	8.2	8.1	7.8	7.6	7.4	7.2	7	6.8	6.6	6.5
8	9.3	9.2	9.0	8.7	8.5	8.2	8	7.8	7.5	7.4
10	11.7	11.5	11.2	10.9	10.6	10.3	10	9.7	9.4	9.3
13	15.1	15.0	14.6	14.2	13.8	13.4	13	12.6	12.2	12.0
15	17.5	17.3	16.8	16.4	15.9	15.5	15	14.6	14.1	13.9
16	18.6	18.4	17.9	17.4	17.0	16.5	16	15.5	15.0	14.8
20	23.3	23.0	22.4	21.8	21.2	20.6	20	19.4	18.8	18.5
25	29.1	28.8	28.0	27.3	26.5	25.8	25	24.3	23.5	23.1
30	35.0	34.5	33.6	32.7	31.8	30.9	30	29.1	28.2	27.8
32	37.3	36.8	35.8	34.9	33.9	33.0	32	31.0	30.1	29.6
35	40.8	40.3	39.2	38.2	37.1	36.1	35	34.0	32.9	32.4
40	46.6	46.0	44.8	43.6	42.4	41.2	40	38.8	37.6	37.0
50	58.3	57.5	56.0	54.5	53.0	51.5	50	48.5	47.0	46.3
60	69.9	69.0	67.2	65.4	63.6	61.8	60	58.2	56.4	55.5
63	73.4	72.5	70.6	68.7	66.8	64.9	63	61.1	59.2	58.3

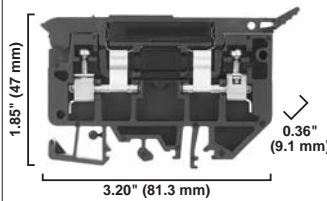







Tripping Characteristics

C Curve



D Curve



	1492-H...	1492-WFB4...		
Dimensions are not intended to be used for manufacturing purposes. Note: Height dimension is measured from top of rail to top of terminal block.				
Specifications	Single-circuit fusible terminal block with or without fuse indication.	Single-circuit fuse block with or without fuse indication.		
Certifications	  	  		
Voltage Rating	H6/WFB4: 300V AC/DC H5/WFB424: 10...57V AC/DC H4/WFB4250: 100...300V AC	H6/WFB4: 300V AC/DC H5/WFB424: 10...57V AC/DC H4/WFB4250: 85...264V AC		
Maximum Current	15 A	15 A		
Wire Range (Rated Cross Section)	#30...12 AWG 0.5...4 mm ²	#30...12 AWG 0.5...4 mm ²		
Wire Strip Length	0.38 in. (9.7 mm)	0.31 in. (8 mm)		
Recommended Tightening Torque	7.1 lb•in. (0.8 N•m)	2.65...5.3 lb•in. (0.3...0.6 N•m)		
Density	33 pcs/ft (109pcs/m)	38 pcs/ft (125 pcs/m)		
Housing Temperature Range	-40...+195 °F (-40...+90 °C)	-40...+195 °F (-40...+90 °C)		
Indicator Type				
H6/WFB4	Non-Indicating	Non-Indicating		
H5/WFB424	Red LED	Red LED		
H4/WFB4250	Neon	Neon		
Leakage Current				
H6/WFB4	—	—		
H5/WFB424	2 mA @ 24V	2 mA @ 24V		
H4/WFB4250	2 mA @ 300V	2 mA @ 300V		
Fuse Size (Not Supplied)	1/4 x 1-1/4 in.	5 x 20 mm		
Short-Circuit Current Rating	See page 12-43			
Terminal Blocks	Cat. No.	Pkg Qty.	Cat. No.	Pkg Qty.
Color: Black No-indication	1492-H6	25	1492-WFB4	50
Black w/LED	1492-H5	25	1492-WFB424	50
Black w/Neon	1492-H4	25	1492-WFB4250	50
Accessories	Cat. No.	Pkg Qty.	Cat. No.	Pkg Qty.
Mounting Rails:				
1 m Symmetrical DIN (Steel)	199-DR1	10	199-DR1	10
1 m Symmetrical DIN (Aluminum)	1492-DR5	10	1492-DR5	10
1 m Hi-Rise Sym. DIN (Aluminum)	1492-DR6	2	1492-DR6	2
1 m Angled Hi-Rise Sym. DIN (Steel)	1492-DR7	2	1492-DR7	2
3 ft Scored A-B Rail	1492-N1	20	—	—
3 ft Rigid A-B Rail	1492-N22	20	—	—
3 ft High Rise A-B Rail	1492-N44	2	—	—
Standoff Brackets (Use Every 12 in.)	1492-N25	2	—	—
End Barrier	1492-N37	50	Not Required	—
End Anchors and Retainers:				
Screwless End Retainer	1492-ERL35	20	1492-ERL35	20
DIN Rail — Normal Duty	1492-EAJ35	100	1492-EAJ35	100
DIN Rail — Heavy Duty	1492-EAHJ35	50	1492-EAHJ35	50
A-B Rail — Heavy Duty	1492-N23	10	—	—
Uninsulated 10-Pole Side Jumper	1492-N49	10	1492-SJFB8-10	10
Side Jumper Insulating Sleeve	1492-SJS	10	—	—
Other Accessories:				
Partition Plate	—	—	1492-PPSL3	50
Group Marking Carrier	1492-GM35	25	1492-GM35	25
Marking Systems:				
Snap-In Marker Card — For Base Block	1492-MS8X12 (56/card)	5	1492-MS8X12 (56/card)	5
For Handle	1492-MS8X9 (56/card)	5	1492-MS8X9 (56/card)	5
Adhesive Labels	1492-ALHFB (50/sheet)	1	1492-ALHFB (50/card)	1

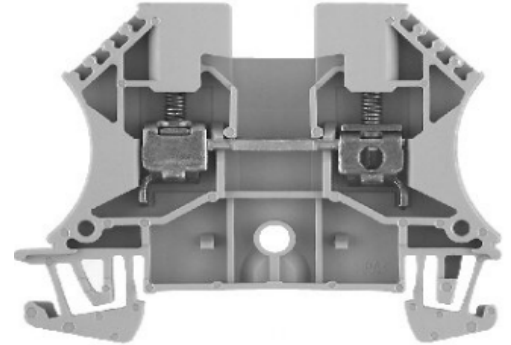
* IEC standards for 5 x 20 mm fuses do not include ratings above 6.3 A.

Product Details and Certifications

Cross Reference RA Part Number: 1492-J4 A

Product: **1492-J4**

Description: 1492-J IEC Terminal Block, One-Circuit Feed-Through Block, 4 mm (# 22 AWG - # 10 AWG) or 2.5 mm (# 22 AWG - # 12 AWG), Standard Feedthrough, Gray (Standard)



Representative Photo Only (actual product may vary based on configuration sections)

ACCESSORY SELECTION

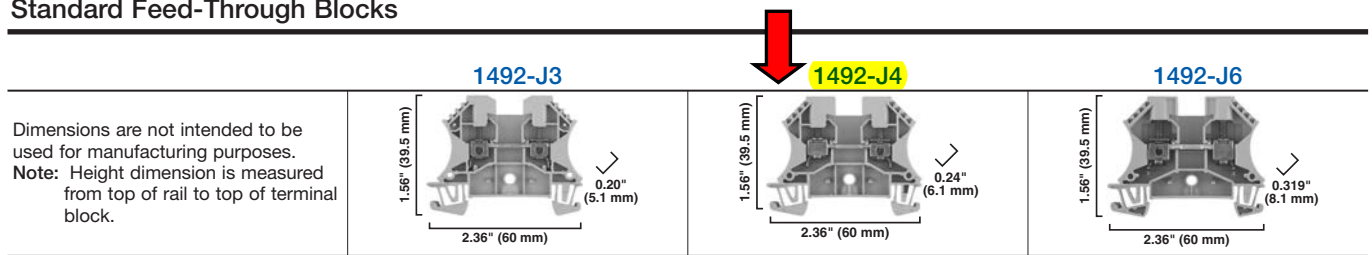
Bulletin Number	1492 Terminal Block Accessories
Accessory Selection	Individual Accessory Selection

CERTIFICATIONS AND APPROVALS

UR	UL 486E, UL 1059; Reference File: E40735, E187022
CSA	CSA C22.2 No. 65, No. 158; On Website, Name: Rockwell, Keyword Search: 1492
IEC	EN 60947-1, EN 60947-7-1(Feed-Through), -2(Ground), -3(Fuse)
ATEX	http://www.rockwellautomation.com/products/certification/ex/excert.html
Short Circuit Current Rating	This terminal block carries a minimum of 10kA SCCR rating for all protection methods. Please see the table for other possible elevated ratings.
For CSA Certifications:	http://directories.csa-international.org/directorymain.asp
For UL Certifications Directory:	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm

Screw Connection Terminal Blocks

Standard Feed-Through Blocks



Specifications	Feed-through terminal block				Feed-through terminal block				Feed-through terminal block			
	UL	CSA	IEC	ATEX	UL	CSA	IEC	ATEX	UL	CSA	IEC	ATEX
Certifications	UL	CSA	IEC	ATEX	UL	CSA	IEC	ATEX	UL	CSA	IEC	ATEX
Voltage Rating	600V AC/DC		800V AC/DC	550V AC/DC	600V AC/DC		800V AC/DC	690V AC/DC	600V AC/DC		800V AC/DC	550V AC/DC
Maximum Current	25 A	20 A	24 A	21 A	35 A	25 A	32 A	28 A	50 A	41 A	36 A	36 A
Wire Range (Rated Cross Section)	#22...12 AWG	#26...12 AWG	2.5 mm ²	2.5 mm ² (#20...14 AWG)	#22...10 AWG	#26...10 AWG	4 mm ²	4 mm ² (#20...12 AWG)	#22...8 AWG	6 mm ²	6 mm ² (#20...10 AWG)	6 mm ² (#20...10 AWG)
Wire Strip Length	0.39 in. (10 mm)				0.39 in. (10 mm)				0.47 in. (12 mm)			
Recommended Tightening Torque	4.5...7.1 lb•in (0.5...0.8 N•m)				9.0 lb•in (1.0 N•m)				14.2 lb•in (1.6 N•m)			
Density	59 pcs/ft (196 pcs/m)				49 pcs/ft (163 pcs/m)				37 pcs/ft (123 pcs/m)			
Housing Temperature Range	-58...+248 °F (-50...+120 °C)				-58...+248 °F (-50...+120 °C)				-58...+248 °F (-50...+120 °C)			
Short-Circuit Current Rating	See page 12-42											

Terminal Blocks		Cat. No.	Pkg Qty.	Cat. No.	Pkg Qty.	Cat. No.	Pkg Qty.
Color:	Grey	1492-J3	100	1492-J4	100	1492-J6	100
	Red	1492-J3-RE	100	1492-J4-RE	100	1492-J6-RE	100
	Blue	1492-J3-B	100	1492-J4-B	100	1492-J6-B	100
	Black	1492-J3-BL	100	1492-J4-BL	100	1492-J6-BL	100
	Green	1492-J3-G	100	1492-J4-G	100	1492-J6-G	100
	Yellow	1492-J3-Y	100	1492-J4-Y	100	1492-J6-Y	100
	Orange	1492-J3-OR	100	1492-J4-OR	100	1492-J6-OR	100
	Brown	1492-J3-BR	100	1492-J4-BR	100	1492-J6-BR	100
	White	1492-J3-W	100	1492-J4-W	100	1492-J6-W	100
	Violet	1492-J3-V	100	1492-J4-V	100	—	—
Mounting Rails:							
1 m Symmetrical DIN (Steel)		199-DR1	10	199-DR1	10	199-DR1	10
1 m Symmetrical DIN (Aluminum)		1492-DR5	10	1492-DR5	10	1492-DR5	10
1 m Hi-Rise Sym. DIN (Aluminum)		1492-DR6	2	1492-DR6	2	1492-DR6	2
1 m Angled Hi-Rise Sym. DIN (Steel)		1492-DR7	2	1492-DR7	2	1492-DR7	2
End Barriers	Grey	1492-EBJ3	50	1492-EBJ3	50	1492-EBJ3	50
	Blue	1492-EBJ3-B	50	1492-EBJ3-B	50	1492-EBJ3-B	50
	Yellow	1492-EBJ3-Y	50	1492-EBJ3-Y	50	1492-EBJ3-Y	50
End Anchors and Retainers:							
DIN Rail — Normal Duty		1492-EAJ35	100	1492-EAJ35	100	1492-EAJ35	100
DIN Rail — Heavy Duty		1492-EAHJ35	50	1492-EAHJ35	50	1492-EAHJ35	50
Screwless End Retainer		1492-ERL35	20	1492-ERL35	20	1492-ERL35	20
Jumpers:*							
Screw Center Jumper — 10-pole		1492-CJJ5-10	20	1492-CJJ6-10	20	1492-CJJ8-10	20
Screw Center Jumper — 4-pole		1492-CJJ5-4	50	1492-CJJ6-4	50	1492-CJJ8-4	50
Screw Center Jumper — 3-pole		1492-CJJ5-3	50	1492-CJJ6-3	50	1492-CJJ8-3	50
Screw Center Jumper — 2-pole		1492-CJJ5-2	50	1492-CJJ6-2	50	1492-CJJ8-2	50
Plug-in Center Jumper — 50-Pole		1492-CJLJ5-50	10	1492-CJLJ6-41 (41-pole)	10	—	—
Plug-in Center Jumper — 10-Pole		1492-CJLJ5-10	20	1492-CJLJ6-10	20	—	—
Plug-in Center Jumper — 9-Pole		1492-CJLJ5-9	20	—	—	—	—
Plug-in Center Jumper — 8-Pole		1492-CJLJ5-8	20	—	—	—	—
Plug-in Center Jumper — 7-Pole		1492-CJLJ5-7	20	—	—	—	—
Plug-in Center Jumper — 6-Pole		1492-CJLJ5-6	20	—	—	—	—
Plug-in Center Jumper — 5-Pole		1492-CJLJ5-5	20	—	—	—	—
Plug-in Center Jumper — 4-Pole		1492-CJLJ5-4	60	1492-CJLJ6-4	60	—	—
Plug-in Center Jumper — 3-Pole		1492-CJLJ5-3	60	1492-CJLJ6-3	60	—	—
Plug-in Center Jumper — 2-Pole		1492-CJLJ5-2	60	1492-CJLJ6-2	60	—	—
Insulated Side Jumper — 24-Pole		1492-SJ5B-24	50	—	—	—	—
Insulated Side Jumper — 10-Pole		1492-SJ5B-10	50	—	—	—	—
Screw Type Jumper Notching Tool		1492-T1	1	1492-T1	1	1492-T1	1
Other Accessories:							
Partition Plate		1492-EBJ16	20	1492-EBJ16	20	1492-EBJ16	20
Test Plug Socket		1492-TPS23	20	1492-TPS23L	50	1492-TPS23L	50
Test Plug		1492-TP23	20	1492-TP23	20	1492-TP23	20
Test Plug (Stackable)		1492-TPJ5	25	1492-TPJ6	25	—	—
Electrical Warning Plate		1492-EWPJ5	25	1492-EWPJ5	25	1492-EWPJ8	50
Marking Systems:							
Snap-in Marker Cards		1492-M5X12 (144/card)	5	1492-M6X12 (120/card)	5	1492-MR8X12 (84/card)	5
		1492-M5X5 (200/card)	5	1492-M6X5 (200/card)	5	1492-M8X5 (160/card)	5

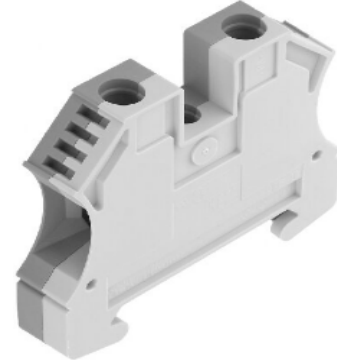
* Use of center jumpers may affect spacings, requiring derating of terminal blocks. See page 12-83 for details.

Product Details and Certifications

Cross Reference RA Part Number: 1492-JG4 A

Product: **1492-JG4**

Description: 1492-J IEC Terminal Block, One-Circuit Feed-Through Ground Block, 4 mm (# 22 AWG - # 10 AWG) or 2.5 mm (# 22 AWG - # 12 AWG), Standard Feedthrough, Green / Yellow Stripe (Standard)



Representative Photo Only (actual product may vary based on configuration sections)

BLOCK STYLE

Bulletin Number	1492 Terminal Block Accessories
Base Block Style	Grounding Blocks

BASE DATA

Base Block Type	One-Circuit Feed-Through Ground Block
-----------------	---------------------------------------

DETAIL DATA

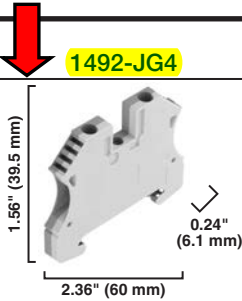
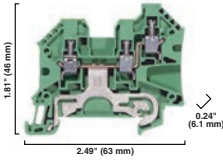
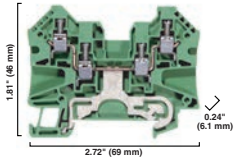



Features	Standard Feedthrough
Maximum Wire Size & Rating	UL: 22-10 AWG\nCSA: 22-10 AWG\nIEC: 4mm ² \nEEx e II: 4mm ² /20-12 AWG
Color	Green / Yellow Stripe (Standard)

CERTIFICATIONS AND APPROVALS

UR	UL 486E, UL 1059; Reference File: E40735, E187022
CSA	CSA C22.2 No. 65, No. 158; On Website, Name: Rockwell, Keyword Search: 1492
IEC	EN 60947-1, EN 60947-7-1(Feed-Through), -2(Ground), -3(Fuse)
ATEX	http://www.rockwellautomation.com/products/certification/ex/excert.html
Short Circuit Current Rating	This terminal block carries a minimum of 10kA SCCR rating for all protection methods. Please see the table for other possible elevated ratings.
For CSA Certifications:	http://directories.csa-international.org/directorymain.asp
For UL Certifications Directory:	http://database.ul.com/cgi-bin/XYV/template/LISEXT/1FRAME/index.htm

Screw Connection Terminal Blocks

Grounding Blocks

	1492-JG4	1492-JG4TW	1492-JG4Q				
<p>Dimensions are not intended to be used for manufacturing purposes. Note: Height dimension is measured from top of rail to top of terminal block.</p> 							
Specifications	Feed-through grounding terminal block		Single-level grounding terminal block with 3 connection points, 2 on one side				
Certifications	 CSA IEC ATEX	 CSA IEC	 CSA IEC				
Voltage Rating	—		—				
Maximum Current	Grounding		Grounding				
Wire Range (Rated Cross Section)	#22...10 AWG	4 mm ² 4 mm ² (#20...12 AWG)	#30...10 AWG 0.5...4 mm ²				
Wire Strip Length	0.39 in. (10 mm)		0.394 in. (10 mm)				
Recommended Tightening Torque	9 lb•in (1.0 N•m)		6.2 lb•in (0.7 N•m)				
Mounting Torque - Center Screw	4.4...7.1 lb•in (0.5...0.8 N•m)		—				
Density	49 pcs/ft (163 pcs/m)		49 pcs/ft (163 pcs/m)				
Housing Temperature Range	-58...+248 °F (-50...+120 °C)		-58...+248 °F (-50...+120 °C)				
Short-Circuit Current Rating	See page 12-42						
Terminal Blocks	Cat. No.	Pkg Qty.	Cat. No.	Pkg Qty.	Cat. No.	Pkg Qty.	
Color:	Green/Yellow	1492-JG4	100	1492-JG4TW	50	1492-JG4Q	50
Accessories	Cat. No.	Pkg Qty.	Cat. No.	Pkg Qty.	Cat. No.	Pkg Qty.	
Mounting Rails:							
1 m Symmetrical DIN (Steel)	199-DR1	10	199-DR1	10	199-DR1	10	
1 m Symmetrical DIN (Aluminum)	1492-DR5	10	1492-DR5	10	1492-DR5	10	
1 m Hi-Rise Sym. DIN (Aluminum)	1492-DR6	2	1492-DR6	2	1492-DR6	2	
1 m Angled Hi-Rise Sym. DIN (Steel)	1492-DR7	2	1492-DR7	2	1492-DR7	2	
End Barrier Yellow	Not Required	—	1492-EBJ4TW-Y	50	1492-EBJ4Q-Y	50	
End Anchors:							
Screwless End Retainer	1492-ERL35	20	1492-ERL35	20	1492-ERL35	20	
DIN Rail - Normal Duty	1492-EAJ35	100	1492-EAJ35	100	1492-EAJ35	100	
DIN Rail - Heavy Duty	1492-EAHJ35	50	1492-EAHJ35	50	1492-EAHJ35	50	
Marking Systems:							
Snap-in marker cards	1492-M6X12 (120/card)	5	1492-MR6X12 (120/card)	5	1492-MR6X12 (120/card)	5	
Snap-in marker cards	1492-M6X5 (200/card)	5	1492-M6X12 (120/card)	5	1492-M6X12 (120/card)	5	

Bulletin 1606-XLB Basic Power Supply



Cost-Effective, Efficient Power for Control Circuits

Features and Benefits

- Available in 1.5A (36 Watts), 2.5A (60 Watts), 3.75A (90 Watts), 5A (120 Watts), 10A (240 Watts) and 20A (480 Watts) sizes
- Designed for extended mean time between failure for longer service – at a significant price advantage
- Clever single-board design enables up to 95.2% efficiency, reducing heat output which can putting less thermal stress on other components in the enclosure
- DC-OK signal allows monitoring of unit's output voltage
- Clicks smoothly onto any standard DIN rail and features large-sized terminals, making wiring easier



1606-XLB36EH 1.5A (36 W)
Push-in Terminals



1606-XLB90EH 3.8A (90 W)
Push-in Terminals



1606-XLB90EQ 3.8A (90 W)
NEC Class 2
Screw Terminals



1606-XLB480E 20A (480 W)
Screw terminals

Basic DIN Rail Mounted Power Supplies

Bulletin 1606-XLB offers reliability and efficiency usually available only in more expensive power supplies.

These power supplies are rated up to 1.37 million hours mean time between failure (MTBF) and the minimum service life-time is typically 47,000 hours. Efficiency figures range from 90.7% up to 95.2%. Furthermore, the XLB family offers a DC "OK" signal that can be used to monitor the unit's output voltage.

Robust enough for demanding applications, these convection cooled units can operate from -10 °C (some units -25 °C) up to 70 °C. Typically, power derating is only required above 55 °C. The XLB family is easy to mount on any standard DIN rail and features large-sized terminals for east wiring. The 240 W version is only 49 mm wide, an industry leading space saving benefit of XLB.

The new 1606-XLB product family is cost-effective without compromising reliability, efficiency and ease of application.

Introducing new 1606-XLB family of power supplies with high efficiency and life expectancy

	36W	60W		90W		120W	240W	480W
	XLB36EH	XLB60BH	XLB60EH XLB60E	XLB90EH	XLB90E XLB90EQ ²	XLB120E	XLB240E	XLB480E
Output								
Output current, nominal	1.5A	5A	2.5A	3.8A	3.8A	5A	10A	20A
Output voltage, nominal DC	24V	12V	24V	24V	24V	24V	24V	24V
output voltage range	24-28V	12-15V	24-28V	24-28V	24-28V	24-28V	24-28V	24-28V
Hold-up time, typ. at 230Vac	161ms	114ms	113ms	119ms	119ms	50ms	32ms	27ms
Input								
AC input voltage, nominal	100-240V	100-240V	100-240V	100-240V	100-240V	100-120V ⁽¹⁾ 200-240V ⁽¹⁾	100-240V	100-240V
AC input voltage range	90-264V	90-264V	90-264V	90-264V	90-264V	90-132V ⁽¹⁾ 180-264V ⁽¹⁾	90-264V	90-264V
Power factor, typ.	0.46	0.49	0.47	0.45	0.45	0.54	0.93	0.97
Input inrush current, typ. AC (+40°C)	TBD	31A	35A	40A	40A	33A	26A	35A
Operational temperature range	-10°C to +70°C	-10°C to +70°C	-10°C to +70°C	-10°C to +70°C	-10°C to +70°C	-10°C to +70°C	-25°C to +70°C	-25°C to +70°C
Efficiency	> 90%	90.7%	91.8%	93.8%	93.8%	92.3%	95.2%	95.3%
MTBF SN 29500, IEC61709 at +40°C	TBD	TBD	TBD	TBD	TBD	1379kh	822kh	704 kh
Minimum lifetime expectancy at +40°C and 100% load	115 kh 100Vac	89 kh 100Vac	115 kh 100Vac	102 kh 100Vac	102 kh 100Vac	83kh	74kh	102kh
Mechanical data								
Dimensions WxHxD	22.5x90x91mm	36x90x91mm	36x90x91mm	36x90x91mm	36x90x91mm	39x124x124mm	49x124x124mm	59x124x127mm
Weight	138g	225g	220g	270g	270g	370g	540g	810g
DC-OK relay contact	-	-	-	-	-	yes	yes	yes
Connection terminals	push-in	push-in	XLB60EH : push-in XLB60E: screw	push-in	screw	screw	screw	screw

Standards and approvals



Annotations

1) Auto-select 2) NEC Class 2 version
 3) 1606-XLB36EH, 1606-XLB60BH, 1606-XLB60EH / 1606-XLB60E,
 1606-XLB90EH / 1606-XLB90E / 1606-XLB90EQ, 1606-XLB480E,

All values are valid at 230 Vac, 50Hz, +25°C ambient temperature after a warm-up time of 5 minutes, unless stated otherwise. All technical data is subject to change without notice.

General data for all versions:

Power reduction 2.5%/°C from +55°C (PIC480.241C: 1.7%/°C) 5% to
 Humidity 95% r.h.
 Installation height (with derating) 0 to 2,000m (up to 5,000m)
 Shock test 30g 6ms, 20g 11ms in accordance with IEC60068-2-27

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CompactLogix Controllers Specifications

CompactLogix 5370 and Compact GuardLogix 5370 Controller Catalog Numbers

1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L18ERM-BB1BK, 1769-L19ER-BB1B, 1769-L19ER-BB1BK, 1769-L24ER-QB1B, 1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK, 1769-L27ERM-QBFC1B, 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERK, 1769-L30ERM, 1769-L30ERMK, 1769-L30ERMS, 1769-L33ER, 1769-L33ERK, 1769-L33ERM, 1769-L33ERMK, 1769-L33ERMS, 1769-L33ERMSK, 1769-L36ERM, 1769-L36ERMS, 1769-L37ERM, 1769-L37ERMK, 1769-L37ERMS, 1769-L37ERMSK, 1769-L38ERM, 1769-L38ERMK, 1769-L38ERMS, 1769-L38ERMSK

Armor CompactLogix and Armor Compact GuardLogix Controller Catalog Numbers

1769-L33ERMO, 1769-L33ERMOS, 1769-L36ERMO, 1769-L36ERMOS, 1769-L37ERMO, 1769-L37ERMOS, 1769-L38ERMO, 1769-L38ERMOS

1769 Packaged Controller Catalog Numbers

1769-L23-QBFC1B, 1769-L23E-QB1B, 1769-L23E-QBFC1B

1769 Modular Controller Catalog Numbers

1769-L31, 1769-L32C, 1769-L35CR, 1769-L32E, 1769-L32EK, 1769-L35E

1768 Controller Catalog Numbers

1768-L43, 1768-L43S, 1768-L45, 1768-L45S

Memory Card Catalog Numbers

1784-CF128, 1784-SD1, 1784-SD2

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Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes.

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CompactLogix Controllers Environmental Specifications

Environmental Specifications - 1769 CompactLogix Controllers and Compact GuardLogix 5370 Controllers

Attribute	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L18ERM-BB1BK, 1769-L19ER-BB1B, 1769-L19ER-BB1BK	1769-L24ER-QB1B, 1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK, 1769-L27ERM-QBFC1B	1769-L30ER, 1769-L30ER-NSE, 1769-L30ERK, 1769-L30ERM, 1769-L30ERMK, 1769-L33ER, 1769-L33ERK, 1769-L33ERM, 1769-L33ERMK, 1769-L36ERM, 1769-L37ERM, 1769-L37ERMK, 1769-L38ERM, 1769-L38ERMK	1769-L30ERMS, 1769-L33ERMS, 1769-L33ERMSK, 1769-L36ERMS, 1769-L37ERMS, 1769-L37ERMSK, 1769-L38ERMS, 1769-L38ERMSK	1769-L23-QBFC1B, 1769-L23E-QB1B, 1769-L23E-QBFC1B	1769-L31, 1769-L32C, 1769-L35CR, 1769-L32E, 1769-L32EK, 1769-L35E
Temperature, operating IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Na, Operating Thermal Shock)	-20...+60 °C (-4...+140 °F)	0...60 °C (32...140 °F)				
Temperature, storage IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock)	-40...+85 °C (-40...+185 °F)					
Temperature, surrounding air, max	60 °C (140 °F)					
Relative humidity IEC 60068-2-30 (Test Db, Unpackaged Damp Heat)	5...95% noncondensing					
Vibration IEC 60068-2-6 (Test Fc, Operating)	2 g @ 10...500 Hz ⁽¹⁾		5 g @ 10...500 Hz		5 g @ 10...500 Hz	
Shock, operating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	30 g ⁽¹⁾		20 g - DIN rail 30 g - Panel		20 g - DIN rail 30 g - Panel	
Shock, nonoperating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	50 g ^{(1), (2)}		30 g - DIN rail 40 g - Panel		30 g - DIN rail 40 g - Panel	
Emissions CISPR 11	IEC 61000-6-4					
ESD immunity IEC 61000-4-2	6 kV contact discharges 8 kV air discharges			4 kV contact discharges 8 kV air discharges		6 kV contact discharges 8 kV air discharges
Radiated RF immunity IEC 61000-4-3	10V/m with 1 kHz sine wave 80% AM from 80...6000 MHz			10V/m with 200 Hz 50% Pulse 100% AM at 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM at 1890 MHz 10V/m with 1 kHz sine wave 80% AM from 80...2000 MHz 10V/m with 1 kHz sine wave 80% AM from 2000...2700 MHz		1769-L31, 1769-L32C, 1769-L35CR 10V/m with 1 kHz sine wave 80% AM from 80...2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 1890 MHz 1769-L32E, 1769-L35E 10V/m with 1 kHz sine wave 80% AM from 80...2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 1890 MHz 3V/m with 1 kHz sine wave 80% AM from 2000...2700 MHz

Environmental Specifications - 1769 CompactLogix Controllers and Compact GuardLogix 5370 Controllers (Continued)

Attribute	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L18ERM-BB1BK, 1769-L19ER-BB1B, 1769-L19ER-BB1BK	1769-L24ER-QB1B, 1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK, 1769-L27ERM-QBFC1B	1769-L30ER, 1769-L30ER-NSE, 1769-L30ERK, 1769-L30ERM, 1769-L30ERMK, 1769-L33ER, 1769-L33ERK, 1769-L33ERM, 1769-L33ERMK, 1769-L37ERM, 1769-L37ERMK, 1769-L38ERM, 1769-L38ERMK	1769-L30ERMS, 1769-L33ERMS, 1769-L33ERMSK, 1769-L36ERMS, 1769-L37ERMS, 1769-L37ERMSK, 1769-L38ERMS, 1769-L38ERMSK	1769-L23-QBFC1B, 1769-L23E-QB1B, 1769-L23E-QBFC1B	1769-L31, 1769-L32C, 1769-L35CR, 1769-L32E, 1769-L32EK, 1769-L35E
EFT/B immunity IEC 61000-4-4	±3 kV at 5 kHz on power ports ±3 kV at 5 kHz on signal ports ±3 kV at 5 kHz on communication ports		±3 kV at 5 kHz on communication ports	±3 kV at 5 kHz on communication ports ±4 kV at 5 kHz on Protective Earth (PE)	±2 kV at 5 kHz on power ports ±2 kV at 5 kHz on signal ports ±2 kV at 5 kHz on communication ports	1769-L31, 1769-L32C, 1769-L35CR ±2 kV at 5 kHz on communication ports 1769-L32E, 1769-L35E ±3 kV at 5 kHz on power ports ±3 kV at 5 kHz on communication ports
Surge transient immunity IEC 61000-4-5	±1 kV line-line (DM) and ±2 kV line-earth (CM) on power ports ±1 kV line-line (DM) and ±2 kV line-earth (CM) on signal ports ±2 kV line-earth (CM) on communication ports	±1 kV line-line (DM) and ±2 kV line-earth (CM) on power ports ±1 kV line-line (DM) and ±2 kV line-earth (CM) on signal ports ±2 kV line-earth (CM) on shielded ports ±2 kV line-earth (CM) on communication ports	±2 kV line-earth (CM) on communication ports		±1 kV line-line (DM) and ±2 kV line-earth (CM) on power ports ±1 kV line-line (DM) and ±2 kV line-earth (CM) on signal ports ±2 kV line-earth (CM) on shielded ports ±2 kV line-earth (CM) on communication ports	1769-L31 Channel 0: ±2 kV line-earth (CM) on shielded ports Channel 1: ±1 kV line-earth (CM) on shielded ports 1769-L32C, 1769-L35CR, 1769-L32E, 1769-L35E ±2 kV line-earth (CM) on communication ports
Conducted RF immunity IEC 61000-4-6	10V rms with 1 kHz sine wave 80% AM from 150 kHz...80 MHz					

- (1) If you're mounting a CompactLogix™ 5370 L1 controller on an EN 50 022 - 35 x 15 mm (1.38 x 0.59 in.) DIN rail, you must first adhere a bumper on the back of the controller. Failure to install the bumper before mounting the controller causes the system to fail to meet this specification. For more information, see the CompactLogix 5370 Controllers User Manual, publication [1769-UM021](#).
- (2) If you're mounting a CompactLogix 5370 L1 controller on an EN 50 022 - 35 x 15 mm (1.38 x 0.59 in.) DIN rail, the Shock, nonoperating specification = 30 g.

Environmental Specifications - Armor CompactLogix and Armor Compact GuardLogix Controllers

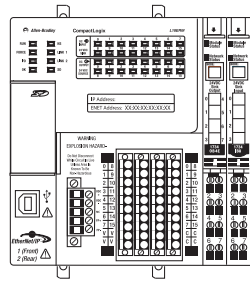
Feature	1769-L33ERMO, 1769-L36ERMO, 1769-L37ERMO, 1769-L38ERMO	1769-L33ERMOS, 1769-L36ERMOS, 1769-L37ERMOS, 1769-L38ERMOS
Temperature, operating IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Na, Operating Thermal Shock)	0 °C < Ta < 60 °C (32 °F < Ta < 140 °F)	
Temperature, ambient, max	60 °C (140 °F)	
Temperature, nonoperating IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock)	-40...+85 °C (-40...+185 °F)	
Relative humidity IEC 60068-2-30 (Test Db, Unpackaged Damp Heat)	5...95% noncondensing	
Vibration IEC 60068-2-6 (Test Fc, Operating)	2 g @ 10...500 Hz	
Shock, operating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	30 g	
Shock, nonoperating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	30 g	
Emissions	IEC 61000-6-4	
ESD immunity IEC 61000-4-2	6 kV contact discharges 8 kV air discharges	
Radiated RF immunity IEC 61000-4-3	10V/m with 1 kHz sine wave 80% AM from 80...6000 MHz	
EFT/B immunity IEC 61000-4-4	±3 kV at 5/100 kHz on power ports ±3 kV at 5/100 kHz on Ethernet ports	
Surge transient immunity IEC 61000-4-5	±1 kV line-line (DM) and ± 2 kV line-earth (CM) on power ports ±2 kV line-earth (CM) on Ethernet ports	
Conducted RF immunity IEC 61000-4-6	10V rms with 1 kHz sine wave 80% AM from 150 kHz...80 MHz	

Environmental Specifications - 1768-CompactLogix Controllers

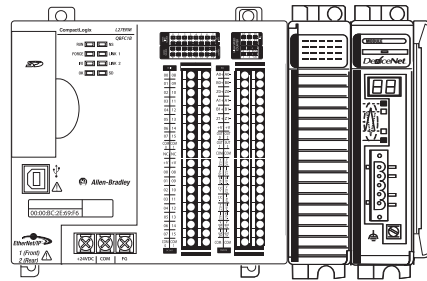
Attribute	1768-L43, 1768-L43S, 1768-L45, 1768-L45S
Temperature, operating IEC 60068-2-1 (Test Ad, Operating Cold), IEC 60068-2-2 (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Na, Operating Thermal Shock)	0...60 °C (32...140 °F)
Temperature, storage IEC 60068-2-1 (Test Ab, Unpackaged Nonoperating Cold), IEC 60068-2-2 (Test Bb, Unpackaged Nonoperating Dry Heat), IEC 60068-2-14 (Test Na, Unpackaged Nonoperating Thermal Shock)	-40...+85 °C (-40...+185 °F)
Temperature, surrounding air, max	60 °C (140 °F)
Relative humidity IEC 60068-2-30 (Test Db, Unpackaged Damp Heat)	5...95% noncondensing
Vibration IEC 60068-2-6 (Test Fc, Operating)	5 g @ 10...500 Hz
Shock, operating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	30 g
Shock, nonoperating IEC 60068-2-27 (Test Ea, Unpackaged Shock)	50 g
Emissions CISPR 11	IEC 61000-6-4
ESD immunity IEC 61000-4-2	6 kV contact discharges 8 kV air discharges
Radiated RF immunity IEC 61000-4-3	10V/m with 1 kHz sine wave 80% AM from 80...2000 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 900 MHz 10V/m with 200 Hz 50% Pulse 100% AM @ 1890 MHz 3V/m with 1 kHz sine wave 80% AM from 2000...2700 MHz
EFT/B immunity IEC 61000-4-4	±4 kV at 5 kHz on communication ports
Surge transient immunity IEC 61000-4-5	±2 kV line-earth (CM) on communication ports
Conducted RF immunity IEC 61000-4-6	10V rms with 1 kHz sine wave 80% AM from 150 kHz...80 MHz

CompactLogix 5370 Controllers

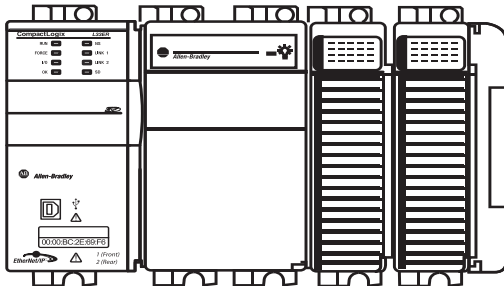
CompactLogix 5370 L1 Control System



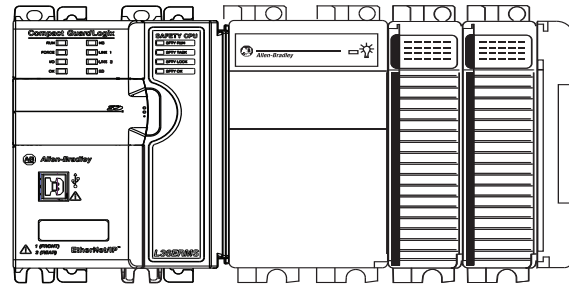
CompactLogix 5370 L2 Control System



CompactLogix 5370 L3 Control System



Compact GuardLogix 5370 Control System



CompactLogix 5370 controllers provide scalable controller solutions to address a wide variety of applications. All CompactLogix 5370 controllers provide the following functionality:

- Two Ethernet ports
- One USB port
- Support for local expansion modules
- Control of local and distributed I/O modules
- Use of 1784-SD1 or 1784-SD2 Secure Digital (SD) card for nonvolatile memory
- A battery is no longer necessary because of the internal energy-storage solution

Some CompactLogix 5370 controllers provide the following functionality:

- Built-in power supply
- Some combination of embedded digital, analog, and high-speed counter modules
- Support for Integrated Motion over an EtherNet/IP™ network
- Access to DeviceNet® networks

The Compact GuardLogix® controller is a 1769-L3 CompactLogix controller that provides safety control to achieve SIL CL 3 according to EN62061 / EN 61511-1 / IEC 61508 and PLe according to EN ISO 13849-1. A major benefit of this system is that it's still one project, safety and standard together.

Application	Description
SIL 1, 2, 3	<p>The Compact GuardLogix controller system is type-approved and certified for use in safety applications up to and including SIL 3 according to IEC 61508, and applications up to and including PLe/Cat.4 according to ISO 13849-1. For more information, see the following:</p> <ul style="list-style-type: none"> • GuardLogix 5570 and Compact GuardLogix 5370 Controllers Systems Safety Reference Manual, publication 1756-RM099 • Compact GuardLogix 5370 Controllers User Manual, publication 1769-UM002 • GuardLogix Safety Application Instruction Set Reference Manual, publication 1756-RM095

During development, safety and standard have the same rules. The following are allowed:

- Multiple programmers
- Online editing
- Forcing

Once the project is tested and ready for final validation, you apply the safety application signature and safety-lock the application. This process sets the safety task to a SIL 3 integrity level. The Compact GuardLogix enforces the SIL 3 integrity level. When safety memory is locked and protected, the safety logic can't be modified and all safety functions operate with SIL 3 integrity. On the standard side of the Compact GuardLogix controller, all functions operate like a regular Logix controller. Thus online editing, forcing, and other activities are all allowed.

Standard logic and external devices, like HMIs or other controllers, can read safety memory with this level of integration. This level of integration removes the need to condition safety memory for use elsewhere. The result is easy systemwide integration and the ability to display safety status on displays or marquees. Use Guard I/O™ modules for field device connectivity. For safety interlocking between Compact GuardLogix controllers, use Ethernet or ControlNet® networks. Multiple Compact GuardLogix controllers can share safety data for zone to zone interlocking, or one Compact GuardLogix controller can use remote distributed safety I/O between different cells/areas.

Features - CompactLogix 5370 Controllers and Compact GuardLogix 5370 Controllers

Feature	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L18ERM-BB1BK, 1769-L19ER-BB1B, 1769-L19ER-BB1BK	1769-L24ER-0B1B, 1769-L24ER-0BFC1B, 1769-L24ER-0BFC1BK, 1769-L27ERM-0BFC1B	1769-L30ER, 1769-L30ER-NSE, 1769-L30ERK, 1769-L30ERM, 1769-L30ERMK, 1769-L33ER, 1769-L33ERK, 1769-L33ERM, 1769-L33ERMK, 1769-L36ERM, 1769-L37ERM, 1769-L37ERMK, 1769-L38ERM, 1769-L38ERMK	1769-L30ERMS, 1769-L33ERMS, 1769-L33ERMK, 1769-L36ERMS, 1769-L37ERMS, 1769-L37ERMK, 1769-L38ERMS, 1769-L38ERMK
Controller tasks: • Continuous • Periodic	<ul style="list-style-type: none"> 32 tasks 100 programs/task 			
Built-in communication ports	<ul style="list-style-type: none"> Two Ethernet ports - CompactLogix 5370 controllers have two Ethernet ports to connect to an EtherNet/IP network. The ports carry the same network traffic as part of the embedded switch of the controller. However, the controller uses only one IP address. One USB port (only for temporary connection) 			
Communication options	EtherNet/IP	<ul style="list-style-type: none"> EtherNet/IP DeviceNet via 1769-SDN scanner 		
EtherNet/IP node, max	<ul style="list-style-type: none"> 1769-L16ER-BB1B: Up to 4 nodes 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L18ERM-BB1BK, 1769-L19ER-BB1B, 1769-L19ER-BB1BK: Up to 8 nodes 	<ul style="list-style-type: none"> 1769-L24ER-0B1B, 1769-L24ER-0BFC1B, 1769-L24ER-0BFC1BK: Up to 8 nodes 1769-L27ERM-0BFC1B: Up to 16 nodes 	<ul style="list-style-type: none"> 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERK, 1769-L30ERM, 1769-L30ERMK, 1769-L33ERMS: Up to 16 nodes 1769-L33ER, 1769-L33ERK, 1769-L33ERM, 1769-L33ERMK, 1769-L33ERMS, 1769-L33ERMK: Up to 32 nodes 1769-L36ERM, 1769-L36ERMS: Up to 48 nodes 1769-L37ERM, 1769-L37ERMK, 1769-L37ERMS, 1769-L37ERMK: Up to 64 nodes 1769-L38ERM, 1769-L38ERMK, 1769-L38ERMS, 1769-L38ERMK: Up to 80 nodes 	
Controller connections	256			
Embedded I/O modules	<ul style="list-style-type: none"> 16 DC digital inputs 16 DC digital outputs 	<p>All controllers:</p> <ul style="list-style-type: none"> 16 DC digital inputs 16 DC digital outputs <p>Only 1769-L24ER-0BFC1B, 1769-L24ER-0BFC1BK, and 1769-L27ERM-0BFC1B:</p> <ul style="list-style-type: none"> 4 high-speed counter modules 4 high-speed counter module outputs 4 universal analog inputs 2 analog output points 	-	
Sockets, max	32			
Integrated Motion over an EtherNet/IP network	1769-L18ERM-BB1B, 1769-L18ERM-BB1BK: 1 or 2 axes	1769-L27ERM-0BFC1B - As many as 4 axes	<ul style="list-style-type: none"> 1769-L30ERM, 1769-L30ERMK, 1769-L30ERMS: As many as 4 axes 1769-L33ERM, 1769-L33ERMK, 1769-L33ERMS, 1769-L33ERMK: As many as 8 axes 1769-L36ERM, 1769-L36ERMS: As many as 16 axes 1769-L37ERM, 1769-L37ERMK, 1769-L37ERMS, 1769-L37ERMK: As many as 16 axes 1769-L38ERM, 1769-L38ERMK, 1769-L38ERMS, 1769-L38ERMK: As many as 16 axes 	
Programming languages	<ul style="list-style-type: none"> Relay ladder⁽¹⁾ Structured Text Function block SFC 			
Integrated safety	-			Yes

(1) The Compact GuardLogix 5370 controllers support only the relay ladder programming language in the safety task. The Compact GuardLogix 5370 controllers support all listed programming languages in the standard task.

Technical Specifications - CompactLogix 5370 Controllers and Compact GuardLogix 5370 Controllers

Attribute	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L18ERM-BB1BK, 1769-L19ER-BB1B, 1769-L19ER-BB1BK	1769-L24ER-QB1B, 1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK, 1769-L27ERM-QBFC1B	1769-L30ER, 1769-L30ER-NSE, 1769-L30ERK, 1769-L30ERM, 1769-L30ERMK, 1769-L33ER, 1769-L33ERK, 1769-L33ERM, 1769-L33ERMK, 1769-L36ERM, 1769-L37ERM, 1769-L37ERMK, 1769-L38ERM, 1769-L38ERMK	1769-L30ERMS, 1769-L33ERMS, 1769-L33ERMK, 1769-L36ERMS, 1769-L37ERMS, 1769-L37ERMK, 1769-L38ERMS, 1769-L38ERMK
User memory	<ul style="list-style-type: none"> 1769-L16ER-BB1B: 384 KB 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L18ERM-BB1BK: 512 KB 1769-L19ER-BB1B, 1769-L19ER-BB1BK: 1 MB 	<ul style="list-style-type: none"> 1769-L24ER-QB1B, 1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK: 750 KB 1769-L27ERM-QBFC1B: 1 MB 	<ul style="list-style-type: none"> 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERK, 1769-L30ERM, 1769-L30ERMK: 1 MB 1769-L33ER, 1769-L33ERK, 1769-L33ERM, 1769-L33ERMK: 2 MB 1769-L36ERM: 3 MB 1769-L37ERM, 1769-L37ERMK: 4 MB 1769-L38ERM, 1769-L38ERMK: 5 MB 	<ul style="list-style-type: none"> 1769-L30ERMS: 1 MB standard + 0.5 MB safety 1769-L33ERMS, 1769-L33ERMK: 2 MB standard + 1 MB safety 1769-L36ERMS: 3 MB standard + 1.5 MB safety 1769-L37ERMS, 1769-L37ERMK: 4 MB standard + 1.5 MB safety 1769-L38ERMS, 1769-L38ERMK: 5 MB standard + 1.5 MB safety
Optional nonvolatile memory	1784-SD1 card with 1 Gb of available memory (shipped with controller) 1784-SD2 card with 2 Gb of available memory (available for separate ordering)			
Number of local expansion modules, max ⁽¹⁾	<ul style="list-style-type: none"> 1769-L16ER-BB1B: 6 - 1734 POINT I/O™ modules 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L18ERM-BB1BK, 1769-L19ER-BB1B, 1769-L19ER-BB1BK: 8 - 1734 POINT I/O modules 	4 - 1769 Compact I/O™ modules	<ul style="list-style-type: none"> 1769-L30ER, 1769-L30ER-NSE, 1769-L30ERK, 1769-L30ERM, 1769-L30ERMK, 1769-L30ERMS: 8 - 1769 Compact I/O modules 1769-L33ER, 1769-L33ERK, 1769-L33ERM, 1769-L33ERMK, 1769-L33ERMS, 1769-L33ERMK: 16 - 1769 Compact I/O modules 1769-L36ERM, 1769-L36ERMS: 30 - 1769 Compact I/O modules 1769-L37ERM, 1769-L37ERMK, 1769-L37ERMS, 1769-L37ERMK: 31 - 1769 Compact I/O modules 1769-L38ERM, 1769-L38ERMK, 1769-L38ERMS, 1769-L38ERMK: 31 - 1769 Compact I/O modules 	
Number of I/O module banks, max	-	1	3	
Current draw @ 5V DC, controller power	1 A	<ul style="list-style-type: none"> 1769-L24ER-QB1B: 1.54 A Value rated at the following ambient temperatures: 40 °C (104 °F), 55 °C (131 °F), 60 °C (140 °F). 1769-L24ER-QBFC1B and 1769-L27ERM-QBFC1B: 1 A Value rated at the following ambient temperatures: 40 °C (104 °F), 55 °C (131 °F), 60 °C (140 °F). 	500 mA	850 mA
Current draw @ 24V DC, controller power	-	<ul style="list-style-type: none"> 1769-L24ER-QB1B: 0.95 A Value rated at the following ambient temperatures: 40 °C (104 °F), 55 °C (131 °F), 60 °C (140 °F). 1769-L24ER-QBFC1B and 1769-L27ERM-QBFC1B: 0.8 A Value rated at the following ambient temperatures: 40 °C (104 °F), 55 °C (131 °F), 60 °C (140 °F). 	225 mA	700 mA
Current draw @ 24V DC, field power, max	3 A - Combined total for all devices that draw current from field power connections Input: 5 mA Output: 500 mA		-	
Power dissipation, max	11.5 W	<ul style="list-style-type: none"> 1769-L24ER-QB1B: 12 W 1769-L24ER-QBFC1B, L27ERM-QBFC1B: 21 W 	4.5 W	6.5 W
Isolation voltage	50V (continuous), Basic Insulation Type Tested at 500V AC for 60 s, System to Field	30V (continuous), Basic Insulation Type, USB to system, Ethernet to system and Ethernet to Ethernet Type tested at 500V AC for 60 s		50V, Basic Insulation Type Tested at 500V AC for 60 s, System to Communication ports.
Short circuit protection, field power	Internal fuse, Non-replaceable		-	
Recommended external short circuit protection, field power	User-provided 4...5 A @ 3.15...5.5 A ² t fuse		-	
Weight, approx	0.66 kg (1.5 lb)	<ul style="list-style-type: none"> 1769-L24ER-QB1B = 0.63 kg (1.39 lb) 1769-L24ER-QBFC1B and 1769-L27ERM-QBFC1B = 0.9 kg (1.9 lb) 	0.31 kg (0.68 lb)	0.54 kg (1.18 lb)

Technical Specifications – CompactLogix 5370 Controllers and Compact GuardLogix 5370 Controllers (Continued)

Attribute	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L18ERM-BB1BK, 1769-L19ER-BB1B, 1769-L19ER-BB1BK	1769-L24ER-QB1B, 1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK, 1769-L27ERM-QBFC1B	1769-L30ER, 1769-L30ER-NSE, 1769-L30ERK, 1769-L30ERM, 1769-L30ERMK, 1769-L33ER, 1769-L33ERK, 1769-L33ERM, 1769-L33ERMK, 1769-L36ERM, 1769-L37ERM, 1769-L37ERMK, 1769-L38ERM, 1769-L38ERMK	1769-L30ERMS, 1769-L33ERMS, 1769-L33ERMSK, 1769-L36ERMS, 1769-L37ERMS, 1769-L37ERMSK, 1769-L38ERMS, 1769-L38ERMSK
Module width	100.00 mm (3.94 in.)	<ul style="list-style-type: none"> 1769-L24ER-QB1B = 115.00 mm (4.53 in.) 1769-L24ER-QBFC1B and 1769-L27ERM-QBFC1B = 140 mm (5.51 in.) 	55.00 mm (2.17 in.)	89.00 mm (3.50 in.)
Module location	DIN rail mount	DIN rail or panel mount		
Panel-mounting screw torque	–	1.1...1.8 N•m (10...16 lb•in) - use M4 or #8 screws		
Embedded power supply	24V DC input, isolated	24V DC Input, isolated	1769-PA2, 1769-PB2, 1769-PA4, 1769-PB4	
Power supply distance rating	–	–	<ul style="list-style-type: none"> Controller and 1769-SDN: 4 1769 Compact I/O modules: 4...8, depending on module 	4 (3 I/O modules between controller and power supply)
Wire category ⁽²⁾	1 - signal ports 1 - power ports 2 - communication ports		2 - communication ports	
Wire type, Ethernet	RJ45 connector according to IEC 60603-7, 2 or 4 pair Category 5e minimum cable according to TIA 568 B.1 or Category 5 cable according to ISO/IEC 24702			
Wire type, power terminals, and embedded I/O connections	Copper		–	
Wire size, power terminals ⁽³⁾	0.051...3.31 mm ² (30...12 AWG) solid or stranded copper wire rated at 90 °C (194 °F), or greater, 1.2 mm (3/64 in.) insulation, max Each terminal accepts 1 or 2 wires	0.25...2.50 mm ² (22...14 AWG) solid copper wire rated at 75 °C (167 °F), or greater 1.2 mm (3/64 in.) insulation, max Each terminal accepts only 1 wire	–	
Wire stripping length, power terminals ⁽³⁾	10 mm (0.39 in)	8 mm (0.31 in)	–	
Screw torque, power terminals ⁽³⁾	0.5...0.6 N•m (4.4...5.3 lb•in)	1.0...1.2 N•m (8.9...10.6 lb•in)	–	
Wire size, embedded I/O connections	0.205...1.31 mm ² (24...16 AWG) solid or stranded copper wire rated at 90 °C (194 °F), or greater 1.2 mm (3/64 in.) insulation, max or 90 °C (194 °F) Each terminal accepts only 1 wire		–	
Wire stripping length, embedded I/O connections	10 mm (0.39 in)		–	
North American temperature code	T4A	T3C	T5	
IECEx temperature code	–	T4	–	
UKEX/ATEX temperature code	T4		T5	
Enclosure type rating	None (open-style)			

(1) You can use up to the maximum number of local expansion modules with the CompactLogix 5370 L1 controllers that are listed. This condition applies only if the total current drawn by the embedded I/O and local expansion modules does not exceed both the available POINTBus™ backplane current of 1 A and the field power current of 3 A. For more information on POINTBus backplane current and field-power current considerations when installing local expansion modules, see [page 13](#).

(2) Use this Conductor Category information for planning conductor routing. See the Industrial Automation Wiring and Grounding Guidelines, publication [1770-4.1](#) and the appropriate system-level installation manual.

(3) In regard to the CompactLogix 5370 L1 controllers, this specification applies to connecting wires to the power connector that is inserted in the controller. In regard to the CompactLogix 5370 L2 controllers, this specification applies to connecting wires to power terminals built into the controller.

Real-time Clock Accuracy

This table lists the real-time clock accuracy specifications for the CompactLogix 5370 controllers.

Ambient Temperature	Accuracy
0 °C (32 °F)	-143...+42 s/mo
25 °C (77 °F)	-78...+91 s/mo
40 °C (104 °F)	-101...+73 s/mo
60 °C (140 °F)	-204...-4.50 s/mo

Real-time Clock Hold-up Times

This table lists the typical real-time clock hold-up specifications for the CompactLogix 5370 controllers.

IMPORTANT The values in this table are typical and can vary with some CompactLogix 5370 control systems.

Ambient Temperature	Holdup Time, Typical
0 °C (32 °F)	40 days
25 °C (77 °F)	35 days
40 °C (104 °F)	28 days
60 °C (140 °F)	16 days

The I/O module support for CompactLogix 5370 controller systems varies by controller.

I/O Module Support - CompactLogix 5370 L1 Controllers

The CompactLogix 5370 L1 controllers offer an embedded I/O module and the option to use 1734 POINT I/O modules as local expansion modules.

The embedded I/O module provides the following:

- 16 sinking 24V DC digital input points
- 16 sourcing 24V DC digital output points

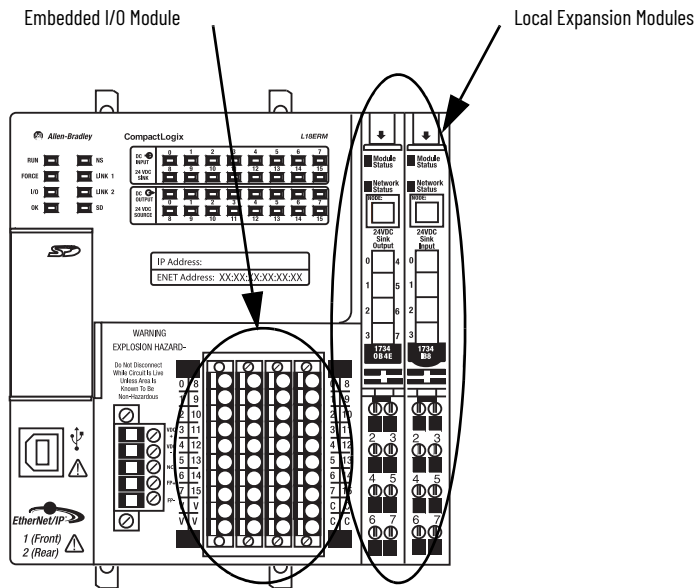
To use 1734 POINT I/O modules as local expansion modules, keep in mind the following:

- Local expansion modules must be installed in the same system as the CompactLogix 5370 L1 controller.
- The modules are installed to the right of the controller.
- The maximum number of local expansion modules available depends on the controller catalog of that system.

This table lists the number of 1734 POINT I/O modules the CompactLogix 5370 L1 controllers support. The minimum RPI of each I/O module is 1.0 ms and can be changed by 0.5 ms increments. You can use the maximum number of 1734 POINT I/O modules with these CompactLogix 5370 L1 controllers. The total current that the embedded I/O and local expansion modules draw can't exceed both the available POINTBus backplane current of 1 A and the field power current of 3 A.

1769-L1 Controllers - Local I/O Module Support

Cat. No.	Local 1734 POINT I/O Modules Supported, max
1769-L16ER-BB1B	6
1769-L18ER-BB1B	8
1769-L18ERM-BB1B, 1769-L18ERM-BB1BK	
1769-L19ER-BB1B, 1769-L19ER-BB1BK	



Depending on the configuration of your application, you can use one of the following devices to make additional POINTBus backplane current or field power current available:

- **1734-EP24DC POINT I/O Expansion Power Supply** - An expansion power supply is installed between embedded I/O modules and local expansion modules or between local expansion modules.

The expansion power supply breaks the available POINTBus backplane current between the modules to its left and right. With the expansion power supply installed, the modules to its left can draw up to 1 A of POINTBus backplane current. The modules to the right of the expansion power supply can draw as much current as the current provided by the expansion power supply.

Additionally, the expansion power supply breaks the available field power current between the modules to its left and right. With the expansion power supply installed, the modules to its left can draw up to 3 A of field power current. The modules to the right of the expansion power supply can draw as much field power current as allowed by the expansion power supply.

For more information on the 1734-EP24DC expansion power supply, see the POINT I/O 24V DC Expansion Power Supply Installation Instructions, publication [1734-IN058](#).

- **1734-FPD POINT I/O Field Power Distributor Module** - A field power distributor module can also be installed between embedded I/O modules and local expansion modules or between local expansion modules.

The field power distributor module breaks the available field power current between the modules to its left and right. With the field power distributor module installed, the modules to its left can draw up to 3 A of field power current. The modules to the right of the field power distributor can draw as much field power current as allowed by the field power distributor.

For more information on the 1734-FPD POINT I/O Field Power Distributor module, see the POINT I/O Field Power Distributor Module Installation Instructions, publication [1734-IN059](#).

IMPORTANT Remember, the field power distributor module changes only the level of field power current available in the system. The module does not affect the level of POINTBus backplane current available.

Local I/O Performance of the CompactLogix 5371 L1 Controllers

The requested packet interval (RPI) defines the frequency at which the controller sends data to and receives data from I/O modules. You set an RPI rate for each I/O module in your system.

CompactLogix 5370 L1 controllers always attempt to scan an I/O module at the configured RPI rate. For individual I/O modules, a Module RPI Overlap minor fault occurs if there are enough I/O modules with RPI rates set too fast that they can't all be serviced in the allotted interval.

The specific configuration parameters for a system determine the impact on actual RPI rates. These configuration factors can impact the effective scan frequency for any individual module:

- Rates at which the RPI rates of other 1734 POINT I/O modules are set
- Number of other 1734 POINT I/O modules in the system
- Types of other 1734 POINT I/O modules in the system
- Application user task priorities

In general, follow these guidelines when setting the RPI rates in a CompactLogix 5370 L1 control system:

- For **digital** modules:
 - 1...2 modules can be scanned in 2 ms.
 - 3...4 modules can be scanned in 4 ms.
 - 5...8 modules can be scanned in 8 ms.

IMPORTANT When considering digital I/O modules, remember that they can be the embedded I/O module on the controller or 1734 POINT I/O modules that are used as local expansion modules. Therefore, the consideration for using two modules can be the embedded I/O module and a 1734 POINT I/O module or two 1734 POINT I/O modules.

- For **specialty and analog** modules (except 1734-485ASC modules):
 - 1 module can be scanned at 20 ms.
 - For each additional module, add 20 ms.

For example, if a CompactLogix 5370 L1 control system uses two analog modules, the module can be scanned in 40 ms.

- For **1734-485ASC** modules, the total data size for all ASC modules determines the RPI rates:
 - For total data size less than 20 bytes, each module can be scanned in 20 ms.
 - For data size greater than 20 bytes, use the size value as the RPI.

For example, if the total data size is 40 bytes, each ASC module can be scanned in 40 ms.

You aren't required to set the RPI values of an individual 1734 POINT I/O module to the values listed previously. For example, if your application scans one or two modules, you do not have to use RPI rates of 2 ms. Remember, though, that higher RPI rates result in scanning the data less frequently.

The RPI shows how quickly modules can be scanned, not how quickly an application can use the data. The RPI is asynchronous to the program scan. Other factors, such as program execution duration, affect I/O throughput.

Embedded DC Input Specifications

Attribute	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L18ERM-BB1BK, 1769-L19ER-BB1B, 1769-L19ER-BB1BK
Inputs	16
Voltage category	24V DC sink
Operating voltage range	10...28.8V DC 24V DC nom
Digital filter, off to on	0.5 ms hardware plus 0...65 ms (selectable)
Input delay, off to on	
Digital filter, on to off	0.5 ms hardware plus 0...65 ms (selectable)
Input delay, on to off	
Off-state voltage, max	5V DC
Off-state current, max	1 mA
On-state current, min	2 mA @ 24V DC
Input impedance, max	5.4 k Ω
Cyclic update time	1...750 ms
Isolation voltage	50V DC (continuous), Basic Insulation Type Tested at 500V AC for 60 s, system to field No isolation between individual channels
IEC input compatibility	Type 3
Isolated groups	None

Embedded DC Output Specifications

Attribute	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L18ERM-BB1BK, 1769-L19ER-BB1B, 1769-L19ER-BB1BK
Outputs	16
Voltage category	24V DC source
Operating voltage range	10...28.8V DC 24V DC nom
Output delay, off to on	0.1 ms
Output delay, on to off	0.1 ms
Off-state leakage current, max	0.5 mA @ 24V DC
On-state current, min	1 mA per channel
On-state voltage drop, max	0.6V DC
Current per point, max	0.5 A
Current per module, max	3 A
Surge current per point, max	1 A for 100 ms per point, repeatable every 2 s
Isolation voltage	50V DC (continuous), Basic Insulation Type Tested at 500V AC for 60 s, system to field No isolation between individual channels
Isolated groups	None
Pilot duty rating	0.5 A

Embedded Power Supply

Attribute	1769-L16ER-BB1B, 1769-L18ER-BB1B, 1769-L18ERM-BB1B, 1769-L18ERM-BB1BK, 1769-L19ER-BB1B, 1769-L19ER-BB1BK
Input voltage range	10...28.8V DC
Input voltage, nom	24V DC
Line requirement (VDC), min	30VA
Available 5V DC POINTBus backplane current	1 A @ 5V DC
Current draw @ 24V DC, field power, max	3 A ⁽¹⁾
Inrush, max	10 A
Line loss ride-through	10 ms...10 s
Output bus current capacity, max	0.1...3 A @ 5V DC
Load current, min	300 mA
Power dissipation, max	12 W
Short circuit protection	Internal fuse Not replaceable
Overvoltage protection	Yes

(1) Combined total for all devices that draw current from field power connections.

I/O Module Support - CompactLogix 5370 L2 Controllers

The CompactLogix 5370 L2 controllers offer embedded I/O modules and the option to use 1769 Compact I/O modules as local expansion modules. This table describes the embedded I/O modules and local expansion modules that the CompactLogix 5370 L2 controllers support.

Cat. No.	Embedded I/O Module Support						Local Expansion Modules Support
	Sinking/Sourcing 24V DC Digital Input Points	Sourcing 24V DC Digital Output Points	High-speed Counter Modules	High-speed Counter Module Output Points	Universal Analog Input Points	Analog Output Points	1769 Compact I/O Modules
1769-L24ER-QB1B	16	16	-	-	-	-	As many as 4 modules
1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK			4	4	4	2	
1769-L27ERM-QBFC1B							

IMPORTANT

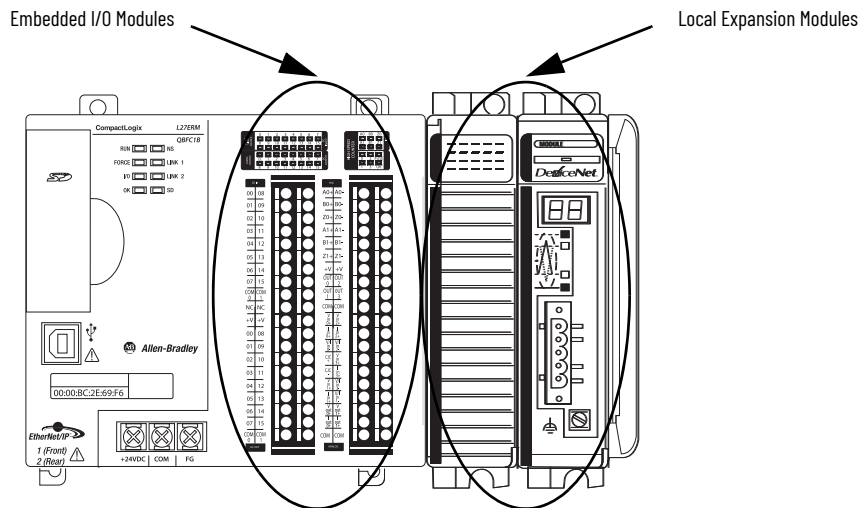
Remember the following when using the embedded I/O modules on CompactLogix 5370 L2 controllers:

- 1769-L24ER-QB1B controller - The digital input points and digital output points are on one embedded I/O module. Therefore, the 1769-L24ER-QB1B controller is considered to have one embedded I/O module.
- 1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK, and 1769-L27ERM-QBFC1B controllers - The digital input points and digital output points are on one embedded I/O module. The high-speed counter module input/output points, universal analog input points, and analog output points are on another single embedded I/O module. Therefore, the 1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK, and 1769-L27ERM-QBFC1B controllers are considered to have two embedded I/O modules.

You configure an RPI rate for the embedded I/O modules to establish specific time intervals at which data is transmitted between the controller and the embedded I/O modules. The available RPI range of the embedded I/O modules is 0.5... 750.0 ms and can be changed by 0.5 ms increments. The default setting is 20 ms.

To use 1769 Compact I/O modules as local expansion modules, keep in mind the following:

- Local expansion modules must be installed in the same system as the CompactLogix 5370 L2 controller.
- Local expansion modules are installed to the right of the embedded I/O modules.
- You must install a 1769-ECR Compact I/O end cap on the right side of the control system. The end cap can be installed on the right side of the embedded I/O module. If local expansion modules are used, the end cap can be installed on the right side of the 1769 Compact I/O module.



CompactLogix 5370 L2 Controller Local I/O Performance

The Requested Packet Interval (RPI) defines the frequency at which the controller sends data to and receives data from I/O modules. You set an RPI rate for each I/O module in your system in the programming software. You also set RPI rates through the programming software for embedded I/O modules, local expansion modules, and distributed I/O modules over an EtherNet/IP network.

The CompactLogix 5370 L2 controllers always attempt to scan an I/O module at the configured RPI rate. The controller scans distributed I/O modules at the configured RPI rates.

With embedded I/O modules and local expansion modules, however, some specific system-configuration parameters determine the actual rate at which the controller scans the modules. That is, the controller can be configured to scan an I/O module at one rate, but actually scan the module at another rate.

For individual I/O modules, a Module RPI Overlap minor fault occurs if there is at least one I/O module that can't be serviced within its RPI time.

The specific configuration parameters for a system determine the impact on actual RPI rates. These configuration factors can impact the effective scan frequency for any individual embedded or local expansion module:

- Rates at which the RPI values of the embedded I/O modules are set
- Number of embedded I/O modules that are used in the system
- Types of embedded I/O modules that are used in the system
- Rates at which RPI values for the 1769 Compact I/O module are set
- Number of 1769 Compact I/O modules in the system
- Types of 1769 Compact I/O modules in the system
- Application user task priorities

RPI Rate Guidelines

Type of Module	Guidelines
Digital and analog (any mix)	<p>The following guidelines apply:</p> <ul style="list-style-type: none"> • 1...2 modules can be scanned in 0.5 ms. • 3...4 modules can be scanned in 1 ms. • 5...6 modules can be scanned in 2 ms. • Some input modules have a fixed 8 ms filter, so selecting a faster RPI has no effect.
Specialty	<p>The following conditions apply:</p> <ul style="list-style-type: none"> • For every full-sized 1769-SDN module in the system, increase the RPI of every other module by 2 ms. • For every 1769-HSC module in the system, increase the RPI of every other module by 1 ms. • For every full-sized 1769-ASCII module system, increase the RPI of every other module by 1 ms. • For every 1769-SM2 module in the system, increase the RPI of every other module by 2 ms. <p>For example, the system includes four I/O modules that are configured with an RPI = 1 ms and you add a 1769-SDN module to the system. You must increase the RPI value for all four I/O modules by 2 ms. Therefore, when the 1769-SDN module is added to the system, the four I/O modules use an RPI = 3 ms.</p> <p>If, in the same system, you add a second 1769-SDN module, the RPI value of the four I/O modules is increased to 5 ms.</p>

IMPORTANT The number of I/O modules can be the embedded I/O modules on the controller or 1769 Compact I/O modules that are used as local expansion modules.

Therefore, the consideration for using modules can be any of the following system configurations:

- Only embedded I/O modules
- Only 1769 Compact I/O modules
- Some combination of embedded I/O modules and 1769 Compact I/O modules

You can set individual RPI rates for 1769 Compact I/O modules higher than those values listed in this table. The RPI shows how quickly modules can be scanned, not how quickly an application can use the data. The RPI is asynchronous to the program scan. Other factors, such as program execution duration, affect I/O throughput.

Embedded DC Input Specifications

Attribute	1769-L24ER-QB1B	1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK, 1769-L27ERM-QBFC1B
Inputs	16	
Voltage category	24V DC sink/source	
Operating voltage range	10...28.8V DC @ 40 °C (104 °F) 10...26.4V DC @ 60 °C (140 °F) 24V DC nom	10...28.8V DC @ 40 °C (104 °F) 10...27.0V DC @ 55 °C (131 °F) 10...26.4V DC @ 60 °C (140 °F) 24V DC nom
Digital filter, off to on	0 s, 100 μs, 500 μs, 1 ms, 2 ms, 4 ms, 8 ms	
Input delay, off to on	100 μs, min 8 ms, max	
Digital filter, on to off	0 s, 100 μs, 500 μs, 1 ms, 2 ms, 4 ms, 8 ms	
Input delay, on to off	100 μs, min 8 ms, max	
Off-state voltage, max	5V DC	
Off-state current, max	1.5 mA	
On-state current, min	2 mA @ 24V DC per channel	
On-state current, max	5 mA @ 24V DC per channel	
Input impedance, max	5.2 kΩ @ 24V DC 6.1 kΩ @ 30V DC	
Cyclic update time	0.5...750 ms	
Isolation voltage	75V (continuous), Reinforced Insulation Type Type tested at 1200V AC for 1 s and at 1700V DC for 1 s; group to system, group to group	
IEC input compatibility	Type 3	
Isolated groups	Group 1: inputs 0...7 Group 2: inputs 8...15 Isolated groups operate in either sink or source configurations	

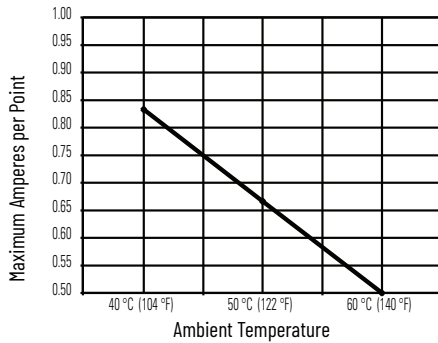
Embedded DC Output Specifications

Attribute	1769-L24ER-QB1B	1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK, 1769-L27ERM-QBFC1B
Outputs	16	
Voltage category	24V DC source	
Operating voltage range	20.4...26.4V DC 24V DC nom	
Output delay, off to on	0.05 ms	
Output delay, on to off	0.5 ms	
Off-state leakage current, max	0.1 mA @ 26.4V DC	
On-state current, max	0.5 mA @ 24V DC per channel	
On-state voltage drop, max	1.0V DC @ 1.0 A	
Current per point, max	0.83 A @ 40 °C (104 °F) 0.5 A @ 60 °C (140 °F)	0.83 A @ 40 °C (104 °F) 0.58 A @ 55 °C (131 °F) 0.5 A @ 60 °C (140 °F)
Current per module, max	6.64 A @ 40 °C (104 °F) 4.0 A @ 60 °C (140 °F)	6.64 A @ 40 °C (104 °F) 4.64 A @ 55 °C (131 °F) 4.0 A @ 60 °C (140 °F)
Surge current per point, max	2.0 A for 10 ms per point, repeatable every 2 s	
Isolation voltage	75V (continuous), Reinforced Insulation Type Type tested at 1200V AC for 1 s and at 1700V DC for 1 s; group to system, group to group	
Isolated groups	Group 1: outputs 0...7 Group 2: outputs 8...15	

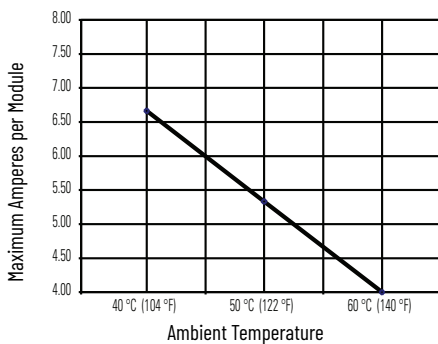
Embedded DC Output Temperature Derating

The area within the curves represents the safe operating range for the embedded DC outputs under various conditions of user-supplied voltages and ambient temperatures.

Embedded DC Outputs Maximum Amperes Per Point Versus Temperature



Embedded DC Outputs Maximum Amperes Per Module Versus Temperature



Embedded Analog Input Specifications

Attribute	1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK, 1769-L27ERM-QBFC1B
Inputs	4 channels of thermocouple/voltage/current 2 channels of RTD/Resistance inputs
Operating voltage range	2.6...30.0V DC @ 40 °C (104 °F) 2.6...26.4V DC @ 55 °C (131 °F) 2.6...5V DC @ 60 °C (140 °F)
Input types	<ul style="list-style-type: none"> • Thermocouple: J, K, T, E, R, S, B, N, and C • Voltage • Current • RTD: Platinum 385, Platinum 3916, Copper 426, Nickel 672, Nickel 618, Nickel-Iron 518 • Resistance
Input ranges ⁽¹⁾	<p>Thermocouple:</p> <ul style="list-style-type: none"> • K at 1370...1372 °C (2498...2501.6 °F) • K at -170...+1370 °C (-274...+2498 °F) • K at -200...+1370 °C (-328...+2498 °F) • S and R at 0...1768 °C (32...3214.4 °F) • S and R at -50...0 °C (-58...+32 °F) • B at 300...1820 °C (572...3308 °F) • B at 250...300 °C (482...572 °F) • J at -210...+1200 °C (-328...+2192 °F) • T at -170...+400 °C (-274...+752 °F) • T at -200...-170 °C (-328...-274 °F) • E at -200...+1000 °C (-328...+1832 °F) • N at -110...+1300 °C (-166...+2372 °F) • N at -200...-110 °C (-328...-166 °F) • C at 0...2315 °C (32...4199 °F) <p>Voltage:</p> <ul style="list-style-type: none"> • -50...+50 mV • -100...+100 mV • 0...5V • 1...5V • 0...10V • -10V...+10V <p>Current:</p> <ul style="list-style-type: none"> • 0...20 mA • 4...20 mA <p>RTD:</p> <ul style="list-style-type: none"> • 0...100 Ω Platinum 385 • 0...200 Ω Platinum 385 • 0...500 Ω Platinum 385 • 0...1000 Ω Platinum 385 • 0...100 Ω Platinum 3916 • 0...200 Ω Platinum 3916 • 0...500 Ω Platinum 3916 • 0...1000 Ω Platinum 3916 • 0...10 Ω Copper 426 • 0...120 Ω Nickel 618 • 0...120 Ω Nickel 672 • 0...604 Ω Nickel-Iron 518 <p>Resistance:</p> <ul style="list-style-type: none"> • 0...150 Ω • 0...500 Ω • 0...1000 Ω • 0...3000 Ω
Resolution, max	15 bits plus sign (Bipolar) 16 bits (Unipolar)
Input impedance	Voltage: 10 MΩ Current: 250 Ω
Converter type	Sigma-Delta
Cyclic update time	11...5000 ms dependent on user configuration
Rated working voltage	30V AC/30V DC
Common mode voltage	±10V DC per channel
Common mode rejection ratio, min	115 dB at 50 Hz at 10V 115 dB at 60 Hz at 10V
Normal mode rejection ratio, min	85 dB at 50 Hz at 1.5V 85 dB at 60 Hz at 1.5V

Embedded Analog Input Specifications (Continued)

Attribute	1769-L24ER-0BFC1B, 1769-L24ER-0BFC1BK, 1769-L27ERM-0BFC1B
Accuracy, overall at 25 °C (77 °F) ⁽²⁾	<p>Thermocouple types:</p> <ul style="list-style-type: none"> • J at -210...+1200 °C (-328...+2192 °F): ±0.6 °C (1.1 °F) • N at -110...+1300 °C (-166...+2372 °F): ±1.0 °C (1.8 °F) • N at -200...-110 °C (-328...-166 °F): ±1.0 °C (1.8 °F) • T at -170...+400 °C (-274...+752 °F): ±1.0 °C (1.8 °F) • T at -200...-170 °C (-328...-274 °F): ±1.0 °C (1.8 °F) • K at 1370...1372 °C (2498...2501.6 °F): ±1.2 °C (2.2 °F) • K at -200...+1370 °C (-328...+2498 °F): ±1.0 °C (1.8 °F) • E at -200...+1000 °C (-328...+1832 °F): ±0.5 °C (0.9 °F) • S and R at 0...1768 °C (32...3214.4 °F): ±1.7 °C (3.1 °F) • S and R at -50...0 °C (-58...+32 °F): ±4.0 °C (7.2 °F) • B at 300...1820 °C (572...3308 °F): ±3.0 °C (5.4 °F) • B at 250...300 °C (482...572 °F): ±6.0 °C (10.8 °F) • C at 0...2315 °C (32...4199 °F): ±1.8 °C (3.2 °F) <p>Voltage inputs:</p> <ul style="list-style-type: none"> • ±50 mV: ±15 µV • ±100 mV: ±20 µV • 0...5V: ±2.5 mV • 1...5V: ±2 mV • 0...10V: ±5 mV • ±10V: ±10 mV <p>Current inputs:</p> <ul style="list-style-type: none"> • 0...20 mA: ±20 µA • 4...20 mA: ±16 µA <p>RTD types:</p> <ul style="list-style-type: none"> • Platinum 385: ±0.5 °C (0.9 °F) • Platinum 3916: ±0.4 °C (0.7 °F) • Nickel: ±0.2 °C (0.4 °F) • Nickel-Iron: ±0.3 °C (0.5 °F) • Copper: ±0.6 °C (1.1 °F) <p>Resistance types:</p> <ul style="list-style-type: none"> • 0...150 Ω: ±0.15 Ω • 0...500 Ω: ±0.5 Ω • 0...1000 Ω: ±1.0 Ω • 0...3000 Ω: ±1.5 Ω
Accuracy, overall at 0...60 °C (32...140 °F) ⁽²⁾	<p>Thermocouple types:</p> <ul style="list-style-type: none"> • J at -210...+1200 °C (-328...+2192 °F): ±0.9 °C (1.6 °F) • N at -110...+1300 °C (-166...+2372 °F): ±1.5 °C (2.7 °F) • N at -200...-110 °C (-328...-166 °F): ±1.5 °C (2.7 °F) • T at -170...+400 °C (-274...+752 °F): ±1.5 °C (2.7 °F) • T at -200...-170 °C (-328...-274 °F): ±1.5 °C (2.7 °F) • K at 1370...1372 °C (2498...2501.6 °F): ±1.8 °C (3.2 °F) • K at -200...+1370 °C (-328...+2498 °F): ±1.5 °C (2.7 °F) • E at -200...+1000 °C (-328...+1832 °F): ±0.8 °C (1.4 °F) • S and R at 0...1768 °C (32...3214.4 °F): ±3.5 °C (6.3 °F) • S and R at -50...0 °C (-58...+32 °F): ±4.0 °C (7.2 °F) • B at 300...1820 °C (572...3308 °F): ±4.5 °C (8.1 °F) • B at 250...300 °C (482...572 °F): ±9.0 °C (16.2 °F) • C at 0...2315 °C (32...4199 °F): ±3.5 °C (6.3 °F) <p>Voltage inputs:</p> <ul style="list-style-type: none"> • ±50 mV: ±25 µV • ±100 mV: ±30 µV • 0...5V: ±5 mV • 1...5V: ±4 mV • 0...10V: ±10 mV • ±10V: ±20 mV <p>Current inputs:</p> <ul style="list-style-type: none"> • 0...20 mA: ±50 µA • 4...20 mA: ±40 µA <p>RTD types:</p> <ul style="list-style-type: none"> • Platinum 385: ±0.9 °C (1.6 °F) • Platinum 3916: ±0.8 °C (1.4 °F) • Nickel: ±0.4 °C (0.7 °F) • Nickel-Iron: ±0.5 °C (0.9 °F) • Copper: ±1.1 °C (2.0 °F) <p>Resistance types:⁽²⁾</p> <ul style="list-style-type: none"> • 0...150 Ω: ±0.25 Ω • 0...500 Ω: ±0.8 Ω • 0...1000 Ω: ±1.5 Ω • 0...3000 Ω: ±2.5 Ω

Embedded Analog Input Specifications (Continued)

Attribute	1769-L24ER-0BFC1B, 1769-L24ER-0BFC1BK, 1769-L27ERM-0BFC1B
Cold junction compensation accuracy at 0...60 °C (32...140 °F) ⁽²⁾	±1.3 °C (34.34 °F)
Calibration	Cyclic calibration by user configuration
Non-linearity (in percent full scale)	±0.05%
Repeatability at 25 °C (77 °F) with 10 Hz filter	<p>Thermocouple types:</p> <ul style="list-style-type: none"> • J at -210...+1200 °C (-328...+2192 °F): ±0.1 °C (0.2 °F) • N at -110...+1300 °C (-166...+2372 °F): ±0.1 °C (0.2 °F) • N at -200...-110 °C (-328...-166 °F): ±0.25 °C (0.5 °F) • T at -170...+400 °C (-274...+752 °F): ±0.1 °C (0.2 °F) • T at -200...-170 °C (-328...-274 °F): ±1.5 °C (2.7 °F) • K at 1370...1372 °C (2498...2501.6 °F): ±0.15 °C (0.3 °F) • K at -170...+1370 °C (-274...+2498 °F): ±0.1° (0.2 °F) • K at -200...-170 °C (-328...-274 °F): ±2.0 °C (3.6 °F) • E at -200...+1000 °C (-328...+1832 °F): ±0.1° (0.2 °F) • S and R at 0...1768 °C (32...3214.4 °F): ±0.4 °C (0.7 °F) • S and R at -50...0 °C (-58...+32 °F): ±1.0 °C (1.8 °F) • B at 300...1820 °C (572...3308 °F): ±0.7 °C (1.3 °F) • B at 250...300 °C (482...572 °F): ±1.5 °C (2.7 °F) • C at 0...2315 °C (32...4199 °F): ±0.2 °C (0.4 °F) <p>Voltage inputs:</p> <ul style="list-style-type: none"> • ±50 mV: ±6 µA • ±100 mV: ±6 µV • 0...5V: ±150 mV • 1...5V: ±150 mV • 0...10V: ±150 mV • ±10V: ±150 mV <p>Current inputs:</p> <ul style="list-style-type: none"> • 0...20 mA: ±0.3 µA • 4...20 mA: ±0.3 µA <p>RTD types:</p> <ul style="list-style-type: none"> • Platinum 385: ±0.2 °C (0.4 °F) • Platinum 3916: ±0.2 °C (0.4 °F) • Nickel: ±0.01 °C (0.02 °F) • Nickel-Iron: ±0.01 °C (0.02 °F) • Copper: ±0.2 °C (0.4 °F) <p>Resistance types:</p> <ul style="list-style-type: none"> • 0...150 Ω: ±0.04 Ω • 0...500 Ω: ±0.2 Ω • 0...1000 Ω: ±0.2 Ω • 0...3000 Ω: ±0.2 Ω
Overload at input terminals, max	Voltage: ±35V DC continuous Current: 32 mA continuous, ±7.6V DC
Channel diagnostics	Invalid configuration, Over-, or underrange by bit reporting, open circuit
Isolation voltage	30V AC/30V DC (continuous), reinforced insulation type Type tested at 720V DC for 60 s; inputs to system backplane

(1) Values for these input types rated at the following ambient temperatures: 40 °C (104 °F), 55 °C (131 °F), 60 °C (140 °F).

(2) These specification values are based on cyclic calibration and connecting a 4-wire device to the module.

Embedded Analog Output Specifications

Attribute	1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK, 1769-L27ERM-QBFC1B
Outputs	2 single-ended
Output types	<ul style="list-style-type: none"> Voltage Current
Output ranges ⁽¹⁾	Voltage: <ul style="list-style-type: none"> 0...5V 1...5V 0...10V -10V...+10V Current: <ul style="list-style-type: none"> 0...20 mA 4...20 mA
Converter type	R-2R Ladder Voltage Switching
Resolution, max	15 bits plus sign (Bipolar) 16 bits (Unipolar)
Cyclic update time, nom	2.5 ms
Cyclic update time, max	9.5 ms
Current load on voltage output	10 mA max
Resistive load on current output	0...300 Ω
Load range on voltage output	> 1 kΩ at 10V DC
Inductive load, max (current outputs)	0.1 mH
Capacitive load, max (Voltage Outputs)	1 μF
Accuracy, overall at 25 °C (77 °F)	Voltage: ±0.5% full scale Current: ±0.5% full scale
Accuracy, overall at 0...60 °C (32...140 °F)	Voltage: ±0.8% full scale Current: ±0.8% full scale
Accuracy drift with temperature	Voltage: ±0.0086% full scale per °C Current: ±0.0086% full scale per °C
Output ripple range 0...50 kHz (referred to output range)	±0.05%
Non-linearity	±0.05% (in percent full scale)
Repeatability	± 0.05%
Output impedance	Voltage: <1 Ω Current: >1 MΩ
Short circuit protection	Yes
Short circuit, nom	Current: 16 mA
Open circuit, max	16V
Output response at system power-up and powerdown	Current: ± 1.0V spike for < 5 ms Voltage: ± 1.0V DC spike < 5 ms
Isolation voltage	30V AC/30V DC (continuous), reinforced insulation type Type tested at 500V AC or 710V DC for 60 s; outputs to system backplane

(1) Values for these input types rated at the following ambient temperatures: 40 °C (104 °F), 55 °C (131 °F), 60 °C (140 °F).

Analog Input Ranges

Input Type Normal Op. Range	Full Range ⁽¹⁾	Raw/Prop. Data Units for Full Range	Eng. Unit Values for Full Range x 1		Eng. Unit Values for Full Range x 10		Scaled-for- PID Values for Normal Operating Range	Scaled-for-PID Values for Full Range	Percent of Normal Op. Range Values	Percent of Full Range Values
			°C	°F	°C	°F				
-10... +10V DC	-10.5V... +10.5V	-32767... +32767	-10500...+10500		-1050...+1050		0...16,383	-410...+16793	-10000... +10000	-10500... +10500
0...5V DC	-0.5V... +5.25V		-500...+5250		-50...+525			-1638... +17202		-1000... +10500
0...10V DC	-0.5V... +10.5V		-500...+10500		-50...+1050			-819... +17202		-500... +10500
4...20 mA	3.2...21 mA		3200...21000		320...2100			-819... +17407		-500... +10625
1...5V DC	0.5V...5.25V	-32767... +32767	500...5250		50...525		0...16,383	-2048... +17407	0...10000	-1250... +10625
0...20 mA	0...21 mA		0...21000		0...2100			0...17202		0...10500
J (-210...+1200)			-2100... +12000	-3460... +21920	-210...+1200	-346...+2192				
K (-200...+1372)			-2000... +13720	-3280... +25020	-200...+1372	-328...+2502				
T (-200...+400)			-2000... +4000	-3280...+7520	-200...+400	-328...+752				
E (-200...+1000)			-2000... +10000	-3280... +18320	-200...+1000	-328...+1832				
R (-50...+1768)			-500... +17680	-580...+32140	-50...+1768	-58...+3214				
S (-50...+1768)			-500... +17680	-580...+32140	-50...+1768	-58...+3214				
B (250...1820)			2500...18200	4820... +32767	250...1820	482...3308				
N (-200...+1300)			-2000... +13000	-3280... +23720	-200...+1300	-328...+2372				
C (0...2315)			0...23150	320...32767	0...2315	32...4199		0...16,383		0...10000
-50...+50 mV			-5000...+5000		-500...+500			0...16,383		0...10000
-100...+100 mV			-10000...+10000		-1000...+1000					
0...150 Ω			0...15000		0...1500					
0...500 Ω			0...5000		0...500					
0...1000 Ω			0...10000		0...1000					
0...3000 Ω			0...30000		0...3000					
Platinum 385 (-200...+850)			-2000...+8500	-3280... +15620	-200...+850	-328...+1562				
Platinum 3916 (-200...+510)			-2000...+5100	-3280...+9500	-200...+510	-328...+950				
Copper 426 (-70...+150)			-700...+1500	-940...+3020	-70...+1500	-94...+302				
Nickel 618 (-60...+250)		-600...+2500	-760...+4820	-60...+250	-76...+482					
Nickel 672 (-80...+260)		-800...+2600	-1120...+5000	-80...+260	-112...+500					
Nickel-Iron 518 (-100...+200)		-1000...+2000	-1480...+3920	-100...+200	-148...+392					

(1) Includes amount over and under normal operating.

Embedded Analog Output Module Data⁽¹⁾

Analog Output Module Range	Input Value	Example Data		Output Range State	Raw/Proportional Data		Engineering Unit		Scaled-for-PID		Percent Full Range	
		Controller Ordered	Embedded Analog Module Output		Decimal Range		Decimal Range		Decimal Range		Decimal Range	
					Controller Ordered	Embedded Analog Module Output	Controller Ordered	Embedded Analog Module Output	Controller Ordered	Embedded Analog Module Output	Controller Ordered	Embedded Analog Module Output
±10V	Over 10.5V	+11.0V	+10.5V	Over	-	-	11000	-	17202	-	11000	-
	+10.5V	+10.5V	+10.5V	Over	32767	32767	10500	10500	16793	16793	10500	10500
	±10V	+10.0V	+10.0V	Normal	31207	31207	10000	10000	16383	16383	10000	10000
		0.0V	0.0V	Normal	0	0	0	0	8192	8192	0	0
	-10.0V	-10.0V	Normal	-31207	-31207	-10000	-10000	0	0	-10000	-10000	
	-10.5V	-10.5V	-10.5V	Under	-32767	-32767	-10500	-10500	-410	-410	-10500	-10500
Under 10.5V	-11.0V	-10.5V	Under	-	-	-11000	-10500	-819	-410	-11000	-10500	
0...5V	Over 5.25V	5.5V	+5.25V	Over	-	-	5500	5250	18021	17202	11000	10500
	5.25V	5.25V	+5.25V	Over	32767	32767	5250	5250	17202	17202	10500	10500
	0...5.0V	5.0V	+5.0V	Normal	31207	31207	5000	5000	16383	16383	10000	10000
		0.0V	0.0V	Normal	0	0	0	0	0	0	0	0
	-0.5V	-0.5V	-0.5V	Under	-3121	-3121	-500	-500	-1638	-1638	-1000	-1000
	Under -0.5V	-1.0V	-0.5V	Under	-6241	-3121	-500	-500	-3277	-1638	-2000	-1000
0...10V	Over 10.5V	11.0V	+10.5V	Over	-	-	11000	10500	18021	17202	11000	10500
	+10.5V	+10.5V	+10.5V	Over	32767	32767	10500	10500	17202	17202	10500	10500
	0...10.0V	+10.0V	+10.0V	Normal	31207	31207	10000	10000	16383	16383	10000	10000
		0.0V	0.0V	Normal	0	0	0	0	0	0	0	0
	-0.5V	-0.5V	-0.5V	Under	-1560	-1560	-500	-500	-819	-819	-500	-500
	Under -5.0V	-1.0V	-0.5V	Under	-3121	-1560	-1000	-500	-1638	-819	-1000	-500
4...20 mA	Over 21.0 mA	+22.0 mA	21 mA	Over	-	-	22000	21000	18431	17407	11250	10625
	21.0 mA	+21.0 mA	21 mA	Over	32767	32767	21000	21000	17407	17407	10625	10625
	4...20.0 mA	+20.0 mA	20 mA	Normal	31207	31207	20000	20000	16383	16383	10000	10000
		+4.0 mA	+4.0 mA	Normal	6241	6241	4000	4000	0	0	0	0
	3.2 mA	+3.2 mA	+3.2 mA	Under	4993	4993	3200	3200	-819	-819	-500	-500
	Under 3.2	0.0 mA	+3.2 mA	Under	0	4993	0	3200	-4096	-819	-2500	-500
1...5V	Over 5.25V	+5.5V	+5.25V	Over	-	-	5500	5250	18431	17407	11250	10625
	+5.25V	+5.25V	+5.25V	Over	32767	32767	5250	5250	17407	17407	10625	10625
	1...5.0V	+5.0V	+5.0V	Normal	31207	31207	5000	5000	16383	16383	10000	10000
		+1.0V	+1.0V	Normal	6241	6241	1000	1000	0	0	0	0
	0.5V	+0.5V	+0.5V	Under	3121	3121	500	500	-2048	-2048	-1250	-1250
	Under 0.5V	0.0V	0.0V	Under	0	3121	0	500	-4096	-2048	-2500	-1250
0...20 mA	Over 21.0 mA	+22.0 mA	21 mA	Over	-	-	22000	21000	18201	17202	11000	10500
	21.0 mA	21.0 mA	21 mA	Over	32767	32767	21000	21000	17202	17202	10500	10500
	0...20.0 mA	20.0 mA	20 mA	Normal	31207	31207	20000	20000	16383	16383	10000	10000
		0.0 mA	0.0 mA	Normal	0	0	0	0	0	0	0	0
	Under 0.0 mA	-1.0 mA	0.0 mA	Under	-1560	0	0	-1000	-819	0	-500	0

(1) If Clamping is enabled, the output value is the clamped value that is defined in the configuration.

Embedded HSC Module Input Specifications

Attribute	1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK, 1769-L27ERM-QBFC1B
Input frequency, max	250 kHz
Input current, max	15 mA per channel
Input current, min	6.8 mA
Input voltage range	2.6...30V DC ⁽¹⁾
On-state voltage, max	30V DC
On-state current, min	6.8 mA
Off-state voltage, max	1.0V DC
Off-state current, max	1.5 mA
Off-state leakage current, max	1.5 mA
Input impedance, nom	1950 Ω
Pulse width, min	2.5 μs
Phase separation, min	1.3 μs
Isolation voltage	75V (continuous), reinforced insulation type Type tested at 1200V AC for 60 s; inputs to system backplane and input to input

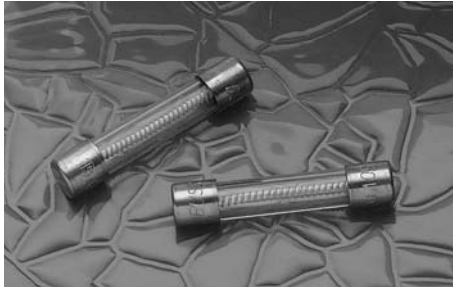
(1) See [Maximum Input Voltage - 24V DC Operation](#) temperature derating.

Embedded HSC Module Output Specifications

Attribute	1769-L24ER-QBFC1B, 1769-L24ER-QBFC1BK, 1769-L27ERM-QBFC1B
Output voltage range	5...30V DC
On-state voltage, max	User power - 0.1V DC
On-state output current, max	0.25 A per channel
On-state output current, min	1 mA
On-state voltage drop, max	0.5V DC
Off-state leakage current, max	5 μA
Turn-on time, max	400 μs
Turn-off time, max	200 μs
Reverse polarity protection	30V DC
Isolation voltage	75V (continuous), reinforced insulation type Type tested at 1200V AC for 60 s; inputs to system backplane and input to input
Current per channel, max	1.0 A @ 40 °C (104 °F) 0.5 A @ 55 °C (131 °F) 0.25 A @ 60 °C (140 °F)
Current per module, max	4.0 A @ 40 °C (104 °F) 2.0 A @ 55 °C (131 °F) 1.0 A @ 60 °C (140 °F)

MDL

1/4" x 1 1/4" Time-delay glass tube fuses



Product features

- Time-delay
- Optional axial leads available
- 1/4 x 1 1/4 (6.4 x 31.7mm) physical size
- Glass tube, nickel-plated brass endcap construction
- UL Listed product meets standard 248-14

Environmental data

- Shock: 1A thru 30A – MIL-STD-202, Method 207, (HI Shock)
- Vibration: 1/4A thru 30A – MIL-STD-202, Method 204, Test Condition C (Except 5g, 500HZ)

Agency information

- UL Listed Card: MDL 1/16 - 8A (Guide JDYX, File E19180)
- UL Recognized Card: MDL 9 - 30A (Guide JDYX2, File E19180)
- CSA Certification Card: MDL 1/16 - 8A (Class No. 1422-01)
- CSA Component Acceptance: MDL 9-30A (Class No. 1422-30)
- CE

Ordering

- Specify packaging code
- Insert packaging code prefix before part number. E.g., BK (or BK1)-MDL-5-R
- Specify option codes if desired
- For axial leads, insert "V" between catalog series and amp rating. E.g., BK-MDL-V-5-R
- For board washable, insert "B" between catalog series and amp rating. E.g., BK-MDL-B-5-R
- For axial leads and board washable, insert "B" then "V" between catalog series and amp rating. E.g., BK-MDL-BV-5-R

Part Number	Voltage Rating Vac	Specifications			Typical DC Cold Resistance** (Ω)	Typical Melting I ² t† AC	Typical Voltage Drop‡
		AC Interrupting Rating* (amps)@					
		250Vac	125Vac	32Vac			
MDL-1/16-R	250	35	10000	-	45.6	0.0046	2.79
MDL-1/10-R	250	35	10000	-	15.68	0.0420	1.95
MDL-1/8-R	250	35	10000	-	12.238	0.0422	1.52
MDL-3/16-R	250	35	10000	-	4.81	0.116	1.05
MDL-2/10-R	250	35	10000	-	5.234	0.314	0.972
MDL-1/4-R	250	35	10000	-	3.208	0.447	0.965
MDL-3/10-R	250	35	10000	-	2.046	0.412	0.808
MDL-3/8-R	250	35	10000	-	1.567	0.982	1.46
MDL-1/2-R	250	35	10000	-	0.943	1.656	1.27
MDL-3/4-R	250	35	10000	-	0.397	4.343	1.01
MDL-1-R	250	35	10000	-	0.273	11.498	0.995
MDL-1-1/4-R	250	100	10000	-	0.205	86.2	0.722
MDL-1-1/2-R	250	100	10000	-	0.156	22.7	0.721
MDL-2-R	250	100	10000	-	0.116	62.3	0.644
MDL-2-1/4-R	250	100	10000	-	0.096	49.6	0.535
MDL-2-1/2-R	250	100	10000	-	0.081	63.1	0.410
MDL-3-R	250	100	10000	-	0.057	67.5	0.345
MDL-4-R	250	200	10000	-	0.038	19.3	0.187
MDL-5-R	250	200	10000	-	0.025	32.0	0.160
MDL-6-R	250	200	10000	-	0.022	37.4	0.155
MDL-6-1/4-R	250	200	10000	-	0.02	38.7	0.152
MDL-7-R	250	200	10000	-	0.018	42.7	0.140
MDL-8-R	250	200	10000	-	0.015	47.8	0.119
MDL-9-R	32	-	-	1000	0.012	51.5	0.124
MDL-10-R	32	-	-	1000	0.01	64.4	0.114
MDL-15-R	32	-	-	1000	0.005	354.0	0.130
MDL-20-R	32	-	-	1000	0.004	2914.0	0.530
MDL-25††	32	-	-	1000	0.01225	15221.0	0.30
MDL-30††	32	-	-	1000	0.0011	15581.0	0.40

* Interrupting Ratings (Interrupting ratings were measured at 70% - 80% power factor on AC)

** DC Cold Resistance (Measured at ≤10% of rated current)

† Typical Melting I²t (A²Sec) (I²t was measured at listed interrupting rating and rated voltage.)

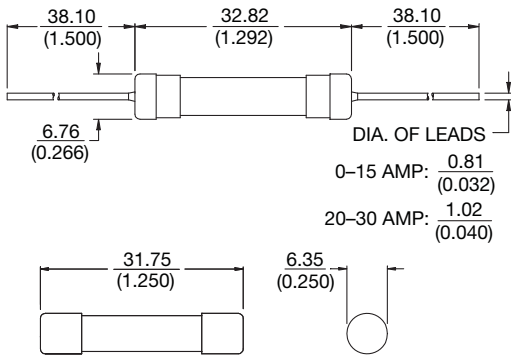
‡ Typical Voltage Drop (Voltage drop was measured at 25°C±3°C ambient temperature at rated current)

†† MDL-25 & MDL-30 not available in RoHS compliant construction.

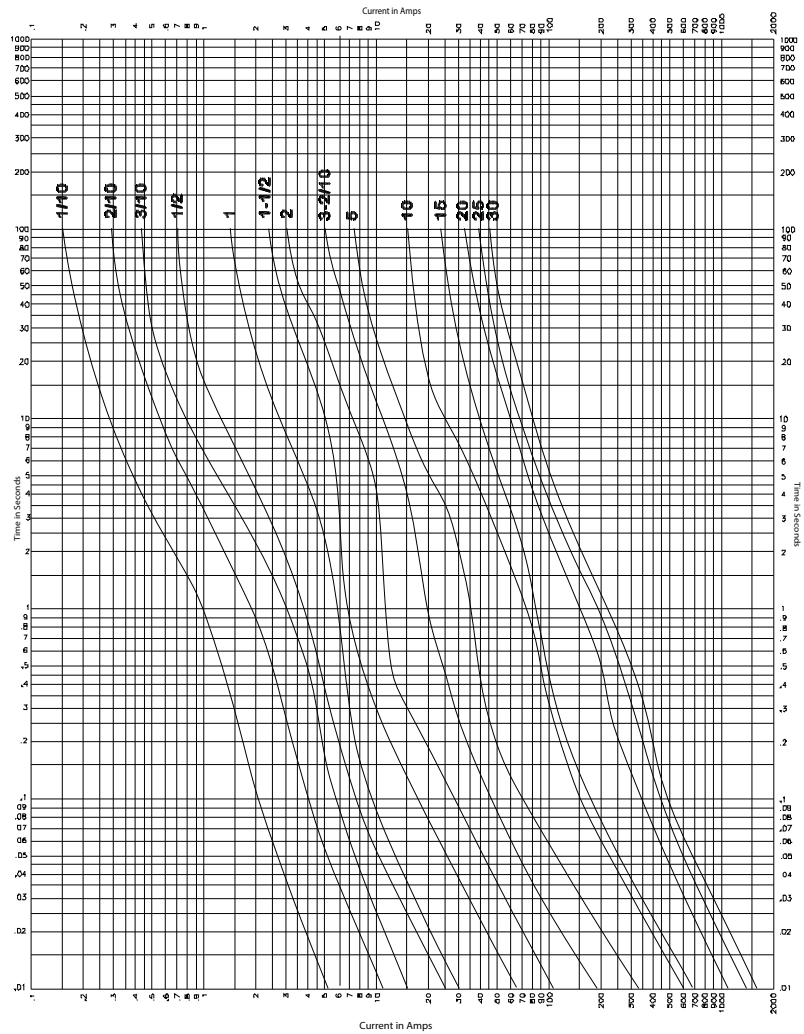


Powering Business Worldwide

Dimensions - mm (in)
Drawing Not to Scale



Time-Current Curve



Packaging Code	
Packaging Code	Description
BK	100 fuses packed into a cardboard carton

Option Code	
Option Code	Description
B	Sealed to withstand aqueous cleaning (Board Washable)
V	Axial leads - copper tinned wire with nickel plated brass overcaps

Life Support Policy: Eaton does not authorize the use of any of its products for use in life support devices or systems without the express written approval of an officer of the Company. Life support systems are devices which support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.

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Quality Products. Service Excellence.

Polycarbonate HMI Hinged Cover Kits *PJHMI Series*



Features

- Provides protection for instruments or electronics requiring routine attention or detail.
- Available in light gray solid opaque or polycarbonate thermoplastic clear covers.
- Cover Latching Options - hinged screw cover, tamper proof screw cover, and snap latch with pad lock feature.
- Listed UL component for use with enclosures rated NEMA Types 1, 3, 3R, 4, 4X, 12 or 13.
- CSA listed NEMA Type 1, 3, 3R, 4, 4X, 12 or 13.
- 316 stainless steel hinge pin.
- UV stabilized for outdoor use.
- Formed-In-Place (FIP) polyurethane gasket in continuous channel.
- Designed for use with wall thicknesses from 16 gauge through 1/4"
- #10-32 threaded brass inserts with plated steel mounting fasteners.
- Service temperature -31°F (-35°C) to 266°F (130°C)

Accessories

- HMI Cover Prop Arm



Clear Cover	Opaque Cover	Optional Prop Arm	Closure Style	Frame Size Dimensions			Viewing Area	
				H	W	D	H	W
PJHMI66CCH	PJHMI66H	PJHMIPROP66	Screw Cover	6.50	6.72	2.27	4.47	4.69
PJHMI66CCHTP	PJHMI66HTP	PJHMIPROP66	Tamperproof Screw Cover	6.50	6.72	2.27	4.47	4.69
PJHMI66CCL	PJHMI66L	PJHMIPROP66	Snap Latch Cover	6.50	6.72	2.27	4.47	4.69
PJHMI86CCH	PJHMI86H	PJHMIPROP86	Screw Cover	8.50	6.72	2.27	6.47	4.69
PJHMI86CCHTP	PJHMI86HTP	PJHMIPROP86	Tamperproof Screw Cover	8.50	6.72	2.27	6.47	4.69
PJHMI86CCL	PJHMI86L	PJHMIPROP86	Snap Latch Cover	8.50	6.72	2.27	6.47	4.69

Clear Cover	Opaque Cover	Optional Prop Arm	Closure Style	Frame Size Dimensions			Viewing Area	
				H	W	D	H	W
PJHMI88CCH	PJHMI88H	PJHMIPROP88	Screw Cover	7.93	8.15	2.27	6.47	6.69
PJHMI88CCHTP	PJHMI88HTP	PJHMIPROP88	Tamperproof Screw Cover	7.93	8.15	2.27	6.47	6.69
PJHMI88CCL	PJHMI88L	PJHMIPROP88	Snap Latch Cover	7.93	8.15	2.27	6.47	6.69
PJHMI108CCH	PJHMI108H	PJHMIPROP108	Screw Cover	9.93	8.15	2.27	8.47	6.69
PJHMI108CCHTP	PJHMI108HTP	PJHMIPROP108	Tamperproof Screw Cover	9.93	8.15	2.27	8.47	6.69
PJHMI108CCL	PJHMI108L	PJHMIPROP108	Snap Latch Cover	9.93	8.15	2.27	8.47	6.69
PJHMI1210CCH	PJHMI1210H	PJHMIPROP1210	Screw Cover	11.93	10.15	2.27	10.47	8.69
PJHMI1210CCHTP	PJHMI1210HTP	PJHMIPROP1210	Tamperproof Screw Cover	11.93	10.15	2.27	10.47	8.69
PJHMI1210CCL	PJHMI1210L	PJHMIPROP1210	Snap Latch Cover	11.93	10.15	2.27	10.47	8.69
PJHMI1412CCH	PJHMI1412H	PJHMIPROP1412	Screw Cover	13.95	12.07	2.20	12.49	10.71
PJHMI1412CCHTP	PJHMI1412HTP	PJHMIPROP1412	Tamperproof Screw Cover	13.95	12.07	2.20	12.49	10.71
PJHMI1412CCL	PJHMI1412L	PJHMIPROP1412	Snap Latch Cover	13.95	12.07	2.20	12.49	10.71
PJHMI1614CCH	PJHMI1614H	PJHMIPROP1614	Screw Cover	16.01	14.23	2.27	14.49	12.71
PJHMI1614CCHTP	PJHMI1614HTP	PJHMIPROP1614	Tamperproof Screw Cover	16.01	14.23	2.27	14.49	12.71
PJHMI1614CCL	PJHMI1614L	PJHMIPROP1614	Snap Latch Cover	16.01	14.23	2.27	14.49	12.71
PJHMI2016CCH	PJHMI2016H	PJHMIPROP2016	Screw Cover	20.50	16.72	2.27	18.49	14.71
PJHMI2016CCHTP	PJHMI2016HTP	PJHMIPROP2016	Tamperproof Screw Cover	20.50	16.72	2.27	18.49	14.71
PJHMI2016CCL	PJHMI2016L	PJHMIPROP2016	Snap Latch Cover	20.50	16.72	2.27	18.49	14.71

Tags: window kit hinged

Data subject to change without notice

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TEMPERATURE CONTROL SWITCH

INDUSTRY STANDARDS

 cURus; File No. E164102
 UL94-VO

 Protection rating IEC IP20
 CSA Certified, File Number 215952
 CE

APPLICATION

These easy-to-install thermostats regulate and monitor air temperature in enclosures that contain heat-emitting equipment. Thermostats prolong heater and fan life expectancy by controlling operation time and increase electrical component working efficiency by exposing them to fewer environmental contaminants.

Performance Data Temperature Control Switch

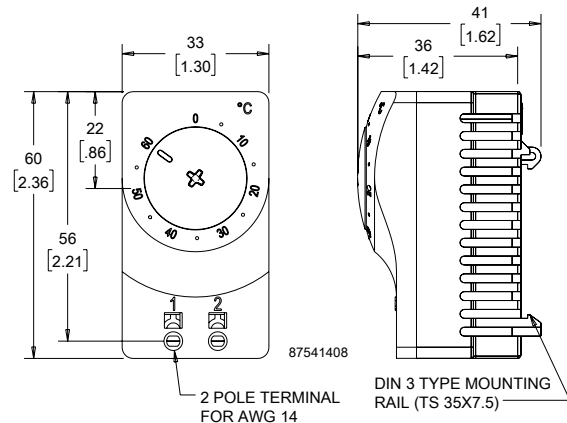
CATALOG NUMBERS		
	ATEMNCF	ATEMNCF
	ATEMNCC	ATEMNOC
ELECTRICAL DATA		
Maximum Load (Switching Capacity)		
120 VAC	15 A resistive / 2 A inductive @ 120 VAC	
250 VAC	10 A resistive / 2 A inductive @ 250 VAC	
DC	DC 30 W	
Minimum load	20 mA (all voltages)	
Contact Type	NC (normally closed), quick acting	NO (normally open), quick acting
Control Application	Heater	Fan
UNIT CONSTRUCTION		
Unit Dimensions - H x W x D (mm/in.)	60 x 33 x 41/2.36 x 1.30 x 1.62	

FEATURES

- Bimetal temperature sensor
- Plastic housing
- Connections consist of tubular screw terminals for AWG 14 (.04 sq. in.)
- Clip for 35mm DIN rail, EN 60715

FINISH

- Plastic, UL94V-0, Light Gray



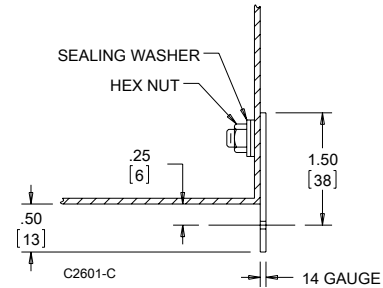
MOUNTING BRACKET KITS (DMFK)



Mounting bracket kits are field-installable. Includes two 14-gauge, steel, external mounting brackets and fasteners. Sealing washers are provided with each kit to maintain Type 4 or 12 rating after installation. Steel mounting brackets are plated.

BULLETIN: A80

Catalog Number	Description	Fastener Thread Size
DMFK1	Mounting bracket kit	#10-32
DMFK2	Mounting bracket kit	#10-32



MOUNTING BRACKET KITS (CMFK, CMTGFT)

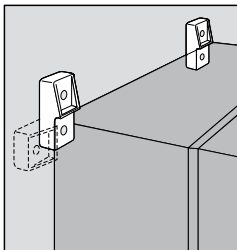


Mounting-Bracket Kits are field installable. Composite and stainless steel brackets are rated to Type 4X. Set of four (4) brackets can support 500 lb. (227 kg) maximum load. All hardware is included. Four brackets per kit. *Mounting brackets are required to maintain UL/CSA external mounting requirement.*

BULLETIN: A80

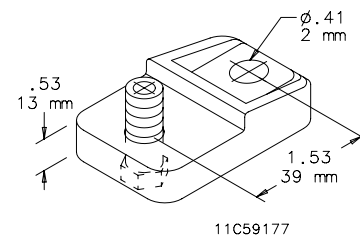
Catalog Number	Description	Fastener Thread Size
CMFK	Steel	#3/8-16
CMFKSS	Stainless Steel	#3/8-16
CMTGFT	Composite	#3/8-16

ULTRX MOUNTING BRACKET KIT



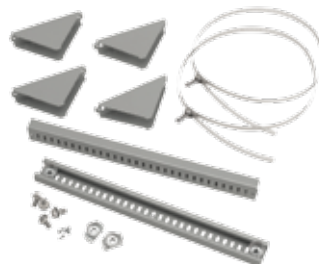
Kit is field-installable. Corrosion-resistant fiberglass material. Type 316 stainless steel mounting hardware is included. Four mounting brackets per kit.

BULLETIN: UX1Y



Catalog Number	Description	Kit Qty.
UUMF	Mounting Bracket Kit	4

POLE-MOUNT KIT



Use to mount CONCEPT, Networking and wall-mount enclosures to poles of various sizes and shapes. Simply attach the plated steel channel bar to the mounting holes at the back of the enclosure and wrap the stainless steel strap around the pole and through the bar. Kit includes two mounting channels, two straps suitable for 3-in. (76-mm) to 12-in. (305-mm) diameter pole and mounting hardware.

BULLETIN: CWY

Catalog Number	Fits Enclosure (in.)	Fits Enclosure (mm)
CPMK12	when B = 12.00	when B = 305
CPMK16	when B = 16.00	when B = 406
CPMK20	when B = 20.00	when B = 508
CPMK24	when B = 24.00	when B = 610
CPMK30	when B = 30.00	when B = 762

CONCEPT, TYPE 4X

INDUSTRY STANDARDS

Mounting brackets required to meet UL/CSA external mounting requirements.

UL 508A Listed; Type 3R, 4, 4X, 12; File No. E61997
 cUL Listed per CSA C22.2 No 94; Type 3R, 4, 4X, 12; File No. E61997

NEMA/EEMAC Type 3R, 4, 4X, 12, 13
 CSA File No. 42186: Type 4, 4X, 12
 VDE IP66
 IEC 60529, IP66
 Meets NEMA Type 3RX requirements

APPLICATION

For indoor or outdoor applications that require corrosion protection from chemicals and water. Concept Enclosures feature streamlined styling with an attractive stroked finish and flush quarter-turn latches for secure closure. Available in solid- and window-door models.

SPECIFICATIONS

- Manufactured from Type 304 or Type 316L stainless steel
- Minimum-width body flange provides maximum body opening
- External formed 90-degree body flange
- Panel mounting studs fit optional Concept panels and other accessories
- Mounting holes in back of body for direct mounting or for optional external mounting brackets
- Type 316 stainless steel hidden hinges promote clean aesthetic appearance
- Corner formed doors are interchangeable and easily removed by pulling clip-style hinge pins
- Provision on door (except window-door style and when B = 12 in.) for thermoplastic data pocket
- Provision on door (except window-door style and when B = 12 in.) for optional doorstop kit
- Quarter-turn latches furnished with flush slotted insert
- Seamless foam-in-place gasket
- Self-grounding latch system with double seal
- Bonding provision on door; grounding stud on body
- Furnished hardware kit consists of panel-mounting nuts, panel-grounding hardware and sealing washers for wall-mounting holes
- Installation instructions
- Window doors have a clear polycarbonate window

FINISH

Door and body have smooth #4 brushed finish.

ACCESSORIES

Type 316 Stainless Steel Door Stop Kit
 Concept panels
 H2Omit Vent Drains, Type 4X
 H2Omit Thermoelectric Dehumidifier
 Handles
 Lock Inserts
 HF Side-Mount Filter Fans
 Steel, Stainless Steel and Non-Metallic Window Kits
 PaneLite Enclosure Lights
 Hol-Sealers Hole Seals

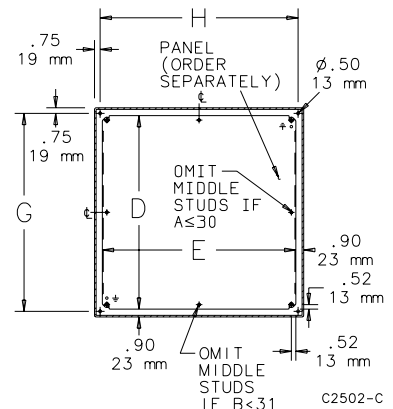
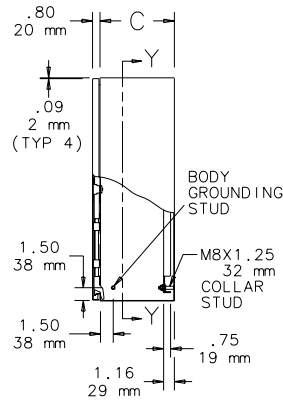
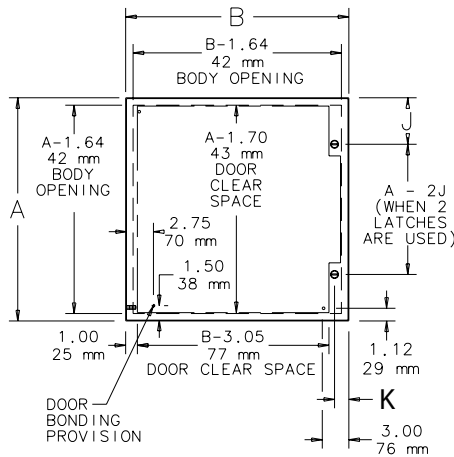
MODIFICATION AND CUSTOMIZATION

nVent HOFFMAN excels at modifying and customizing products to your specifications. Contact your local nVent HOFFMAN sales office or distributor for complete information.

BULLETIN: CWS
Standard Product One-Door

Catalog Number	AxBxC in.	AxBxC mm	Door Gauge	Body Gauge	Panel	Conductive Panel	Panel Size D x E (in.)	Panel Size G x H (mm)	Mounting G x H (in.)	Mounting G x H (mm)	Latches Qty.	Style	J (in.)	J (mm)
CSD12126SS	12.00 x 12.00 x 6.00	305 x 305 x 152	16	16	CP1212	CP1212G	10.20 x 10.20	259 x 259	10.50 x 10.50	267 x 267	1	Quarter-turn	6.00	152
CSD12126SS6	12.00 x 12.00 x 6.00	305 x 305 x 152	16	16	CP1212	CP1212G	10.20 x 10.20	259 x 259	10.50 x 10.50	267 x 267	1	Quarter-turn	6.00	152
CSD12246SS	12.00 x 24.00 x 6.00	305 x 610 x 152	16	16	CP2412	CP2412G	22.20 x 10.20	564 x 259	10.50 x 22.50	268 x 572	1	Quarter-turn	6.00	152
CSD12246SS6	12.00 x 24.00 x 6.00	305 x 610 x 152	16	16	CP2412	CP2412G	22.20 x 10.20	564 x 259	10.50 x 22.50	268 x 572	1	Quarter-turn	6.00	152
CSD16126SS	16.00 x 12.00 x 6.00	406 x 305 x 152	16	16	CP1612	CP1612G	14.20 x 10.20	361 x 259	14.50 x 10.50	368 x 267	1	Quarter-turn	8.00	203
CSD16126SS6	16.00 x 12.00 x 6.00	406 x 305 x 152	16	16	CP1612	CP1612G	14.20 x 10.20	361 x 259	14.50 x 10.50	368 x 267	1	Quarter-turn	8.00	203
CSD16166SS	16.00 x 16.00 x 6.00	406 x 406 x 152	16	16	CP1616	CP1616G	14.20 x 14.20	361 x 361	14.50 x 14.50	368 x 368	1	Quarter-turn	8.00	203
CSD16166SS6	16.00 x 16.00 x 6.00	406 x 406 x 152	16	16	CP1616	CP1616G	14.20 x 14.20	361 x 361	14.50 x 14.50	368 x 368	1	Quarter-turn	8.00	203
CSD20166SS	20.00 x 16.00 x 6.00	508 x 406 x 152	16	16	CP2016	CP2016G	18.20 x 14.20	462 x 361	18.50 x 14.50	470 x 368	1	Quarter-turn	10.00	254
CSD20166SS6	20.00 x 16.00 x 6.00	508 x 406 x 152	16	16	CP2016	CP2016G	18.20 x 14.20	462 x 361	18.50 x 14.50	470 x 368	1	Quarter-turn	10.00	254
CSD20206SS	20.00 x 20.00 x 6.00	508 x 508 x 152	16	16	CP2020	CP2020G	18.20 x 18.20	462 x 462	18.50 x 18.50	470 x 470	1	Quarter-turn	10.00	254
CSD20206SS6	20.00 x 20.00 x 6.00	508 x 508 x 152	16	16	CP2020	CP2020G	18.20 x 18.20	462 x 462	18.50 x 18.50	470 x 470	1	Quarter-turn	10.00	254
CSD24206SS	24.00 x 20.00 x 6.00	610 x 508 x 152	16	16	CP2420	CP2420G	22.20 x 18.20	564 x 462	22.50 x 18.50	572 x 470	1	Quarter-turn	12.00	305
CSD24206SS6	24.00 x 20.00 x 6.00	610 x 508 x 152	16	16	CP2420	CP2420G	22.20 x 18.20	564 x 462	22.50 x 18.50	572 x 470	1	Quarter-turn	12.00	305
CSD30166SS	30.00 x 16.00 x 6.00	762 x 406 x 152	16	16	CP3016	CP3016G	28.20 x 14.20	716 x 361	28.50 x 14.50	724 x 368	2	Quarter-turn	5.00	127
CSD30166SS6	30.00 x 16.00 x 6.00	762 x 406 x 152	16	16	CP3016	CP3016G	28.20 x 14.20	716 x 361	28.50 x 14.50	724 x 368	2	Quarter-turn	5.00	127
CSD16128SS	16.00 x 12.00 x 8.00	406 x 305 x 203	16	16	CP1612	CP1612G	14.20 x 10.20	361 x 259	14.50 x 10.50	368 x 267	1	Quarter-turn	8.00	203
CSD16128SS6	16.00 x 12.00 x 8.00	406 x 305 x 203	16	16	CP1612	CP1612G	14.20 x 10.20	361 x 259	14.50 x 10.50	368 x 267	1	Quarter-turn	8.00	203
CSD16168SS	16.00 x 16.00 x 8.00	406 x 406 x 203	16	16	CP1616	CP1616G	14.20 x 14.20	361 x 361	14.50 x 14.50	368 x 368	1	Quarter-turn	8.00	203
CSD16168SS6	16.00 x 16.00 x 8.00	406 x 406 x 203	16	16	CP1616	CP1616G	14.20 x 14.20	361 x 361	14.50 x 14.50	368 x 368	1	Quarter-turn	8.00	203
CSD16208SS	16.00 x 20.00 x 8.00	406 x 508 x 203	16	16	CP2016	CP2016G	18.20 x 14.20	462 x 361	18.50 x 18.50	368 x 470	1	Quarter-turn	8.00	203
CSD16208SS6	16.00 x 20.00 x 8.00	406 x 508 x 203	16	16	CP2016	CP2016G	18.20 x 14.20	462 x 361	18.50 x 18.50	368 x 470	1	Quarter-turn	8.00	203
CSD20168SS	20.00 x 16.00 x 8.00	508 x 406 x 203	16	16	CP2016	CP2016G	18.20 x 14.20	462 x 361	18.50 x 14.50	470 x 368	1	Quarter-turn	10.00	254
CSD20168SS6	20.00 x 16.00 x 8.00	508 x 406 x 203	16	16	CP2016	CP2016G	18.20 x 14.20	462 x 361	18.50 x 14.50	470 x 368	1	Quarter-turn	10.00	254
CSD20208SS	20.00 x 20.00 x 8.00	508 x 508 x 203	16	16	CP2020	CP2020G	18.20 x 18.20	462 x 462	18.50 x 18.50	470 x 470	1	Quarter-turn	10.00	254
CSD20208SS6	20.00 x 20.00 x 8.00	508 x 508 x 203	16	16	CP2020	CP2020G	18.20 x 18.20	462 x 462	18.50 x 18.50	470 x 470	1	Quarter-turn	10.00	254
CSD20248SS	20.00 x 24.00 x 8.00	508 x 610 x 203	16	16	CP2420	CP2420G	22.20 x 18.20	564 x 462	18.50 x 22.50	470 x 572	1	Quarter-turn	10.00	254
CSD20248SS6	20.00 x 24.00 x 8.00	508 x 610 x 203	16	16	CP2420	CP2420G	22.20 x 18.20	564 x 462	18.50 x 22.50	470 x 572	1	Quarter-turn	10.00	254
CSD24168SS	24.00 x 16.00 x 8.00	610 x 406 x 203	16	16	CP2416	CP2416G	22.20 x 14.20	564 x 361	22.50 x 14.50	572 x 368	1	Quarter-turn	12.00	305

Catalog Number	AxBxC in.	AxBxC mm	Door Gauge	Body Gauge	Panel	Conductive Panel	Panel Size D x E (in.)	Panel Size D x E (mm)	Mounting G x H (in.)	Mounting G x H (mm)	Latches Qty.	Style	J (in.)	J (mm)
CSD24168SS6	24.00 x 16.00 x 8.00	610 x 406 x 203	16	16	CP2416	CP2416G	22.20 x 14.20	564 x 361	22.50 x 14.50	572 x 368	1	Quarter-turn	12.00	305
CSD24208SS	24.00 x 20.00 x 8.00	610 x 508 x 203	16	16	CP2420	CP2420G	22.20 x 18.20	564 x 462	22.50 x 18.50	572 x 470	1	Quarter-turn	12.00	305
CSD24208SS6	24.00 x 20.00 x 8.00	610 x 508 x 203	16	16	CP2420	CP2420G	22.20 x 18.20	564 x 462	22.50 x 18.50	572 x 470	1	Quarter-turn	12.00	305
CSD24248SS	24.00 x 24.00 x 8.00	610 x 610 x 203	14	16	CP2424	CP2424	22.20 x 22.20	564 x 564	22.50 x 22.50	572 x 572	2	Quarter-turn	5.00	127
CSD24248SS6	24.00 x 24.00 x 8.00	610 x 610 x 203	14	16	CP2424	CP2424G	22.20 x 22.20	564 x 564	22.50 x 22.50	572 x 572	2	Quarter-turn	5.00	127
CSD24308SS	24.00 x 30.00 x 8.00	610 x 762 x 203	14	16	CP3024	CP3024G	28.20 x 22.20	716 x 564	28.50 x 22.50	724 x 572	2	Quarter-turn	5.00	127
CSD24308SS6	24.00 x 30.00 x 8.00	610 x 762 x 203	14	16	CP3024	CP3024G	28.20 x 22.20	716 x 564	28.50 x 22.50	724 x 572	2	Quarter-turn	5.00	127
CSD30208SS	30.00 x 20.00 x 8.00	762 x 508 x 203	14	16	CP3020	CP3020G	28.20 x 18.20	716 x 462	28.50 x 18.50	724 x 470	2	Quarter-turn	5.00	127
CSD30208SS6	30.00 x 20.00 x 8.00	762 x 508 x 203	14	16	CP3020	CP3020G	28.20 x 18.20	716 x 462	28.50 x 18.50	724 x 470	2	Quarter-turn	5.00	127
CSD30248SS	30.00 x 24.00 x 8.00	762 x 610 x 203	14	16	CP3024	CP3024G	28.20 x 22.20	716 x 564	28.50 x 22.50	724 x 572	2	Quarter-turn	5.00	127
CSD30248SS6	30.00 x 24.00 x 8.00	762 x 610 x 203	14	16	CP3024	CP3024G	28.20 x 22.20	716 x 564	28.50 x 22.50	724 x 572	2	Quarter-turn	5.00	127
CSD30308SS	30.00 x 30.00 x 8.00	762 x 762 x 203	14	16	CP3030	CP3030G	28.20 x 28.20	716 x 716	28.50 x 28.50	724 x 724	2	Quarter-turn	5.00	127
CSD30308SS6	30.00 x 30.00 x 8.00	762 x 762 x 203	14	16	CP3030	CP3030G	28.20 x 28.20	716 x 716	28.50 x 28.50	724 x 724	2	Quarter-turn	5.00	127
CSD36248SS	36.00 x 24.00 x 8.00	914 x 610 x 203	14	16	CP3624	CP3624G	34.20 x 22.20	869 x 564	34.50 x 22.50	876 x 572	2	Quarter-turn	5.00	127
CSD36248SS6	36.00 x 24.00 x 8.00	914 x 610 x 203	14	16	CP3624	CP3624G	34.20 x 22.20	869 x 564	34.50 x 22.50	876 x 572	2	Quarter-turn	5.00	127
CSD36308SS	36.00 x 30.00 x 8.00	914 x 762 x 203	14	16	CP3630	CP3630G	34.20 x 28.20	869 x 716	34.50 x 28.50	876 x 724	2	Quarter-turn	5.00	127
CSD36308SS6	36.00 x 30.00 x 8.00	914 x 762 x 203	14	16	CP3630	CP3630G	34.20 x 28.20	869 x 716	34.50 x 28.50	876 x 724	2	Quarter-turn	5.00	127
CSD161210SS	16.00 x 12.00 x 10.00	406 x 305 x 254	16	16	CP1612	CP1612G	14.20 x 10.20	361 x 259	14.50 x 10.50	368 x 267	1	Quarter-turn	8.00	203
CSD161210SS6	16.00 x 12.00 x 10.00	406 x 305 x 254	16	16	CP1612	CP1612G	14.20 x 10.20	361 x 259	14.50 x 10.50	368 x 267	1	Quarter-turn	8.00	203
CSD161610SS	16.00 x 16.00 x 10.00	406 x 406 x 254	16	16	CP1616	CP1616G	14.20 x 14.20	361 x 361	14.50 x 14.50	368 x 368	1	Quarter-turn	8.00	203
CSD161610SS6	16.00 x 16.00 x 10.00	406 x 406 x 254	16	16	CP1616	CP1616G	14.20 x 14.20	361 x 361	14.50 x 14.50	368 x 368	1	Quarter-turn	8.00	203
CSD162010SS	16.00 x 20.00 x 10.00	406 x 508 x 254	16	16	CP2016	CP2016G	18.20 x 14.20	462 x 361	18.50 x 14.50	470 x 368	1	Quarter-turn	8.00	203
CSD162010SS6	16.00 x 20.00 x 10.00	406 x 508 x 254	16	16	CP2016	CP2016G	18.20 x 14.20	462 x 361	18.50 x 14.50	470 x 368	1	Quarter-turn	8.00	203
CSD201610SS	20.00 x 16.00 x 10.00	508 x 406 x 254	16	16	CP2016	CP2016G	18.20 x 14.20	462 x 361	18.50 x 14.50	470 x 368	1	Quarter-turn	10.00	254
CSD201610SS6	20.00 x 16.00 x 10.00	508 x 406 x 254	16	16	CP2016	CP2016G	18.20 x 14.20	462 x 361	18.50 x 14.50	470 x 368	1	Quarter-turn	10.00	254
CSD202010SS	20.00 x 20.00 x 10.00	508 x 508 x 254	16	16	CP2020	CP2020G	18.20 x 18.20	462 x 462	18.50 x 18.50	470 x 470	1	Quarter-turn	10.00	254
CSD202010SS6	20.00 x 20.00 x 10.00	508 x 508 x 254	16	16	CP2020	CP2020G	18.20 x 18.20	462 x 462	18.50 x 18.50	470 x 470	1	Quarter-turn	10.00	254
CSD202410SS	20.00 x 24.00 x 10.00	508 x 610 x 254	16	16	CP2420	CP2420G	22.20 x 18.20	464 x 462	18.50 x 22.50	470 x 572	1	Quarter-turn	10.00	254
CSD202410SS6	20.00 x 24.00 x 10.00	508 x 610 x 254	16	16	CP2420	CP2420G	22.20 x 18.20	464 x 462	18.50 x 22.50	470 x 572	1	Quarter-turn	10.00	254
CSD241610SS	24.00 x 16.00 x 10.00	610 x 406 x 254	16	16	CP2416	CP2416G	22.20 x 14.20	564 x 361	22.50 x 14.50	572 x 368	1	Quarter-turn	12.00	305
CSD241610SS6	24.00 x 16.00 x 10.00	610 x 406 x 254	16	16	CP2416	CP2416G	22.20 x 14.20	564 x 361	22.50 x 14.50	572 x 368	1	Quarter-turn	12.00	305
CSD242010SS	24.00 x 20.00 x 10.00	610 x 508 x 254	16	16	CP2420	CP2420G	22.20 x 18.20	564 x 462	22.50 x 18.50	572 x 470	1	Quarter-turn	12.00	305
CSD242010SS6	24.00 x 20.00 x 10.00	610 x 508 x 254	16	16	CP2420	CP2420G	22.20 x 18.20	564 x 462	22.50 x 18.50	572 x 470	1	Quarter-turn	12.00	305
CSD242410SS	24.00 x 24.00 x 10.00	610 x 610 x 254	14	16	CP2424	CP2424G	22.20 x 22.20	564 x 564	22.50 x 22.50	572 x 572	2	Quarter-turn	5.00	127
CSD242410SS6	24.00 x 24.00 x 10.00	610 x 610 x 254	14	16	CP2424	CP2424G	22.20 x 22.20	564 x 564	22.50 x 22.50	572 x 572	2	Quarter-turn	5.00	127
CSD243010SS	24.00 x 30.00 x 10.00	610 x 762 x 254	14	16	CP3024	CP3024G	28.20 x 22.20	716 x 564	22.50 x 28.50	572 x 724	2	Quarter-turn	5.00	127
CSD243010SS6	24.00 x 30.00 x 10.00	610 x 762 x 254	14	16	CP3024	CP3024G	28.20 x 22.20	716 x 564	22.50 x 28.50	572 x 724	2	Quarter-turn	5.00	127
CSD302010SS	30.00 x 20.00 x 10.00	762 x 508 x 254	14	16	CP3020	CP3020G	28.20 x 18.20	716 x 462	28.50 x 18.50	724 x 470	2	Quarter-turn	5.00	127
CSD302010SS6	30.00 x 20.00 x 10.00	762 x 508 x 254	14	16	CP3020	CP3020G	28.20 x 18.20	716 x 462	28.50 x 18.50	724 x 470	2	Quarter-turn	5.00	127
CSD302410SS	30.00 x 24.00 x 10.00	762 x 610 x 254	14	16	CP3024	CP3024G	28.20 x 22.20	716 x 564	28.50 x 22.50	724 x 572	2	Quarter-turn	5.00	127
CSD302410SS6	30.00 x 24.00 x 10.00	762 x 610 x 254	14	16	CP3024	CP3024G	28.20 x 22.20	716 x 564	28.50 x 22.50	724 x 572	2	Quarter-turn	5.00	127
CSD303010SS	30.00 x 30.00 x 10.00	762 x 762 x 254	14	16	CP3030	CP3030G	28.20 x 28.20	716 x 716	28.50 x 28.50	724 x 724	2	Quarter-turn	5.00	127
CSD303010SS6	30.00 x 30.00 x 10.00	762 x 762 x 254	14	16	CP3030	CP3030G	28.20 x 28.20	716 x 716	28.50 x 28.50	724 x 724	2	Quarter-turn	5.00	127
CSD362410SS	36.00 x 24.00 x 10.00	914 x 610 x 254	14	16	CP3624	CP3624G	34.20 x 22.20	869 x 564	34.50 x 22.50	876 x 572	2	Quarter-turn	5.00	127
CSD362410SS6	36.00 x 24.00 x 10.00	914 x 610 x 254	14	16	CP3624	CP3624G	34.20 x 22.20	869 x 564	34.50 x 22.50	876 x 572	2	Quarter-turn	5.00	127
CSD363010SS	36.00 x 30.00 x 10.00	914 x 762 x 254	14	16	CP3630	CP3630G	34.20 x 28.20	869 x 716	34.50 x 28.50	876 x 724	2	Quarter-turn	5.00	127
CSD363010SS6	36.00 x 30.00 x 10.00	914 x 762 x 254	14	16	CP3630	CP3630G	34.20 x 28.20	869 x 716	34.50 x 28.50	876 x 724	2	Quarter-turn	5.00	127
CSD422410SS	42.00 x 24.00 x 10.00	1067 x 610 x 254	14	14	CP2442	CP2442G	22.20 x 40.20	564 x 1021	40.50 x 22.50	1029 x 572	1	3-point	21.00	533
CSD422410SS6	42.00 x 24.00 x 10.00	1067 x 610 x 254	14	14	CP2442	CP2442G	22.20 x 40.20	564 x 1021	40.50 x 22.50	1029 x 572	1	3-point	21.00	533
CSD423010SS	42.00 x 30.00 x 10.00	1067 x 762 x 254	14	14	CP4230	CP4230G	40.20 x 28.20	1021 x 716	40.50 x 28.50	1029 x 724	1	3-point	21.00	533
CSD423010SS6	42.00 x 30.00 x 10.00	1067 x 762 x 254	14	14	CP4230	CP4230G	40.20 x 28.20	1021 x 716	40.50 x 28.50	1029 x 724	1	3-point	21.00	533
CSD482410SS	48.00 x 24.00 x 10.00	1219 x 610 x 254	14	14	CP4824	CP4824G	46.20 x 22.20	1173 x 564	46.50 x 22.50	1181 x 572	1	3-point	24.00	610
CSD482410SS6	48.00 x 24.00 x 10.00	1219 x 610 x 254	14	14	CP4824	CP4824G	46.20 x 22.20	1173 x 564	46.50 x 22.50	1181 x 572	1	3-point	24.00	610
CSD202012SS	20.00 x 20.00 x 12.00	508 x 508 x 305	16	16	CP2020	CP2020G	18.20 x 18.20	462 x 462	18.50 x 18.50	470 x 470	1	Quarter-turn	10.00	254
CSD202012SS6	20.00 x 20.00 x 12.00	508 x 508 x 305	16	16	CP2020	CP2020G	18.20 x 18.20	462 x 462	18.50 x 18.50	470 x 470	1	Quarter-turn	10.00	254
CSD242412SS	24.00 x 24.00 x 12.00	610 x 610 x 305	14	16	CP2424	CP2424G	22.20 x 22.20	564 x 564	22.50 x 22.50	572 x 572	2	Quarter-turn	5.00	127
CSD242412SS6	24.00 x 24.00 x 12.00	610 x 610 x 305	14	16	CP2424	CP2424G	22.20 x 22.20	564 x 564	22.50 x 22.50	572 x 572	2	Quarter-turn	5.00	127
CSD302412SS	30.00 x 24.00 x 12.00	762 x 610 x 305	14	16	CP3024	CP3024G	28.20 x 22.20	716 x 564	28.50 x 22.50	724 x 572	2	Quarter-turn	5.00	127
CSD302412SS6	30.00 x 24.00 x 12.00	762 x 610 x 305	14	16	CP3024	CP3024G	28.20 x 22.20	716 x 564	28.50 x 22.50	724 x 572	2	Quarter-turn	5.00	127
CSD303012SS	30.00 x 30.00 x 12.00	762 x 762 x 305	14	16	CP3030	CP3030G	28.20 x 28.20	716 x 716	28.50 x 28.50	724 x 724	2	Quarter-turn	5.00	127
CSD303012SS6	30.00 x 30.00 x 12.00	762 x 762 x 305	14	16	CP3030	CP3030G	28.20 x 28.20	716 x 716	28.50 x 28.50	724 x 724	2	Quarter-turn	5.00	127
CSD362412SS	36.00 x 24.00 x 12.00	914 x 610 x 305	14	16	CP3624	CP3624G	34.20 x 22.20	869 x 564	34.50 x 22.50	876 x 572	2	Quarter-turn	5.00	127
CSD362412SS6	36.00 x 24.00 x 12.00	914 x 610 x 305	14	16	CP3624	CP3624G	34.20 x 22.20	869 x 564	34.50 x 22.50	876 x 572	2	Quarter-turn	5.00	127
CSD363012SS	36.00 x 30.00 x 12.00	914 x 762 x 305	14	14	CP3630	CP3630G	34.20 x 28.20	869 x 716	34.50 x 28.50	876 x 724	2	Quarter-turn	5.00	127
CSD363012SS6	36.00 x 30.00 x 12.00	914 x 762 x 305	14	14	CP3630	CP3630G	34.20 x 28.20	869 x 716	34.50 x 28.50	876 x 724	2	Quarter-turn	5.00	127
CSD242416SS	24.00 x 24.00 x 16													


 SECTION Y-Y
(WITH PANEL INSTALLED)

Standard Product One-Door with Window

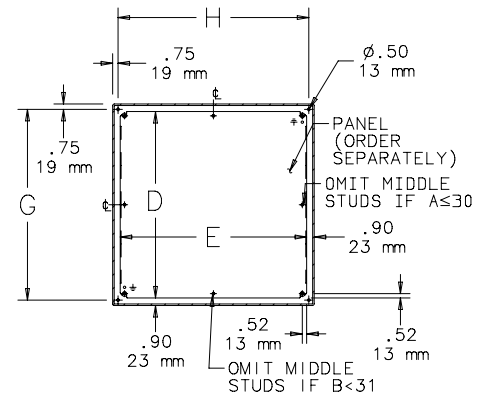
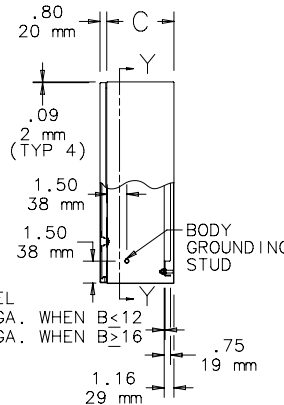
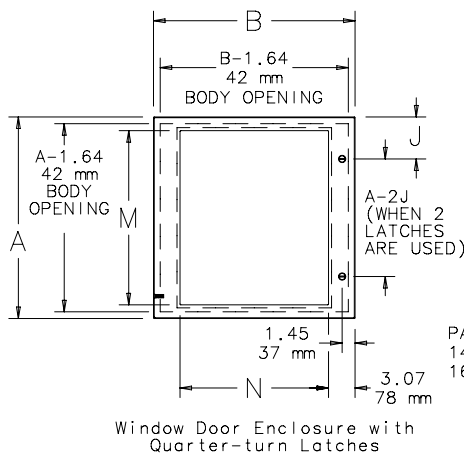
Catalog Number	AxBxC in.	AxBxC mm	Door Ga.	Body Ga.	Panel	Panel Size D x E (in.)	Panel Size D x E (mm)	Mounting G x H (in.)	Mounting G x H (mm)	Window Size M x N (in.)	Window Size M x N (mm)	Latch Qty.	Style	J (in.)	J (mm)
CSD12126WSS	12.00 x 12.00 x 6.00	305 x 305 x 152	16	16	CP1212	10.20 x 10.20	259 x 259	10.50 x 10.50	267 x 267	8.74 x 7.10	222 x 180	1	Quarter-turn	6.00	152
CSD16126WSS	16.00 x 12.00 x 6.00	406 x 305 x 152	16	16	CP1612	14.20 x 10.20	361 x 259	14.50 x 10.50	368 x 267	12.74 x 7.10	324 x 180	1	Quarter-turn	8.00	203
CSD20166WSS	20.00 x 16.00 x 6.00	508 x 406 x 152	16	16	CP2016	18.20 x 14.20	462 x 361	18.50 x 14.50	470 x 368	16.74 x 11.10	425 x 282	1	Quarter-turn	10.00	254
CSD20206WSS	20.00 x 20.00 x 6.00	508 x 508 x 152	16	16	CP2020	18.20 x 18.20	462 x 462	18.50 x 18.50	470 x 470	16.74 x 15.10	425 x 384	1	Quarter-turn	10.00	254
CSD20168WSS	20.00 x 16.00 x 8.00	508 x 406 x 203	16	16	CP2016	18.20 x 14.20	462 x 361	18.50 x 14.50	470 x 368	16.74 x 11.10	425 x 282	1	Quarter-turn	10.00	254
CSD20208WSS	20.00 x 20.00 x 8.00	508 x 508 x 203	16	16	CP2020	18.20 x 18.20	462 x 462	18.50 x 18.50	470 x 470	16.74 x 15.10	425 x 384	1	Quarter-turn	10.00	254
CSD24208WSS	24.00 x 20.00 x 8.00	610 x 508 x 203	16	16	CP2420	22.20 x 18.20	564 x 462	22.50 x 18.50	572 x 470	20.74 x 15.10	527 x 384	1	Quarter-turn	12.00	305
CSD24248WSS	24.00 x 24.00 x 8.00	610 x 610 x 203	14	16	CP2424	22.20 x 22.20	564 x 564	22.50 x 22.50	572 x 572	20.74 x 17.68	527 x 449	2	Quarter-turn	5.00	127
CSD30248WSS	30.00 x 24.00 x 8.00	762 x 610 x 203	14	16	CP3024	28.20 x 22.20	716 x 564	28.50 x 22.50	724 x 572	26.74 x 17.68	679 x 449	2	Quarter-turn	5.00	127
CSD161210WSS	16.00 x 12.00 x 10.00	406 x 305 x 254	16	16	CP1612	14.20 x 10.20	361 x 259	14.50 x 10.50	368 x 267	12.74 x 7.10	324 x 180	1	Quarter-turn	8.00	203
CSD201610WSS	20.00 x 16.00 x 10.00	508 x 406 x 254	16	16	CP2016	18.20 x 14.20	462 x 361	18.50 x 14.50	470 x 368	16.74 x 11.10	425 x 282	1	Quarter-turn	10.00	254
CSD202010WSS	20.00 x 20.00 x 10.00	508 x 508 x 254	16	16	CP2020	18.20 x 18.20	462 x 462	18.50 x 18.50	470 x 470	16.74 x 15.10	425 x 384	1	Quarter-turn	10.00	254
CSD242010WSS	24.00 x 20.00 x 10.00	610 x 508 x 254	16	16	CP2420	22.20 x 18.20	564 x 462	22.50 x 18.50	572 x 470	20.74 x 15.10	527 x 384	1	Quarter-turn	12.00	305
CSD242410WSS	24.00 x 24.00 x 10.00	610 x 610 x 254	14	16	CP2424	22.20 x 22.20	564 x 564	22.50 x 22.50	572 x 572	20.74 x 17.68	527 x 449	2	Quarter-turn	5.00	127
CSD302410WSS	30.00 x 24.00 x 10.00	762 x 610 x 254	14	16	CP3024	28.20 x 22.20	716 x 564	28.50 x 22.50	724 x 572	26.74 x 17.68	679 x 449	2	Quarter-turn	5.00	127
CSD202012WSS	20.00 x 20.00 x 12.00	508 x 508 x 305	14	16	CP2020	18.20 x 18.20	462 x 462	18.50 x 18.50	470 x 470	16.74 x 15.10	425 x 384	1	Quarter-turn	10.00	254
CSD302412WSS	30.00 x 24.00 x 12.00	762 x 610 x 305	14	16	CP3024	28.20 x 22.20	716 x 564	28.50 x 22.50	724 x 572	26.74 x 17.68	679 x 449	2	Quarter-turn	5.00	127

Purchase panels separately.

Optional NEMA style steel and stainless steel panels require conversion kit catalog number CCPM4.

Material is stainless steel Type 304.

For Conductive Panels, add a "C" to the panel catalog number.

CONCEPT Single-Door Wall-Mounted Enclosures with Windows

 SECTION Y-Y
(WITH PANEL INSTALLED)

HF SIDE-MOUNT FILTER FANS



HF04
21 CFM (36 m³/Hr.)

HF05
35 CFM (59 m³/Hr.)

HF09
70 CFM (119 m³/Hr.)

HF10
159 CFM (270 m³/Hr.)

HF13
395 CFM (671 m³/Hr.)
484 CFM (822 m³/Hr.)

INDUSTRY STANDARDS

UL/cUL Listed; File No. E482010

CE
EAC

Type 12 standard on all models
IP54 standard option on all models except HF13
IP55 standard option on all models except HF04

APPLICATION

- Industrial automation
- Automotive assembly
- Package handling equipment
- Food and beverage process controls
- Wind energy systems

FEATURES

- Click-fit design quickly installs into enclosure wall; no tools or screws required
- Opens with the flick of a finger for easy filter replacement
- Enclosure side wall mounting
- Reverse airflow option on HF13 models available to push/pull air through higher static pressure
- Standard rope gasket provides proper seal to the enclosure
- Similar cut-out sizes as other filter fan manufacturers
- Terminal block connections
- Optional thermostat available to save energy and extend service life
- Hinged grille remains attached after opening

SPECIFICATIONS

- Size range from 4 in. (102 mm) to 13 in. (325 mm)
- Free air flow from 21 CFM (36 m³/hr.) to 484 CFM (822 m³/hr.)
- Service life hours from 40,000 to 100,000 hours
- Operating temperature range from -4 F/-20 C to 149 F/65 C

FINISH

- RAL 7035 light-gray, UV-resistant plastic standard
- RAL 9011 black, UV-resistant plastic

Performance Data HF05 35 CFM (59 m³/hr.) Side-Mount Filter Fans

ELECTRICAL DATA				
Rated Voltage	115	230	24*	48*
Frequency (Hz)	50/60	50/60	—	—
Nominal Current Maximum (Amps)	.16/.14	.12/.10	.35	.17
Power Consumption Maximum (Watts)	11.0/10.0	15.0/14.0	8.4	8.2
Power Connection	Terminal Block			
TYPE 12 / IP54 FILTER FANS				
RAL 7035 Light Gray:				
Catalog Number	HF0516414	HF0526414	HF0524414	HF0548414
RAL 9011 Black:				
Catalog Number	HF0516413	HF0526413	HF0524413	HF0548413
Free Airflow (CFM / m ³ /hr.)	35/59	35/59	35/59	35/59
Airflow with 1 Exhaust Grille (CFM / m ³ /hr.)	23/39	23/39	23/39	23/39
Airflow with 2 Exhaust Grilles (CFM / m ³ /hr.)	28/48	28/48	28/48	28/48
TYPE 12 / IP55 FILTER FANS				
RAL 7035 Light Gray:				
Catalog Number	HF0516514	HF0526514	HF0524514	HF0548514
RAL 9011 Black:				
Catalog Number	HF0516513	HF0526513	HF0524513	HF0548513
Free Airflow (CFM / m ³ /hr.)	12/20	12/20	12/20	12/20
Airflow with 1 Exhaust Grille (CFM / m ³ /hr.)	8/14	8/14	8/14	8/14
Airflow with 2 Exhaust Grilles (CFM / m ³ /hr.)	9/15	9/15	9/15	9/15
FILTER FAN UNIT CONSTRUCTION				
Fan RPM	2600/2900	2600/2900	3200	3200
Sound Pressure (dBA at 50/60 Hz)	40/44	40/44	40/44	40/44
Operating Temperature Range:				
Maximum (°F / °C)	131/55	131/55	149/65	149/65
Minimum (°F / °C)	14/-10	14/-10	-4/-20	14/-10
Service Life (hours) at 40 C	40,000	40,000	100,000	100,000
Unit Dimensions - H x W x D (in. / mm)	6.15 x 6.16 x 3.98/156 x 157 x 101			
Cutout Dimensions - H x W (in. / mm)	4.92 x 4.92/125 x 125			
Weight (lb. / kg)	1.77/.80			
TYPE 12 / IP54 EXHAUST GRILLES				
RAL 7035 Light Gray:				
Catalog Number	HG0500404	HG0500404	HG0500404	HG0500404
RAL 9011 Black:				
Catalog Number	HG0500403	HG0500403	HG0500403	HG0500403
TYPE 12 / IP55 EXHAUST GRILLES				
RAL 7035 Light Gray:				
Catalog Number	HG0500504	HG0500504	HG0500504	HG0500504
RAL 9011 Black:				
Catalog Number	HG0500503	HG0500503	HG0500503	HG0500503
ACCESSORIES				
Replacement Filters:				
Type 12 / IP54 Catalog Number	89134424R	89134424R	89134424R	89134424R
Type 12 / IP55 Catalog Number	89136408R	89136408R	89136408R	89136408R
Thermostat Catalog Number (°F)	THERM16F	THERM26F	—	—
Thermostat Catalog Number (°C)	THERM16C	THERM26C	—	—
Shroud Catalog Number	HH05GS35001, HH05GS61001, HH05SS04001			

Above airflow rates at 60 Hz; see performance curves for airflow at 50 Hz and more details.

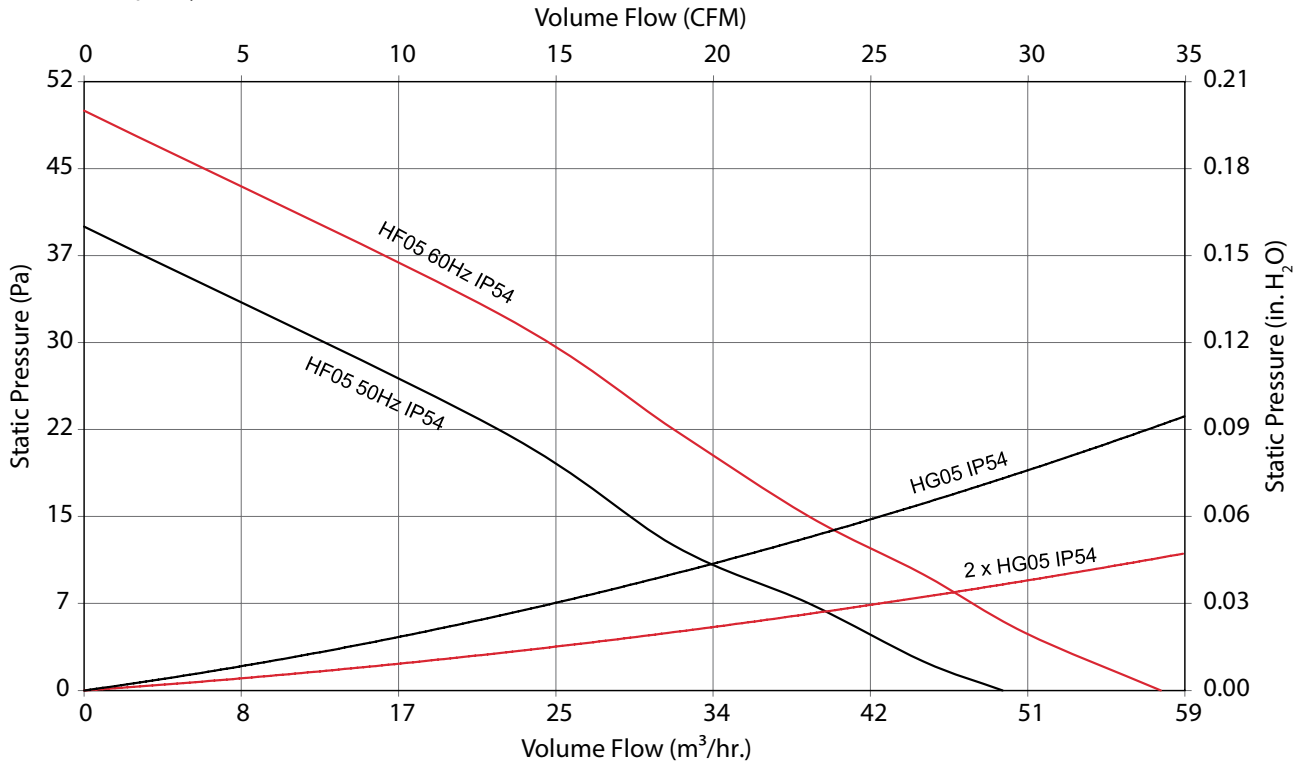
Unit depth is from the back edge of the grille to the back of the fan.

Exhaust Grilles sold separately.

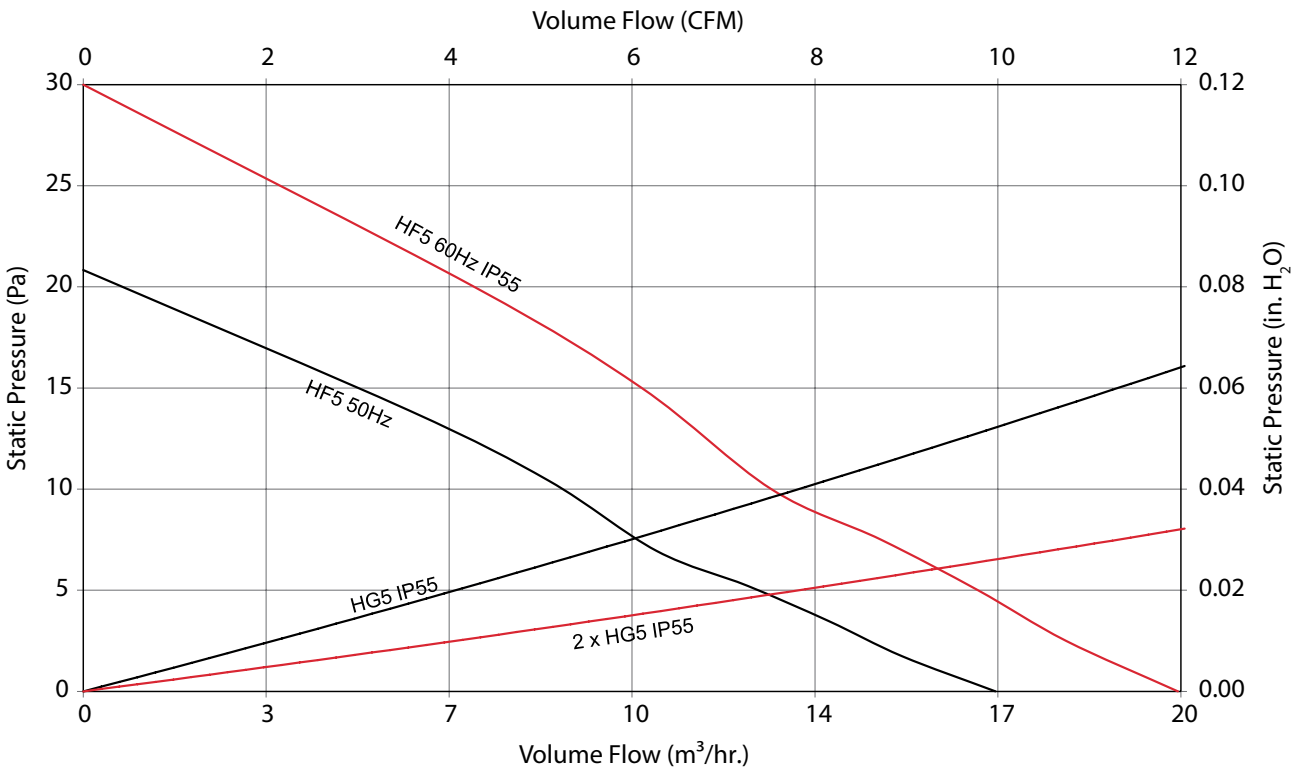
* This indicates a DC Voltage.

Performance Curves for HF05 Models 35 CFM (59 m³/hr.) Side-Mount Filter Fans

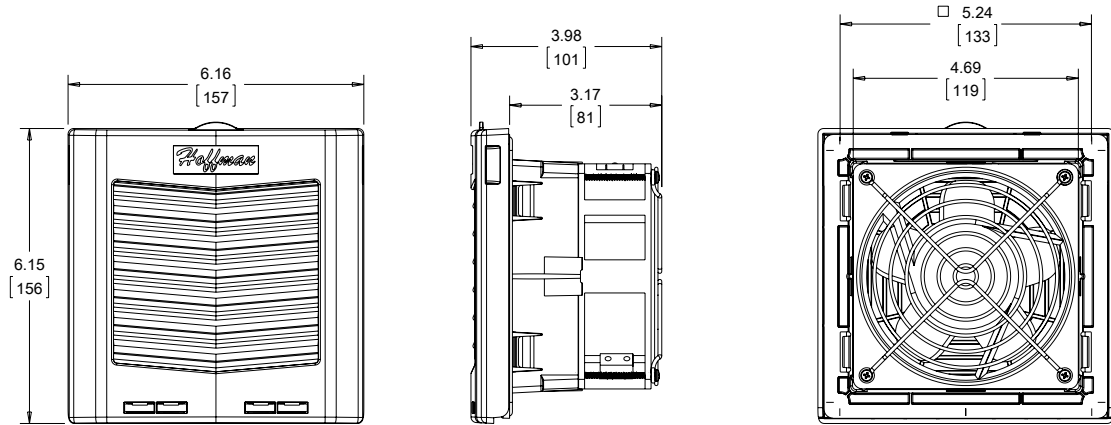
HF05 Capacity Curve, IP54



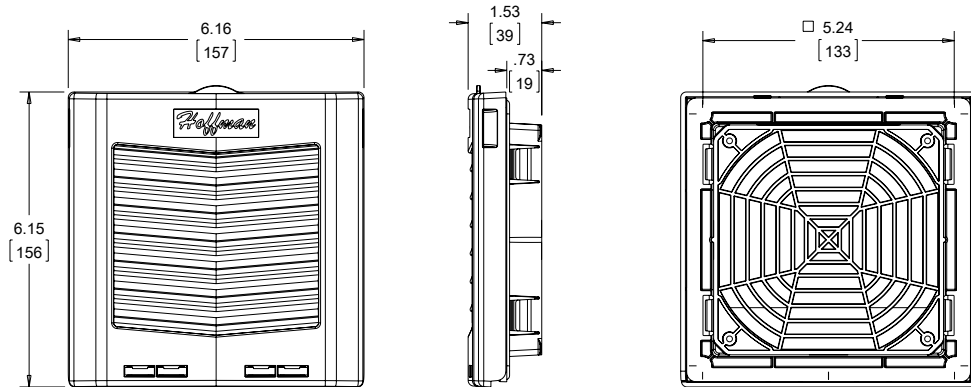
HF05 Capacity Curve, IP55



HF05 35 CFM (59 m³/hr.) Side-Mount Filter Fans

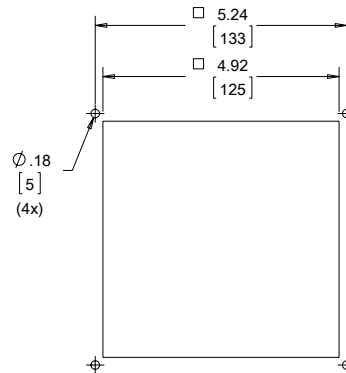


Exhaust Grille



Order exhaust grille kits separately.

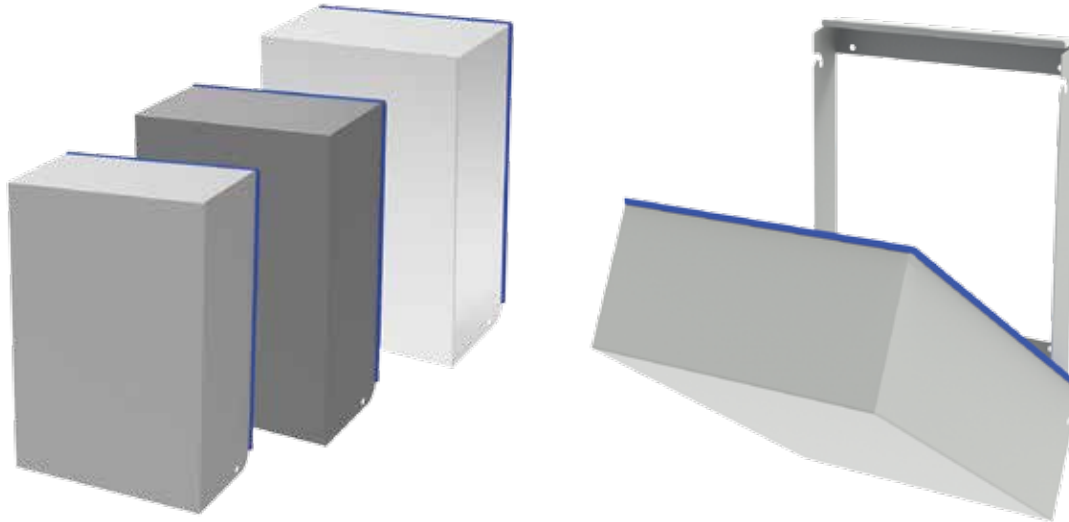
89140583



Cutout Dimensions

Visit nVent.com/HOFFMAN to download 2D and 3D CAD drawings into the overall design of your electrical system.

FILTER FAN SHROUDS, TYPE 4/4X



INDUSTRY STANDARDS

Maintains UL/cUL Listed Type 4 and Type 4X rating when properly installed on a Type 4 or Type 4X enclosure.

UL 508A UL/cUL Listed; Type 4, 4X; File No. E482010

CE
EAC

APPLICATION

- Outdoor telecommunication
- Outdoor displays
- Security systems
- Industrial automation
- Automotive assembly
- Package handling equipment
- Wind energy systems

FEATURES

- Protects filter fan and exhaust grill from standard washdown procedures
- Meets Type 4/4X standards when used with HF or TFP Type 12 Filter Fans and Grilles
- Hinge allows the shroud to be opened at a 45-degree angle for easy filter replacement
- Hinge design also allows for easy and complete removal for cleaning
- 10-degree, sloped top design
- Only reduces filter fan airflow by 10 percent
- Easy one person installation with simple back panel mounting; hardware included
- FDA approved blue silicone gasket that is easily replaceable
- Pre-drilled side holes allow for locking provision on side

FINISH

- RAL 7035 light gray polyester powder coat paint on mild steel
- ANSI 61 gray polyester powder coat paint on mild steel
- Stainless Steel #304

NOTES

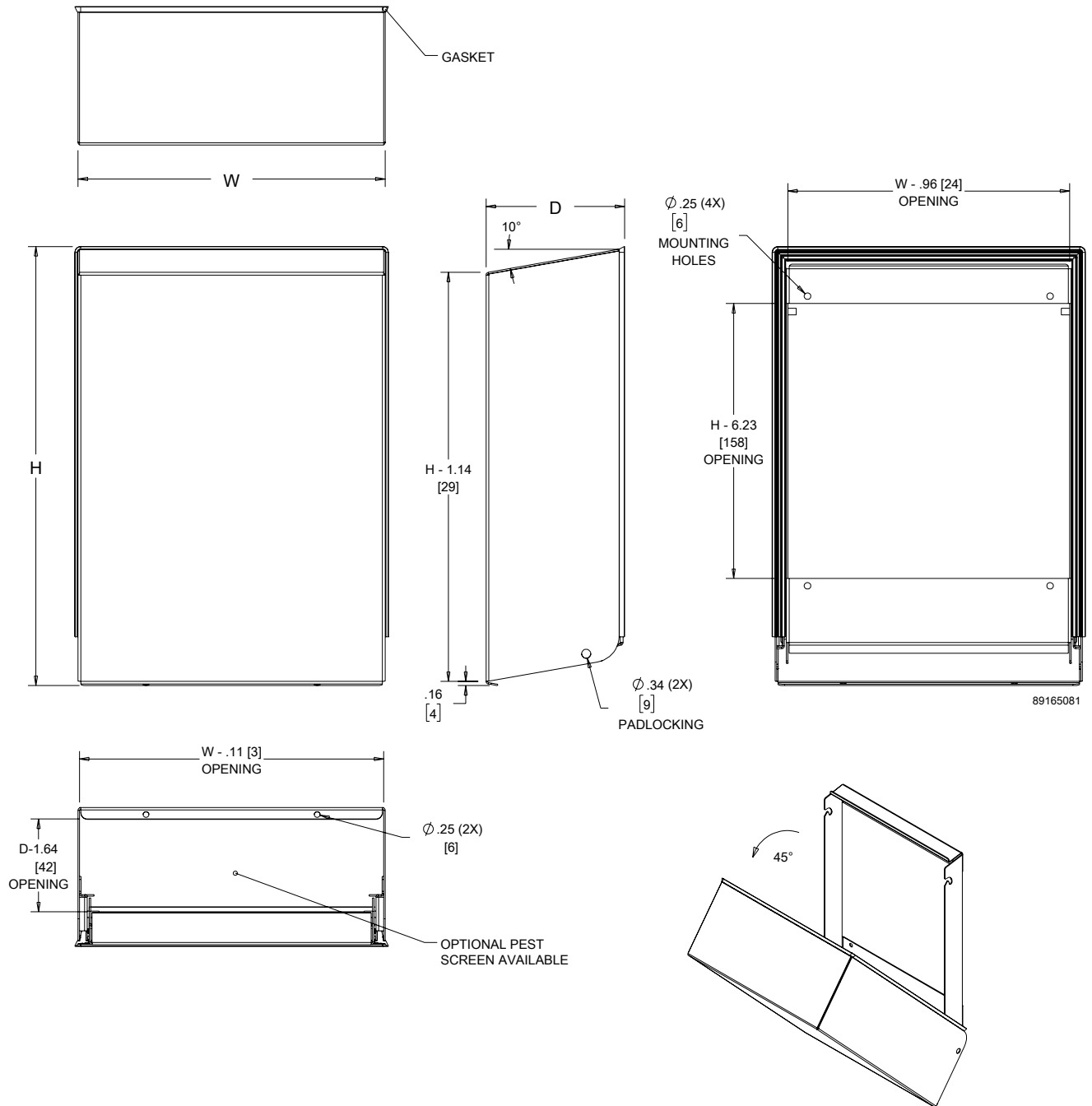
Hoffman Type 4/4X shrouds are for general ventilating use only and are not suitable in all applications or environments. Spraying water directly up the bottom of the shroud will incur water ingress.

To protect sensitive components against condensation, an enclosure heater or closed-loop cooling is recommended.
To protect sensitive components against corrosive elements, closed-loop cooling is recommended.

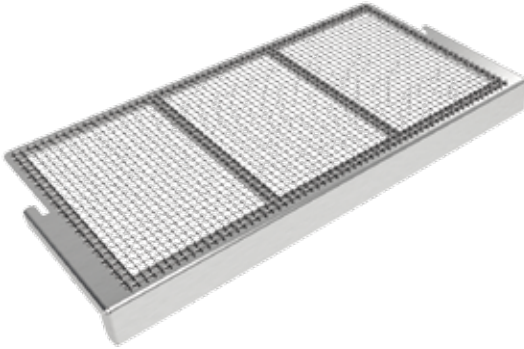
The shroud Type 4/4X UL rating contingent on proper use of nVent HOFFMAN Type 12 filter fans with filter media.

Performance Data

HH05 Models			
Catalog Number	HH05MS35004	HH05MS61004	HH05SS04004X
Provides protection for:			
HF Filter Fan Models	HF04 and HF05	HF04 and HF05	HF04 and HF05
HG Exhaust Grille Models	HG04 and HG05	HG04 and HG05	HG04 and HG05
Unit Construction			
Material	Mild Steel	Mild Steel	Stainless Steel #304
Finish	RAL 7035 polyester powder coat paint	ANSI 61 polyester powder coated paint	Brushed
Unit Dimensions H x W x D (in./mm)	12.33 x 7.70 x 3.40 313 x 196 x 86	12.33 x 7.70 x 3.40 313 x 196 x 86	12.33 x 7.70 x 3.40 313 x 196 x 86
HH09 Models			
Catalog Number	HH09MS35004	HH09MS61004	HH09SS04004X
Provides protection for:			
HF Filter Fan Models	HF09	HF09	HF09
HG Exhaust Grille Models	HG09	HG09	HG09
TFP Side-Mount Fans	TFP41UL12, TFP42UL12	TFP41UL12, TFP42UL12	TFP41UL12, TFP42UL12
Unit Construction			
Material	Mild Steel	Mild Steel	Stainless Steel #304
Finish	RAL 7035 polyester powder coat paint	ANSI 61 polyester powder coated paint	Brushed
Unit Dimensions H x W x D (in./mm)	14.58 x 9.70 x 4.60 370 x 246 x 117	14.58 x 9.70 x 4.60 370 x 246 x 117	14.58 x 9.70 x 4.60 370 x 246 x 117
HH10 Models			
Catalog Number	HH10MS35004	HH10MS61004	HH10SS04004X
Provides protection for:			
HF Filter Fan Models	HF10	HF10	HF10
HG Exhaust Grille Models	HG10	HG10	HG10
TFP Side-Mount Fans	TFP61UL12, TFP62UL12	TFP61UL12, TFP62UL12	TFP61UL12, TFP62UL12
Unit Construction			
Material	Mild Steel	Mild Steel	Stainless Steel #304
Finish	RAL 7035 polyester powder coat paint	ANSI 61 polyester powder coated paint	Brushed
Unit Dimensions H x W x D (in./mm)	16.66 x 11.90 x 5.20 423 x 302 x 132	16.66 x 11.90 x 5.20 423 x 302 x 132	16.66 x 11.90 x 5.20 423 x 302 x 132
HH13 Models			
Catalog Number	HH13MS35004	HH13MS61004	HH13SS04004X
Provides protection for:			
HF Filter Fan Models	HF13	HF13	HF13
HG Exhaust Grille Models	HG13	HG13	HG13
TFP Side-Mount Fans	TFP101UL12, TFP102UL12	TFP101UL12, TFP102UL12	TFP101UL12, TFP102UL12
Unit Construction			
Material	Mild Steel	Mild Steel	Stainless Steel #304
Finish	RAL 7035 polyester powder coat paint	ANSI 61 polyester powder coated paint	Brushed
Unit Dimensions H x W x D (in./mm)	19.50 x 14.30 x 6.10 495 x 363 x 155	19.50 x 14.30 x 6.10 495 x 363 x 155	19.50 x 14.30 x 6.10 495 x 363 x 155

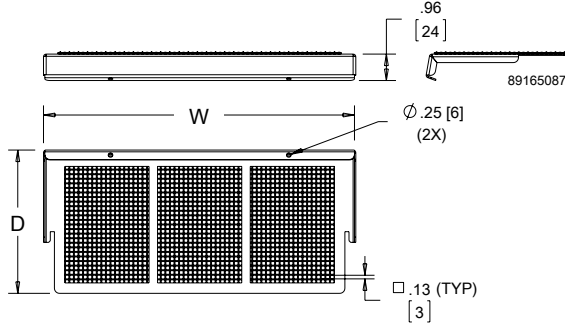


FILTER FAN SHROUD, TYPE 4/4X PEST SCREENS

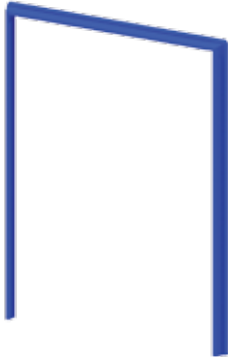


Stainless steel frame and mesh with 0.13 (3 mm) holes to keep large pests and debris from entering and clogging filter media.

CATALOG NUMBER	Description	W (in./mm)	D (in./mm)
HH05PS004	5-inch shroud pest screen	7.41 188	3.43 87
HH09PS004	9-inch shroud pest screen	9.46 240	4.61 117
HH10PS004	10-inch shroud pest screen	9.49 241	5.23 133
HH13PS004	13-inch shroud pest screen	14.07 357	6.11 155



FILTER FAN SHROUD, TYPE 4/4X REPLACEMENT GASKET



FDA approved, blue silicone gasket that is easily replaceable.

CATALOG NUMBER	Description
HH05RGKSP	5-inch shroud replacement gasket
HH09RGKSP	9-inch shroud replacement gasket
HH10RGKSP	10-inch shroud replacement gasket
HH13RGKSP	13-inch shroud replacement gasket



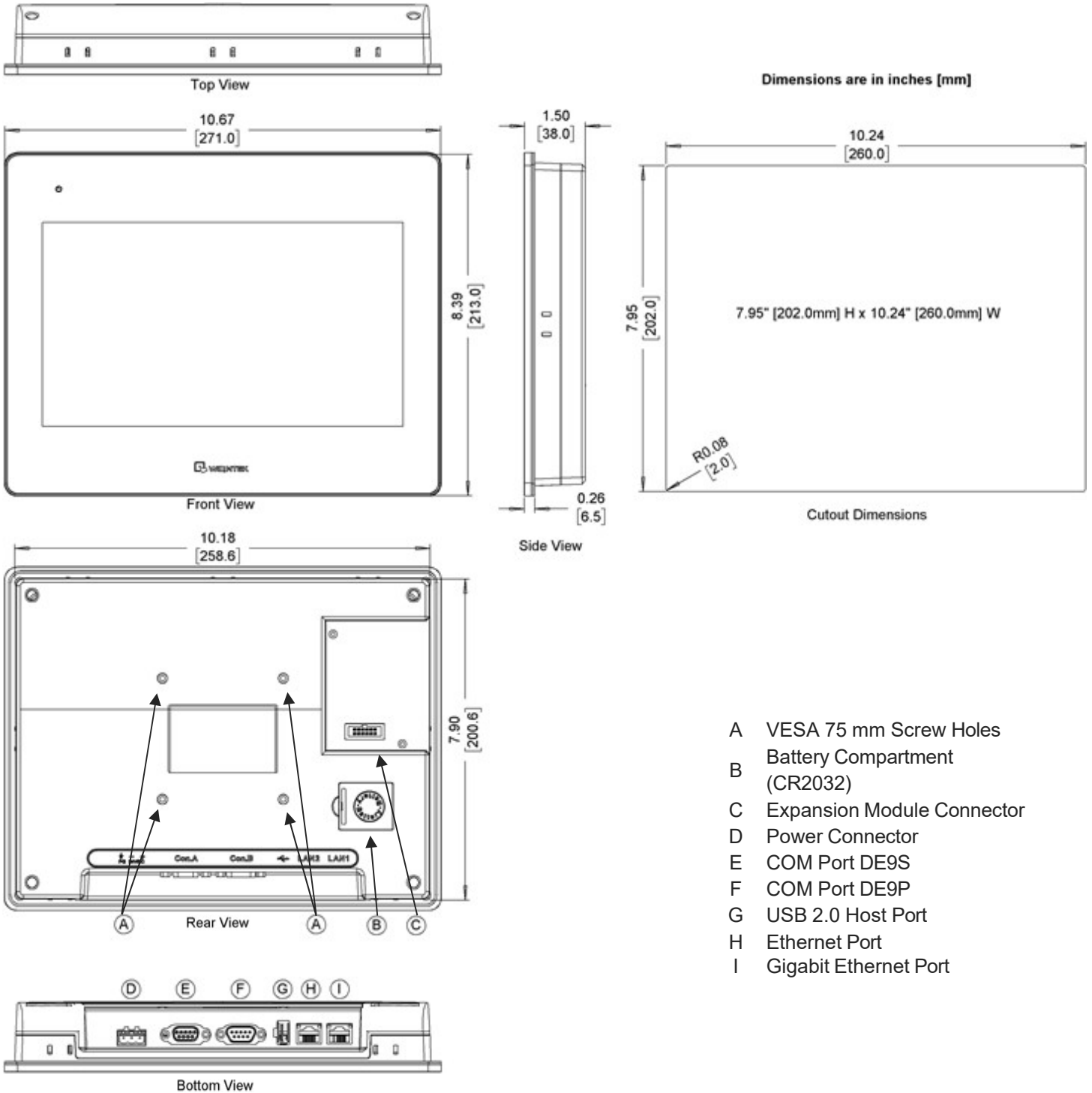
10.1" Touchscreen HMI with IIoT Features



- Wireless Compatibility via M02 Wi-Fi Expansion Module*
- High-Speed Screen Update
- Built-In Edge Gateway Function
- E-mail Alarm Notification
- Recipe Functionality, PDF Reader



System	CPU	Quad-Core RISC
	Memory (RAM)	1 GB
	Memory (Flash)	4 GB
	RTC	Built-in
I/O Ports	Serial	1 x DE9P COM1: RS-232, COM3: RS-232** 1 x DE9S COM2: RS-485 2 or 4 wire, COM3: RS-485 2 wire
	LAN	1 x 10/100 Base-T RJ-45, 1 x GbE RJ-45
	CANbus	N/A
	USB Host	1 x USB 2.0
	USB Client	N/A
	Audio	N/A
	Video	N/A
	Wi-Fi*	M02 Wi-Fi Expansion Module (optional – see notes)
	HDMI®	N/A
	SD Card Slot	N/A
Display	Display Type	10.1" TFT LCD
	Size (W x H)	8.82 x 4.96 inches [224 x 126 mm]
	Max. Resolution	1024 x 600
	Max. Color	16.7 M
	Luminance (cd/m²)	350
	View Angle (H°/V°)	160/140
	Contrast Ratio	500:1
Backlight Lifetime (Hours)	50,000+	
Touch Screen	Type	4-wire resistive touch
	Active Area Accuracy	Length (X) ±2%, width (Y) ±2%
Electrical	Input Voltage	24 ± 20% VDC
	Input Current	1 A @ 24 VDC
	Input Power	24 W
	Power Isolation	Built-in
	Isolation Resistance	Exceed 50 MΩ at 500 VDC
Mechanical	Enclosure	Plastic, Black
	PCB Coating	Yes
	Dimensions (W x H x D)	10.67 x 8.39 x 1.50 inches [271 x 213 x 38 mm]
	Panel Cutout (W x H)	10.24 x 7.95 inches [260 x 202 mm]
	Net Weight	Approx. 2.65 lbs. [1.2 kg]
Environmental	Mounting	Panel mounting, VESA 75 x 75 mm
	Operating Temperature	32° ~ 122°F [0° ~ 50°C]
	Storage Temperature	-4° ~ 140°F [-20° ~ 60°C]
	Relative Humidity	10% ~ 90% (non-condensing)
	Vibration Endurance	10 to 25 Hz (X, Y, Z direction, 2G, 30 minutes)
	Rating	UL Type 4X (indoor use only), NEMA 4, IP66 compliant front panel
Software	Certifications	cULus, CE, RoHS
	Software	EBPro (v6.08.01 or later), EasyAccess 2.0 (Optional), CODESYS® (Optional) IIoT Ready, MQTT, Sparkplug B, VNC, CMTViewer, Webview
Notes	<p>* M02 Wi-Fi Expansion Module (sold separately – see website Product Page or contact Maple Systems for information) **Only Tx and Rx may be used for COM1 RS-232 while COM3 RS-232 is in use. MPI is not supported.</p> <p>Codesys® is a trademark of 3S-Smart Software Solutions GmbH Specifications subject to change without notice</p>	



- A VESA 75 mm Screw Holes
- B Battery Compartment (CR2032)
- C Expansion Module Connector
- D Power Connector
- E COM Port DE9S
- F COM Port DE9P
- G USB 2.0 Host Port
- H Ethernet Port
- I Gigabit Ethernet Port

Why Buy A Maple HMI

In addition to our powerful and affordable hardware, we'll also continue to support your company long after a sale. Wide product selection, large in-stock inventory, outstanding product warranty, free technical support and software, and in-house repairs with quick turnaround times, Maple Systems has your business covered.



Add Remote IO for PLC Functionality

Select Maple Advanced and High-Performance HMIs have a sleek hardware platform that runs both an HMI application created with our free HMI software and PLC logic programmed with CODESYS; each on its own dedicated processor. Unlike the typical multicore set up, where the operating system scheduler is responsible for allocating tasks to each processor, these HMIs have a hard separation between cores. One core is dedicated to the HMI application, the other to executing PLC logic of the CODESYS project. This ensures taxing graphics processing operations will not interfere with deterministic real time control tasks executing on the other processor.

After selecting your HMI, choose from a suite of easy to use [powerful I/O modules](#) to connect to your field equipment. We offer a complete set of I/O modules which can be combined with one of our communication couplers to create a remote I/O block.

Remote Access and the IIoT

[Remote access](#) is the ability to access an HMI or connected device, from another device, at any time, and from anywhere. With our [free HMI software](#) and supported hardware solutions, you have the freedom to access the HMI, and all its data and applications, from another device and control it as if you were standing in front of it. Our Advanced and High-Performance HMIs support [cMT Viewer](#), [WebView](#), Web Streaming, and [EasyAccess 2.0](#) and are designed to make accessing your HMI and data fast and streamlined.

Let us serve as your guide, making it an easy process to join the next evolution of automated control. Our Advanced and High-Performance HMIs can act as an access point enabling operating equipment on the plant floor to connect to information technologies of the Industrial Internet of Things (IIoT). With our IIoT solutions, that are already included in the EBPro software, we can help you achieve better access to invaluable data and open a world of possibilities for your business. Read more about our [IIoT solutions](#).

Build your SCADA

We offer all the components you need to create your own unique level of supervisory data acquisition and control, from the simplest stand-alone machine to sophisticated multi-device networked production line(s), all the way to enterprise-level operations and IIoT functionalities leveraging cloud connectivity.

Our products can help you standardize communications between devices, gluing different systems together for one source to your SCADA. No need to redesign your entire application. Keep the components that are already working for you, just add Maple Systems components to grow your abilities to supervise, control, and acquire data.

Incredible Functionality Out of the Box

- Easily and quickly create the project with functional objects including numeric object, lamp object, combo-button, alarms, and recipes
- Pick and place objects, pictures, and shapes
- Import/export recipes
- Create trend display, graphs, XY plots, and pie charts
- Add passwords and security levels
- Assign communication (PLC) drivers easily and more with our Free HMI software

Additionally our HMIs support remote access solutions with VNC, MQTT, and OPC UA. For additional features see our High-Performance HMI series.



User Friendly HMI Configuration Software

Because designing the layout of screens and user-interface (UI) of the HMI is typically where most of the development time is spent, we've made our Free HMI configuration software easy to use.

- Import tags feature
- Tools to diagnose and monitor PLC to HMI connection
- Debugging tools
- Pre-built libraries
- Off-line and on-line simulation

These are just a few of the ways our software makes creating your project easier. We also have controller information sheets, cable drawings, sample projects, Getting Started Guides, and videos/tutorials available in our [support center](#) 24/7.



Programmable Logic Controller (PLC) Connectivity

With over 300 PLC & Controller communication protocols, these HMIs will easily integrate with your preferred PLC brands, including:

Allen-Bradley
Siemens
Omron
Emerson
GE
Panasonic
Mitsubishi
[...and many more](#)

Allen-Bradley **ABB** babcock™

BALDOR *Danfoss* SIEMENS

MITSUBISHI **Parker**

TOSHIBA YASKAWA **Koyo**

Matsushita

Panel Mount HMI Feature Overview

With few exceptions, all our Standard HMIs support (this covers all the HMI prefix models, ex: HMI5043L/LB, HMI5070L/LB):	With few exceptions, all our Advanced HMIs support (this covers all the cMT2xxx series):	With few exceptions, all our High Performance HMIs support (this covers all the cMT3xxx series HMIs):
Alarm & Event Messages	Alarm & Event Messages	Alarm & Event Messages
Animation - Flow Block	Animation - Flow Block	Animation - Flow Block
ASCII Characters	ASCII Characters	ASCII Characters
Bar Graphs	Bar Graphs	Bar Graphs
Combo Button	Combo Button	Combo Button
Data Logging and Sampling	Data Logging and Sampling	Data Logging and Sampling
Date / Time	Date / Time	Date / Time
Dynamic Drawing	Dynamic Drawing	Dynamic Drawing
Dynamic Scale	Dynamic Scale	Dynamic Scale
EasyAccess 2.0	EasyAccess 2.1	EasyAccess 2.0
EasyWatch	EasyWatch	EasyWatch
Enhanced Security Mode	Enhanced Security Mode	Enhanced Security Mode
Event Alarm Log	Event Alarm Log	Event Alarm Log
File Browser	File Browser	File Browser
Grid Display	Grid Display	Grid Display
Languages (Up to 24)	Languages (Up to 24)	Languages (Up to 24)
Libraries	Libraries	Libraries
Macros	Macros	Macros
Meters & Gauges	Meters & Gauges	Meters & Gauges
Modbus	Modbus	Modbus
Objects (Grouping, Layering, Aligning, Flip)	Objects (Grouping, Layering, Aligning, Flip)	Objects (Grouping, Layering, Aligning, Flip)
Off-line / On-line Simulation	Off-line / On-line Simulation	Off-line / On-line Simulation
OPC UA Client	OPC UA Client	OPC UA Client
Operation Log	Operation Log	Operation Log
Pass-Through Mode	Pass-Through Mode	Pass-Through Mode
Picture Object	Picture Object	Picture Object
Picture Viewer	Picture Viewer	Picture Viewer
Pie Chart	Pie Chart	Pie Chart
PLC Tag Embedded in Project	PLC Tag Embedded in Project	PLC Tag Embedded in Project
Project Password	Project Password	Project Password
Recipes	Recipes	Recipes
Remote Access	Remote Access	Remote Access
Scheduler	Scheduler	Scheduler
Security Levels (Enhanced)	Security Levels (Enhanced)	Security Levels (Enhanced)
System Setting Editor	System Setting Editor	System Setting Editor
Table	Table	Table
Text Object	Text Object	Text Object
Timer Object	Timer Object	Timer Object
Trend Display (Graphs)	Trend Display (Graphs)	Trend Display (Graphs)
User-Defined Start-Up Screen	User-Defined Start-Up Screen	User-Defined Start-Up Screen
Utility Manager	Utility Manager	Utility Manager
VNC Server	VNC Server	VNC Server
XY Plot	XY Plot	XY Plot
Email (1)	Email	Email
Macro Windows Open / Cycle / Close (1)	Macro Windows Open / Cycle / Close	Macro Windows Open / Cycle / Close
MQTT (1)	MQTT	MQTT
String Table (1)	String Table	String Table
Time Synchronization (1)	Time Synchronization	Time Synchronization
USB Tethering (1)	USB Tethering	USB Tethering
VNC Viewer (1)	VNC Viewer	VNC Viewer
	IP Camera	IP Camera
	USB Camera	USB Camera
	Animation (Objects, Word Lamp, GIFs, Moving Shape)	Animation (Objects, Word Lamp, GIFs, Moving Shape)
	BACnet	BACnet
	CANbus	CANbus
	cMT Diagnoser	cMT Diagnoser
	cMT Viewer Support	cMT Viewer Support
	CODESYS (2)	CODESYS (2)
	Media Player	Media Player
	MQTT - Advanced JSON	MQTT - Advanced JSON
	MQTT - AWS IoT, Sparkplug B, Azure IoT Hub, Google Cloud IoT Core	MQTT - AWS IoT, Sparkplug B, Azure IoT Hub, Google Cloud IoT Core
	PDF Reader	PDF Reader
	Web Streaming	Web Streaming
	WebView	WebView
		Barcode Scanner (Android Camera)
		Database Server
		File Transfer Protocol (FTP)
		OPC UA Server
		PLC Web Browser
		SQL Database Server Integration

This table is for illustration only and subject to change. Always check the software to see if a feature is supported in your specific hardware.

(1) Not supported in the B Series

(2) Not supported on the cMT2166X

ATQR

Time Delay/Class CC

UL/CSA LISTED POWER FUSES

TAKE CONTROL OF FAULT CURRENTS HEADED FOR YOUR CONTROL TRANSFORMER



ATQR small-dimension fuses feature time-delay characteristics ideally suited for the high inrush currents of control transformers, solenoids, and similar inductive loads. Mersen's ATQR fuses provide superior protection for the branch circuits of electrical distribution systems.

FEATURES/BENEFITS:

- Time-delay for control transformer inrush loads without nuisance opening
- Highly current-limiting for low peak let-thru current
- Rejection-style design prevents replacement errors (when used with recommended fuse blocks)
- High visibility orange label ensures instant brand recognition, and simplifies replacement
- Metal-embossed date and catalog number for traceability and lasting identification
- Fiberglass body provides dimensional stability in harsh industrial settings
- High-grade silica filler ensures fast arc quenching and high current limitation

HIGHLIGHTS:

- Time-delay
- Best choice for small transformer protection
- Current-limiting

RATINGS:

Volts: 600VAC (1/10-30A),
300VDC (3-2/10 - 30A)

Amps: 1/10 to 30A

IR: 200kA I.R. AC, 100kA I.R. DC

APPLICATIONS:

- Control transformers
- Solenoids
- Inductive loads
- Lighting, heating & general-purpose loads

Note: See motor fuse applications tables for more information

APPROVALS:

- UL listed to standard 248-4 File E2137
- DC listed to UL standard 248
- CSA certified to standard C22.2 No. 248.4



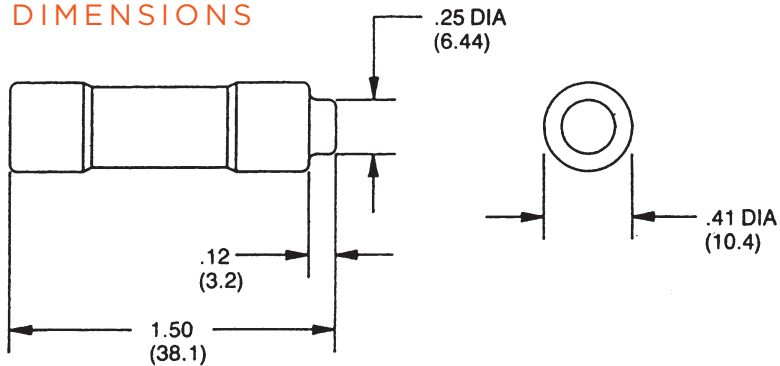
CATALOG NUMBERS (AMPS)

ATOR1/10	ATOR8/10	ATOR2-8/10	ATOR7-1/2
ATOR1/8	ATOR1	ATOR3	ATOR8
ATOR3/16	ATOR1-1/8	ATOR3-2/10	ATOR9
ATOR2/10	ATOR1-1/4	ATOR3-1/2	ATOR10
ATOR1/4	ATOR1-4/10	ATOR4	ATOR12
ATOR3/10	ATOR1-1/2	ATOR4-1/2	ATOR15
ATOR4/10	ATOR1-6/10	ATOR5	ATOR17-1/2
ATOR1/2	ATOR1-8/10	ATOR5-6/10	ATOR20
ATOR6/10	ATOR2	ATOR6	ATOR25
ATOR3/4	ATOR2-1/4	ATOR6-1/4	ATOR30
	ATOR2-1/2	ATOR7	

RECOMMENDED FUSE BLOCKS
FOR CLASS CC FUSES

Number of Poles	Catalog Numbers			
	UltraSafe™ Indicating Fuse Holder	Screw Connector w/ Double Quick Connects	Pressure Plate Connector w/ Double Quick Connects	Copper Box Connector
ADDER		30310R	30320R	30350R
1	USCC1I	30311R	30321R	30351R
2	USCC2I	30312R	30322R	30352R
3	USCC3I	30313R	30323R	30353R
3	USFMCCI			

DIMENSIONS



TRM

Time-Delay Midget Fuses

MIDGET, PC MOUNT & MINIATURE FUSES

MF



Tri-Onic® TRM time-delay midget fuses are rated 250 volts AC and are offered in ampere ratings from 1/10 to 30A. They have 12 seconds time-delay at 200% rating to provide supplemental protection of small motors, small transformers and other high inrush loads, plus many other 250 volt applications. (Not for Branch Circuit Protection).

FEATURES/BENEFITS:

- Numerous ratings for a wide variety of applications
- 250VAC rating in all sizes up to 30A
- Time-delay for circuits with high inrush current
- Can be used with UltraSafe™ fuse holders
- 1 1/2" x 13/32" (10mm x 38mm) dimensions

CATALOG NUMBERS (AMPS)

TRM1/10	TRM4/10	TRM1-1/8	TRM2	TRM3-2/10	TRM5-6/10	TRM8	TRM15
TRM15/100	TRM1/2	TRM1-1/4	TRM2-1/4	TRM3-1/2	TRM6	TRM9	TRM20
TRM2/10	TRM6/10	TRM1-4/10	TRM2-1/2	TRM4	TRM6-1/4	TRM10	TRM25
TRM1/4	TRM8/10	TRM1-6/10	TRM2-8/10	TRM4-1/2	TRM7	TRM12	TRM30
TRM3/10	TRM1	TRM1-8/10	TRM3	TRM5			

RECOMMENDED FUSE BLOCKS for Midget (10x38mm) Fuses

Number of Poles	Catalog Number			
	UltraSafe™ Indicating Fuse Holder	Screw Connector	Pressure Plate Connector	Copper Box Connector
Adder		30310	30320	30350
1	USM1I	30311	30321	30351
2	USM2I	30312	30322	30352
3	USM3I	30313	30323	30353
3	USFM10I			

RATINGS:

- **Volts:** 250VAC
- **Amps:** 1/10 to 30A
- **I.R.:** 10kA I.R.

HIGHLIGHTS:

- Time-delay

APPLICATIONS:

- Small motors
- Small transformers
- Lighting circuits
- Control circuits

APPROVALS:

- UL listed to standard 248-14 File E33925
- CSA Certified to Standard C22.2 No. 248.14



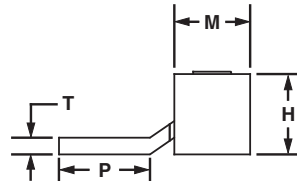
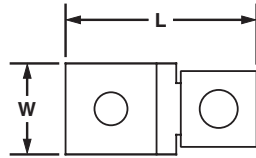


One-Hole, Single Piece, Straight Fixed Tongue Lug

For Use with Stranded Copper Code Conductors

Type CXS

- Made from a single piece of high strength electrolytic copper to provide premium electrical and mechanical performance
- Patented one piece design. Provides premium electrical and mechanical
- Wide wire range-taking capability minimizes inventory requirements
- Serrations incorporated in barrel of connector to provide premium wire pullout strength of wire termination
- Plated, fillister head, steel set screw provides high strength, durable electrical contact between conductor and connector
- cULus Listed for use for up to 600 V and temperature rated to 90 C where applicable



Part Number	Copper Conductor Size Range	Stud Hole Size (In.)	Figure Dimensions (In.)					Std. Pkg. Qty.
			L	W	H	T	M	
CXS35-36-C	14 AWG - 6 AWG	3/16	1.08	0.38	0.39	0.05	0.47	100
CXS70-14-C	14 AWG - 4 AWG	1/4	1.28	0.5	0.5	0.06	0.53	
CXS125-14-Q	4 AWG - 1/0 AWG	1/4	1.6	0.62	0.73	0.09	0.65	25
CXS125-56-Q	4 AWG - 1/0 AWG	5/16						

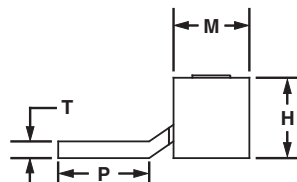
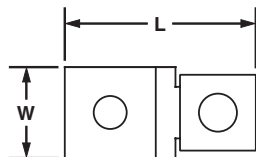


One-Hole, Single Piece, Straight Fixed Tongue, Tin-Plated

For Use with Stranded Copper Code Conductors

Type CXS-T

- Made from a single piece of high strength electrolytic copper to provide premium electrical and mechanical performance
- Patented one piece design. Provides premium electrical and mechanical
- Wide wire range-taking capability minimizes inventory requirements
- Serrations incorporated in barrel of connector to provide premium wire pullout strength of wire termination
- Plated, fillister head, steel set screw provides high strength, durable electrical contact between conductor and connector
- cULus Listed for use for up to 600 V and temperature rated to 90°C where applicable
- Tin-plated to inhibit corrosion



Part Number	Copper Conductor Size Range	Stud Hole Size (In.)	Figure Dimensions (In.)					Std. Pkg. Qty.
			L	W	H	T	M	
CXS35-36T-C	14 AWG - 6 AWG	3/16	1.08	0.38	0.39	0.05	0.47	100
CXS70-14-T-C	14 AWG - 4 AWG	1/4	1.28	0.5	0.5	0.06	0.53	100
CXS125-14T-Q	4 AWG - 1/0 AWG	1/4	1.6	0.62	0.73	0.09	0.65	25
CXS125-56T-Q	4 AWG - 1/0 AWG	5/16						

STFV Plus Series – Active Tracking® Filtering with Surge Protection



The SolaHD STFV Plus Series combines Active Tracking® filtration for low energy noise and surge protection for high energy transients. It continuously tracks the input AC power line responding instantly into action upon detecting extraneous high frequency noise and high voltage transients caused by everyday events such as turning on machinery, motors, or equipment.

These devices are designed to meet UL 1283 for Electromagnetic Interference Filters. STFV Plus attenuates or reduces the amplitude of high frequency noise to a maximum of 90dB that occurs in a range of 100 kHz to 50 MHz. STFV Plus provides the industry's best IEEE C62.41 Category "A & B" Ringwave protection.

They are built to meet your unique requirements, and are available in hardwired, single phase configuration. They are designed for years of trouble free operation and require little or no operator intervention after installation.

Active Tracking® Filters Plus is one part of a total power quality solution. They can be used alone or in conjunction with other SolaHD products to solve more complex power quality problems.

Features

- Non degrading, series Filter/TVSS technology for total durability
- UL Listed surge current capacity – 25,000 Amps
- High impact plastic case, epoxy encapsulated enclosure
- Transient protection in all modes (L-N, L-G, and N-G)
- Single Phase applications up to 30 Amp
- Operating Temperature from -40°C to +60°C
- Hardwired connection
- LED power indication
- UL 1283
- 10 Year Limited Warranty



Applications

- Branch and Control Panels
- Factory Automation Installations
- Point of Use Industrial Service Equipment
- Programmable Logic Controllers
- Dedicated Industrial and Machine tools
- Telecommunications and IT equipment

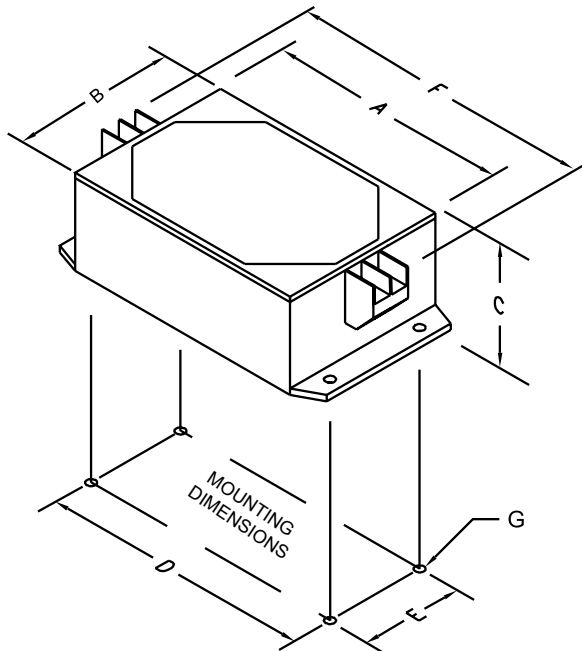
Related Products

- Power Conditioners
- Uninterruptible Power System
- Power Supplies

Selection Table

Catalog Number	Amps	Case Dim. (in) A x B x C	Mounting Flange Dim. (in) D x E x F x G	Number Min. Wire Size (AWG Suggested)	Screw Size	Fuse/Circuit Breaker Ampacity		Weight lbs (kg)
						Suggest	Max	
Single-Phase Models (120 Vac)								
STFV025-10N	2.5	4.0 x 2.88 x 1.81	4.38 x 2.12 x 5.31 x 0.19	26	#6	2.5	3.125	1.0 (.45)
STFV050-10N	5.0	4.0 x 2.88 x 1.81	4.38 x 2.12 x 5.31 x 0.19	22	#6	5	6.25	1.3 (.59)
STFV075-10N	7.5	4.75 x 4.75 x 2.35	5.25 x 3.5 x 6.25 x 0.19	18	#6	7.5	6.25	2.0 (.91)
STFV150-10N	15.0	6.25 x 4.75 x 2.35	6.75 x 3.5 x 7.75 x 0.19	14	#8	15	18.75	3.5 (1.59)
STFV300-10N	30.0	7.75 x 4.75 x 2.35	8.25 x 3.5 x 9.0 x 0.19	10	#8	30	37.5	6.0 (2.72)
Single-Phase Models (240 Vac)								
STFV025-24L	2.5	4.0 x 2.88 x 1.81	4.38 x 2.12 x 5.31 x 0.19	26	#6	2.5	3.125	1.3 (.59)
STFV050-24L	5.0	4.75 x 4.75 x 2.35	5.25 x 3.5 x 6.25 x 0.19	22	#6	5	6.25	2.0 (.91)
STFV075-24L	7.5	6.25 x 4.75 x 2.35	6.75 x 3.5 x 7.75 x 0.19	18	#6	7.5	9.375	3.5 (1.59)
STFV150-24L	15.0	7.75 x 4.75 x 2.35	8.25 x 3.5 x 9.0 x 0.19	14	#8	15	18.75	5.8 (2.63)
STFV300-24L	30.0	7.75 x 4.75 x 2.35	8.25 x 3.5 x 9.0 x 0.19	10	#8	30	37.5	6.0 (2.72)

Dimensions



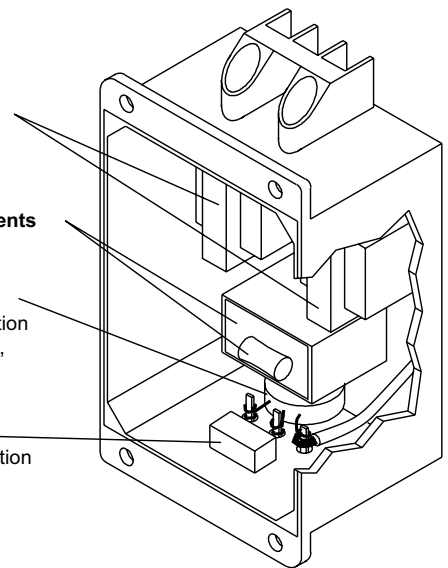
System Design

Series Blocking Inductors
smoothing inductors

Shunt Absorbing Components
sine wave tracking circuitry

MOV Transient Protection
high-energy transient protection
line to neutral, line to ground,
neutral to ground

Pulse Capacitor
high-frequency noise absorption



Contact **Technical Services** at (800) 377-4384 with any questions.
Visit our website at www.solaheviduty.com.

STFV Specifications

Description	Value	
Input Voltage	120 Vac Models	0-150 VRMS
	240 Vac Models	0-275 VRMS
Line Frequency	50/60 Hz	
Configuration	Single Phase (2 wire + ground)	
Response Time	< 5 ns	
Enclosure	High impact plastic case, 94V0, Vacuum impregnated magnetics, epoxy encapsulated	
Fusing	External	
Status Indication	Green LED	
Connection/Mounting Type	Series/Panel Mount	
Operating Temperature	-40°C to +60°C at full load Derate Linearly to 60% at +70°C	
Operating Humidity	0% to 95% Non-condensing	
Mean Time Between Failure (MTBF)	Greater than 100,000 hours (Mil. Std. 217F)	
Packaging	High impact plastic case, Vacuum impregnated magnetics, epoxy encapsulated	
Peak Surge Current Capability (8 x 20 μs)	Per Phase	25,000 Amps
	Line to Neutral	12,500 Amps
	Line to Ground	12,500 Amps
	Neutral to Ground	12,500 Amps
Load Surge Current Rating	10m sec	5 x Nominal
	1 sec	3 x Nominal
	10 sec	2 x Nominal
Frequency Response (Forward Reverse)	100 kHz to 50 MHz	90 dB Max
Transient Reduction* (IEEE C62.41)	Typical Category A Ringwave (6 kV, 200A, 100 kHz)	< 10 volts peak
	Typical Category B Ringwave (6 kV, 500A, 100 kHz)	< 50 volts peak
Safety	ANSI / UL1283 Recognized "Electromagnetic Interference Filters"	
Warranty	10 years	

* All measurements in volts. IEEE test results with no AC applied.



Main

Type	TF
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Complementary

Power Rating	500 VA UL 500 VA CSA 500 VA NOM 300 VA CE
Primary to Secondary Voltage	600 V 120 V 575 V 115 V 550 V 110 V
Fuse type	0.41 x 1.50 in CC top
Temperature rise	115 °C
Height	5.1 in (129.54 mm)
Width	4.5 in (114.30 mm)
Depth	5.46 in (138.68 mm)
Material	Copper winding

Environment

Product Certifications	CE[RETURN]CSA file LR37055 guide 184-N-90[RETURN]JUL listed file E61239
Insulation temperature	356 °F (180 °C)

Ordering and shipping details

Category	16203-9070 TF (NOT T) 250-1000VA
Discount Schedule	CP8
GTIN	785901039266
Returnability	Yes
Country of origin	MX

Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Height	6.50 in (16.51 cm)
Package 1 Width	6.70 in (17.018 cm)
Package 1 Length	7.50 in (19.05 cm)
Package 1 Weight	12.83 lb(US) (5.82 kg)

Offer Sustainability

Sustainable offer status	Green Premium product
California proposition 65	WARNING: This product can expose you to chemicals including: Phenyl glycidyl ether, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov
REACH Regulation	REACH Declaration
EU RoHS Directive	Compliant EU RoHS Declaration
Mercury free	Yes
China RoHS Regulation	China RoHS Declaration
RoHS exemption information	Yes
Environmental Disclosure	Product Environmental Profile
PVC free	Yes

Contractual warranty

Warranty	18 months
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Product data sheet

Specifications

SQUARE D



Circuit Breaker Mechanism, 125A operating mechanism with lockout, for 2 or 3 pole PowerPact B circuit breakers

9421LB7

Product availability : Stock - Normally stocked in distribution facility

Main

Product Type	Operating Mechanism
Product Range	9421L

Ordering and shipping details

Category	21731-9421 L & MISC
Discount Schedule	CP1
GTIN	785901093480
Nbr. of units in pkg.	1
Package weight(Lbs)	28.80 oz (816.5 g)
Returnability	Yes
Country of origin	MX

Packing Units

Unit Type of Package 1	PCE
Package 1 Height	6.30 in (16 cm)
Package 1 width	7.52 in (19.1 cm)
Package 1 Length	8.19 in (20.8 cm)

Offer Sustainability

California proposition 65	WARNING: This product can expose you to chemicals including: Lead and lead compounds, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov
EU RoHS Directive	Under investigation

* Price is "List Price" and may be subject to a trade discount – check with your local distributor or retailer for actual price.

Product data sheet

Specifications

SQUARE D



Circuit Breaker Mechanism, rotary handle, 6 inch handle, chrome plated, NEMA 4X, PowerPact B, H, J, D, L and Compact NSF

9421LC46

Product availability : Stock - Normally stocked in distribution facility

Main

Product	Handle Assembly
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Complementary

Enclosure Type	NEMA 1/3R/4/4X/12 enclosure
For Use With	9421LG7, LF1, LK1, LJ7 or LL1 operating mechanism
Handle Length	6 in (152.40 mm)
Handle Finish	Chrome plated

Ordering and shipping details

Category	21731-9421 L & MISC
Discount Schedule	CP1
GTIN	785901830344
Nbr. of units in pkg.	1
Package weight(Lbs)	2.25 lb(US) (1.02 kg)
Returnability	Yes
Country of origin	MX

Packing Units

Unit Type of Package 1	PCE
Package 1 Height	4.41 in (11.2 cm)
Package 1 width	5.98 in (15.2 cm)
Package 1 Length	6.81 in (17.3 cm)

Offer Sustainability

California proposition 65	WARNING: This product can expose you to chemicals including: Lead and lead compounds, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov
REACH Regulation	REACH Declaration
REACH free of SVHC	Yes

* Price is "List Price" and may be subject to a trade discount – check with your local distributor or retailer for actual price.

EU RoHS Directive	Compliant EU RoHS Declaration
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration Product out of China RoHS scope. Substance declaration for your information.
PVC free	Yes
Halogen content performance	Halogen free plastic parts product

Contractual warranty

Warranty	18 months
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Product data sheet

Specifications

SQUARE D



Circuit Breaker Mechanism, rotary handle, long shaft, support bracket included, for PowerPact B, H, J, L circuit breaker

9421LS13

Product availability : Stock - Normally stocked in distribution facility

Main

Range	9421L
Product	Shaft
For Use With	9421LG7 or LJ7 operating mechanism
Shaft Type	Long

Ordering and shipping details

Category	21731-9421 L & MISC
Discount Schedule	CP1
GTIN	785901499336
Nbr. of units in pkg.	1
Package weight(Lbs)	27.52 oz (780.2 g)
Returnability	Yes
Country of origin	MX

Packing Units

Unit Type of Package 1	PCE
Package 1 Height	2.91 in (7.4 cm)
Package 1 width	5.91 in (15 cm)
Package 1 Length	19.29 in (49 cm)

Offer Sustainability

California proposition 65	WARNING: This product can expose you to chemicals including: Lead and lead compounds, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov
REACH Regulation	REACH Declaration
REACH free of SVHC	Yes
EU RoHS Directive	Compliant EU RoHS Declaration
Mercury free	Yes

* Price is "List Price" and may be subject to a trade discount – check with your local distributor or retailer for actual price.

RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration Product out of China RoHS scope. Substance declaration for your information.
PVC free	Yes
Halogen content performance	Halogen free plastic parts product

Contractual warranty

Warranty	18 months
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Main

Range	PowerPact
Product name	PowerPact B
Device short name	BD 015
Product or Component Type	Circuit breaker
Device Application	Distribution

Complementary

Line Rated Current	15 A
Number of Poles	3P
Control Type	Toggle
Breaking capacity code	D
Breaking capacity	25 KA 208Y/120 V AC 50/60 Hz UL 489 25 KA 240 V AC 50/60 Hz UL 489 18 KA 480/277 V AC 50/60 Hz UL 489 18 KA 480 V AC 50/60 Hz UL 489 14 KA 600Y/347 V AC 50/60 Hz UL 489 10 kA 250 V DC UL 489
[Ue] rated operational voltage	525 V AC 50/60 Hz UL 489
Network Frequency	50/60 Hz
[Ics] rated service breaking capacity	25 KA 220...240 V AC 50/60 Hz IEC 60947-2 14 KA 500...525 V AC 50/60 Hz IEC 60947-2 18 KA 380...415 V AC 50/60 Hz IEC 60947-2 18 kA 440 V AC 50/60 Hz IEC 60947-2
[Uimp] rated impulse withstand voltage	8 kV IEC 60947-2
Trip unit technology	Thermal-magnetic
Continuous current rating	80 %
[Ui] rated insulation voltage	800 V IEC 60947-2
Suitability for isolation	Yes IEC 60947-2
Utilisation category	Category A
Mechanical durability	20000 cycles IEC 947-1 Annex K ed 5.2
Electrical durability	10000 cycles IEC 947-1 Annex K ed 5.2 440 V In
Connection pitch	1.06 in (27 mm)
AWG gauge	AWG 6...AWG 2/0 fine stranded aluminium/copper AWG 14...AWG 3/0 rigid or stranded aluminium/copper
Local signalling	Presence of auxiliary contacts flag green)
Mounting mode	Clip-on 35 x 15 mm symmetrical DIN rail) By screws plate)
Electrical connection	Everlink lug line Everlink lug load
Tightening torque	44.25 Lbf.in (5 N.m) 0.00...0.02 in ² (2.5...16 mm ²) (AWG 14...AWG 4) 79.66 lbf.in (9 N.m) 0.04...0.15 in ² (25...95 mm ²) (AWG 3...AWG 3/0)
Number of slots	1 auxiliary switch OF plug-in) 1 voltage release MN or MX plug-in) 1 alarm switch SD plug-in)

Power wire stripping length	0.79 in (20 mm)
Color	Gray RAL 7016)
9 mm pitches	9
Height	5.39 in (137 mm)
Width	3.19 in (81 mm)
Depth	3.15 in (80 mm)
Net Weight	2.37 lb(US) (1.074 kg)
Quantity per Set	Set of 1

Environment

Quality labels	CE
Standards	CSA C22.2 No 5 GB 14048.2 NEMA AB1 NMX J-266 EN/IEC 60947-5-1 EN/IEC 60947-2 UL 489
Product certifications	UL IEC CCC EAC CSA NOM
IP degree of protection	Front cover IP40 IEC 60529
IK degree of protection	IK07 IEC 62262
Pollution degree	3 IEC 60947-1
Ambient Air Temperature for Operation	-13...158 °F (-25...70 °C)
Ambient Air Temperature for Storage	-58...185 °F (-50...85 °C)
Operating altitude	< 6561.68 ft (2000 m) without derating 5000 m with derating

Ordering and shipping details

Category	01130-BD UNIT MOUNT BREAKER/SWITCH
Discount Schedule	DE2
GTIN	3606481152954
Nbr. of units in pkg.	1
Package weight(Lbs)	3.09 lb(US) (1.4 kg)
Returnability	Yes
Country of origin	MX

Packing Units

Unit Type of Package 1	PCE
Package 1 Height	3.50 in (8.9 cm)
Package 1 width	6.50 in (16.5 cm)
Package 1 Length	10.20 in (25.9 cm)

Offer Sustainability

Sustainable offer status	Green Premium product
California proposition 65	WARNING: This product can expose you to chemicals including: DINP, which is known to the State of California to cause cancer, and DIDP, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov
REACH Regulation	REACH Declaration
EU RoHS Directive	Compliant EU RoHS Declaration
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS Declaration

Environmental Disclosure	Product Environmental Profile
WEEE	The product must be disposed on European Union markets following specific waste collection and never end up in rubbish bins.
PVC free	Yes
Halogen content performance	Halogen free product

Product data sheet

Characteristics

PDC6BD6

Power distribution connector, PowerPacT B,
circuit breaker, 125A, 14 to 6AWG



Product availability: Stock - Normally stocked in distribution facility

Price*: 175.00 USD



Main

Product or Component Type	Cable connector
Accessory / separate part type	Connection kit

Complementary

Provided Equipment	Interphase barriers
Quantity per Set	Set of 3
Line Rated Current	15...125 A
Conductor material	Aluminium Copper
Connections - terminals	Screw terminal 0.004...0.02 in ² (2.5...16 mm ²) AWG 14...AWG 6)

Ordering and shipping details

Category	US10DE201136
Discount Schedule	0DE2
GTIN	3606481154569
Returnability	Yes
Country of origin	MX

Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Height	0.9 In (2.3 cm)
Package 1 Width	5.0000000000 In (12.7 cm)
Package 1 Length	5.6 In (14.2 cm)
Package 1 Weight	5.0 Oz (140.6 g)

Offer Sustainability

Sustainable offer status	Green Premium product
California proposition 65	WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov
REACH Regulation	REACH Declaration
EU RoHS Directive	Compliant with Exemptions
Mercury free	Yes
Sustainable packaging	Yes
China RoHS Regulation	China RoHS Declaration
RoHS exemption information	Yes
Environmental Disclosure	Product Environmental Profile
Circularity Profile	End Of Life Information
PVC free	Yes

Product Life Status : **Commercialised**

Product data sheet

Specifications

SQUARE D

Green Premium™



Panelboard accessory, NQ, ground bar kit, 12 circuits, 225A max

PK9GTA

Product availability : Stock - Normally stocked in distribution facility

Main

Product line QO

Product type Bar

Complementary

Number of connectors 9

Wire size
AWG 14...AWG 10 copper
AWG 12...AWG 10 aluminium
AWG 8 aluminium/copper
AWG 6...AWG 4 aluminium/copper
AWG 14...AWG 12

Provided equipment 2 screw

Bar length 3.78 in (96 mm)

Maximum length of segment 3.15 in (80 mm)

Device mounting Direct mounting back of enclosure

Height 0.437 in (11.10 mm)

Depth 0.312 in (7.92 mm)

Tightening torque
20 lb.in, AWG 14...AWG 10, copper
20 lb.in, AWG 12...AWG 10, aluminium
35 lb.in, AWG 6...AWG 4

Ordering and shipping details

Category 00102-QO LC ACCESSORIES

Discount Schedule DE3A

GTIN 785901026396

Returnability Yes

Country of origin US

Packing Units

Unit Type of Package 1 PCE

Number of Units in Package 1 1

Package 1 Height 0.30 in (0.76 cm)

Package 1 Width 0.70 in (1.78 cm)

* Price is "List Price" and may be subject to a trade discount – check with your local distributor or retailer for actual price.

Package 1 Length	3.80 in (9.65 cm)
Package 1 Weight	1.76 oz (49.9 g)
Unit Type of Package 2	PAL
Number of Units in Package 2	2160
Package 2 Height	26.80 in (68.072 cm)
Package 2 Width	40.00 in (101.6 cm)
Package 2 Length	48.00 in (121.92 cm)
Package 2 Weight	314.00 lb(US) (142.428 kg)

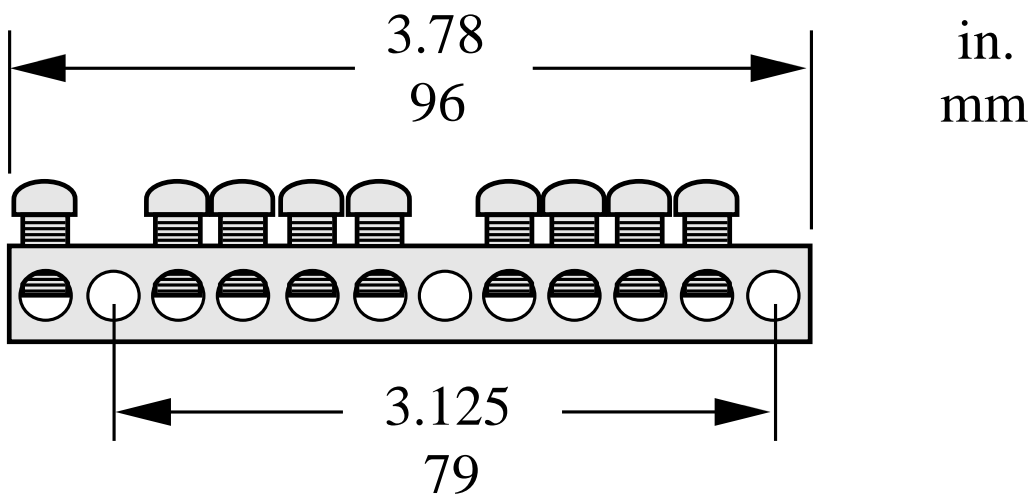
Offer Sustainability

Sustainable offer status	Green Premium product
California proposition 65	WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov
REACH Regulation	REACH Declaration
REACH free of SVHC	Yes
EU RoHS Directive	Pro-active compliance (Product out of EU RoHS legal scope) EU RoHS Declaration
Toxic heavy metal free	Yes
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration Pro-active China RoHS declaration (out of China RoHS legal scope)
Environmental Disclosure	Product Environmental Profile

Contractual warranty

Warranty	18 months
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Dimensions



Recommended replacement(s)

IE-SW-BL05-5TX

Weidmüller Interface GmbH & Co. KG

Klingenbergstraße 26

D-32758 Detmold

Germany

www.weidmueller.com

Product image



- Variations with 5 or 8 ports
- Variations for Gigabit Ethernet
- Sturdy metal housing
- Compact design
- Two redundant power inputs 12/24/48 V DC
- Variations with copper and fibre-optic interface (multimode and singlemode)
- Extensive approvals: CE, FCC, cULus, Class I Div. 2 / ATEX Zone 2, DNV-GL

General ordering data

Version	Network switch, unmanaged, Fast Ethernet, Number of ports: 5x RJ45, IP30, -10 °C...60 °C
Order No.	1240840000
Type	IE-SW-BL05-5TX
GTIN (EAN)	4050118028737
Qty.	1 pc(s).

Creation date April 20, 2022 10:30:23 PM CEST

Catalogue status 08.04.2022 / We reserve the right to make technical changes.

IE-SW-BL05-5TX

Weidmüller Interface GmbH & Co. KG

Klingenbergstraße 26

D-32758 Detmold

Germany

www.weidmueller.com

Technical data

Dimensions and weights

Depth	70 mm	Depth (inches)	2.756 inch
Height	115 mm	Height (inches)	4.528 inch
Width	30 mm	Width (inches)	1.181 inch
Net weight	175 g		

Temperatures

Storage temperature	-40 °C...85 °C	Operating temperature	-10 °C...60 °C
Humidity	5 to 95 % (non-condensing)		

Environmental Product Compliance

REACH SVHC	Lead 7439-92-1
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EMC conformity and approvals

EMC standards	EN 55032, EN 55024, CISPR 32, FCC Part 15 Subpart B Class A, IEC 61000-4-2 ESD: Contact: 6 kV; Air: 8 kV, IEC 61000-4-3 RS: 80 MHz to 1 Ghz: 10 V/m, IEC 61000-4-4 EFT: Power: 2 kV; Signal: 1 kV, IEC 61000-4-5 Surge: Power: 2 kV; Signal: 2 kV, IEC 61000-4-6 CS: 10 V, IEC 61000-4-8	Explosive risk zone	UL/cUL, Class I, Division 2, Groups A, B, C and D, ATEX Zone 2 Ex nA IIC T4 Gc
Free fall	According to IEC 60068-2-32	Safety standard	UL508
Ship use	DNV-GL	Shock	according to IEC 60068-2-27
Vibration	according to IEC 60068-2-6		

Environmental conditions

Humidity	5 to 95 % (non-condensing)	Operating temperature, max.	60 °C
Operating temperature, min.	-10 °C	Storage temperature, max.	85 °C
Storage temperature, min.	-40 °C		

Guarantee

Time interval	5 years
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Interfaces

Function DIP switch	1x for enabling/disabling the broadcast storm protection	LED indicator	PWR1, PWR2, 10/100M (TP-Port)
Number of ports	5x RJ45	RJ45 ports	10/100BaseT(X), auto negotiation, Full-/half-duplex mode, Auto MDI/MDI-X port

Creation date April 20, 2022 10:30:23 PM CEST

Catalogue status 08.04.2022 / We reserve the right to make technical changes.

IE-SW-BL05-5TX

Weidmüller Interface GmbH & Co. KG

Klingenbergstraße 26

D-32758 Detmold

Germany

www.weidmueller.com

Technical data

MTBF

MTBF	According to Standard	Telcordia (Bellcore), GB
	Operating time (hours), min.	3,040,784 h

Power supply

Connection type	1 removable 4-pin terminal block	
Current consumption	0.1 A at 24 V	
Overload current protection	1.1 A	
Reverse polarity protection	Available	
Voltage supply	12/24/48 V DC, 2 redundant inputs	
Voltage supply range	Voltage type	DC
	Voltage, min.	9.6 V
	Voltage, max.	60 V

Switch characteristics

Bandwidth backplane	1 Gbps	MAC table size	1 K
Packet buffer size	512 Kbit		

Technical data

Housing main material	Aluminium	Protection degree	IP30
Speed	Fast Ethernet	Switch	unmanaged
Type of mounting	DIN rail, Panel (with optional mounting kit)		

Technology

Data switching	Store and Forward	Flow control	IEEE 802.3x flow control, Back pressure flow control
Standard	IEEE 802.3 for 10BaseT, IEEE 802.3u for 100BaseT(X), IEEE 802.3x for flow control		

Classifications

ETIM 6.0	EC000734	ETIM 7.0	EC000734
ETIM 8.0	EC000734	ECLASS 9.0	19-17-01-06
ECLASS 9.1	19-17-01-06	ECLASS 10.0	19-17-04-02
ECLASS 11.0	19-17-04-02		

IE-SW-BL05-5TX

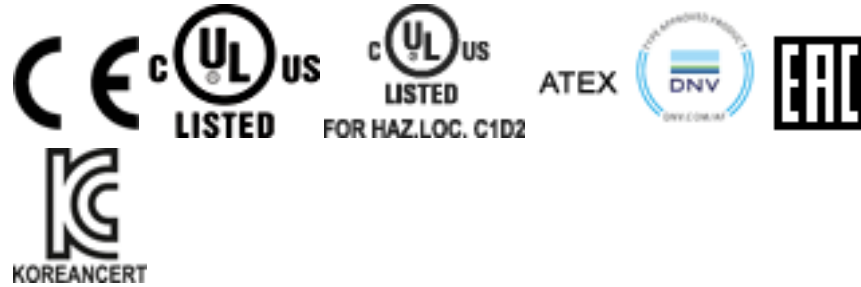
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Technical data

Approvals

Approvals



ROHS	Conform
UL File Number Search	E141197

Downloads

Approval/Certificate/Document of Conformity	DNV certificate ATEX certificate KC certificate EU Declaration of Conformity
Engineering Data	CAD data – STEP
Engineering Data	EPLAN, WSCAD, Zuken E3.S
Product Change Notification	Product Change Notification IE-SW-BL05-series
User Documentation	Hardware Installation Guide
Catalogues	Catalogues in PDF-format