ADDENDUM 2
TO THE CONTRACT PROVISIONS AND CONTRACT PLANS

FOR

CITY OF WOODLAND
WASTEWATER LIFT STATION 8 UPGRADE

G&O #22559

ISSUED THIS DATE: TUESDAY, MARCH 28, 2023

BID SUBMITTAL: 2:00 P.M. (LOCAL TIME) ON TUESDAY, APRIL 4, 2023
CITY OF WOODLAND
230 DAVIDSON AVENUE
WOODLAND, WASHINGTON 98674

Bidder shall acknowledge receipt of this Addendum on Page P-4 of the Proposal.

TO PROSPECTIVE BIDDERS:

The attention of all prospective bidders on the above project is directed to the following additions and modifications to the Contract Provisions and Contract Plans.

I. ADDITIONS, MODIFICATIONS, AND/OR DELETIONS TO THE TECHNICAL SPECIFICATIONS

ITEM 1:

Page 01100-1, Specification Section 01110-1.3, CONTRACTOR USE OF SITE AND PREMISES

REVISE the second paragraph as shown below (added text is italicized, deleted text is shown as strike out):

> "The Contractor shall allow representatives of the Owner and regulatory agencies access to the project site at all times. The Contractor is advised that there is an active private rail line immediately adjacent to the pump station. *Coordination with the rail operator will be necessary.* Rail cars primarily pass by in the evening~~; however, some coordination with the rail operator will be necessary.~~ *and on Monday morning prior to 8:00 a.m. during which no work adjacent to the rail line is permitted. In addition, the Contractor will need to coordinate with the PUD and surrounding businesses that occasionally access the rail crossing on the south portion of the site to cross the tracks. Construction equipment may have to be temporarily moved to allow this access.*"

ITEM 2:

Page 01530-1, Specification Section 02130-1.1, SCOPE

ADD the following paragraph to the end of this Section:

> "There are no manholes within a reasonable distance from the lift station in which pumps for bypass pumping can be installed. The Contractor shall perform bypass pumping from within the existing wet well. The bypass pumping operations shall not cause backup of sewage into structures served by the sewer system. The sewers shall not be surcharged more than 2 feet at the lift station wet well."

Page 01530-2, Specification Section 01530-2.1, BYPASS PUMPING EQUIPMENT

REVISE the first paragraph as shown below (added text is italicized, deleted text is shown as strike out):

> "The estimated peak flow to be pumped is 84 gpm *at a total dynamic head of 17 feet, if discharged through the existing 4-inch force main where indicated on the Drawings*. About 80 percent of this flow (67 gpm) will enter the wet well through the 6-inch diameter sewer from the northwest. The remainder of the flow will be split evenly between the 12-inch diameter sewer from the west and the 6-inch diameter sewer from the south. The Contractor shall maintain on site sufficient equipment and materials to ensure continuous and successful operation of the bypass pumping systems. The Contractor shall maintain on site a standby pump capable of maintaining bypass pumping with the largest ~~duty~~ pump out of service for each bypass pumping location. Standby pumps shall be fueled and operational at all times. The Contractor shall maintain on site a sufficient number of valves, tees, elbows, connections, tools, sewer plugs, piping and other parts or system hardware to ensure immediate repair or modification of any part of the system, as necessary. If electrical pumps are ~~being~~ used, ~~standby generators shall be available to ensure continuity of the pumping operation in the event of a power failure~~ *the Contractor shall provide a separate, independent power supply as well as standby power to ensure continuity of the pumping operation in the event of a failure of the Contractor's primary power supply*."

REVISE the last sentence of the third paragraph as shown below (added text is italicized, deleted text is shown as strike out):

> "Installation of the Contractor's equipment shall not cause sewers to surcharge during maximum flows *more than 2 feet in elevation at the lift station wet well*."

ITEM 3:

Page 11310-1, Specification Section 11313, SUBMERSIBLE CENTRIFUGAL PUMPS INSTALLATION

DELETE the page numbering footer "11310-1 **–** Dry-Pit Non-Clog Centrifugal Pumps Installation" and **REPLACE** with the following:

"11313-1 – Submersible Centrifugal Pumps Installation"

And

"11313-2 – Submersible Centrifugal Pumps Installation"

II. ADDITIONS, MODIFICATIONS, AND/OR DELETIONS TO THE CONTRACT PROVISIONS APPENDIX

ITEM 1:

Appendix C – Pumps and Control Submittal Package

ADD the attached information under Appendix C – Pumps and Control Submittal Package.

III. ADDITIONS, MODIFICATIONS, AND/OR DELETIONS TO THE CONTRACT PLANS

ITEM 1:

SHEET C-1, EXISTING SITE AND DEMOLITION PLAN

ADD Note 7 to this sheet.

"7. FOR THE USE OF THE STAGING AREA, THE CONTRACTOR WILL NEED TO COORDINATE WITH THE PUD AND SURROUNDING BUSINESSES THAT OCCASIONALLY ACCESS THE RAIL CROSSING THROUGH THE STAGING AREA TO CROSS THE TRACKS. CONSTRUCTION EQUIPMENT MAY HAVE TO BE TEMPORARILY MOVED TO ALLOW THIS ACCESS."

ITEM 2:

SHEET C-2, NEW SITE PLAN

DELETE Sheet C-2 in its entirety and **REPLACE** with the attached revised Sheet C-2.

ITEM 3:

SHEET M-4, UPPER PLAN, LOWER PLAN AND SECTIONS

DELETE Sheet M-4 in its entirety and **REPLACE** with the attached revised Sheet M-4.

ITEM 4:

SHEET S-2, UPPER PLAN, FOUNDATION PLAN AND DETAILS

DELETE Sheet S-2 in its entirety and **REPLACE** with the attached revised Sheet S-2.

ITEM 5:

SHEET E-2, TAG LIST, ONE LINE DIAGRAM, AND CABLE AND CONDUIT SCHEDULES

DELETE Sheet E-2 in its entirety and **REPLACE** with the attached revised Sheet E-2.

ITEM 6:

SHEET E-3, ELECTRICAL SITE PLAN

DELETE Sheet E-3 in its entirety and **REPLACE** with the attached revised Sheet E-3.

WECI
Whitney Equipment Company, Inc

16120 Woodinville-Redmond Rd NE Ste 3, Woodinville, WA 98072 www.weci.com 425-486-9499

SUBMITTAL

Woodland - LS #8
Concertor Retrofit

Submersible Pumps

Customer: City of Woodland
Date Submitted: 3/14/23

BILL OF MATERIALS

SCOPE OF SUPPLY

CONCERTOR PUMPS

Pumps

2ea NX-6020.091, Concertor-MT, 5.5hp,200 - 240V, 4" , FM, FLS, 50' shielded cable

2ea 7481825, P- installation kit, 4"

2ea 5401305, 4" discharge elbow

2ea U4C EAA FA 2", 2" upper guide rail bracket, 304SS

2ea 20' LCA, 20' lifting chain assembly

2ea S0116-0012, 15/32" quick link

2ea ZCS1988, .075" - 1.00" 316SS cable grip

1ea J6A, Cable holder, 304SS

4ea 2" x 20’ guide rail, 2" x 20' 304SS guide rail, schedule 40 (4 pieces @20' long)

2ea FM Approval (explosion proof)

Startup

1ea Days of Manufacturer’s Startup, Training and Field Testing Assistance

WECI
Whitney Equipment Company, Inc

WHITNEY EQUIPMENT COMPANY, INC.
16120 Woodinville-Redmond Rd. Woodinville, WA 98072
Phone: (425) 486-9499 Fax: (425) 485-7409

Specification Data Sheet For: *FLYGT SUBMERSIBLE PUMP NX-6020.091*

DATE	3/13/23	**CONTRACTOR**	City of Woodland
		ENGINEER	
		PROJECT	Woodland - LS #8 Concertor Retrofit
WECO S/O		**EQUIPMENT**	Concertor Pumps

REVISION	BY	DATE	DESCRIPTION	NOTES
0	CT	3/13/23	Original Submittal	Concertor Pumps

A GENERAL SPECIFICATIONS

C BASIC EQUIPMENT FEATURES

1	QUANTITY	2	20	CABLE SEAL	GROMMET TYPE
2	MODEL NUMBER	NX 6020.091	21	SHIELDED CABLE SIZE	50'
3	DUTY POINT 1 PUMP	235 GPM @ 46.7 FT	22	SEAL - INNER	TUNGSTEN CARBIDE
4	SHUTOFF	66' TDH	23	SEAL - OUTER	TUNGSTEN CARBIDE
5	DISCHARGE SIZE	4" CAST IRON	24	WEIGHT	260 LBS
6	IMPELLER TYPE	"N" HI ADAPT	25	LIFTING CHAIN	20" STAINLESS STEEL
7	HORSEPOWER	5.5 HP	26	LIFTING DEVICE	GRIP EYE
8	MOTOR SPEED	500-1765 RPM	27	UPPER GUIDE BRACKET	2" 304 STAINLESS STEEL
9	MOTOR ELECTRICALS	230V, 3 PH, 60 HZ	28	GUIDE RAILS	2" 304 STAINLESS STEEL
10	INSULATION	CLASS H TRICKLE IMPR	29	POWER CABLE GRIPS	STAINLESS STEEL
11	SYSTEM RATING	FM RATED EXP PROOF	30	CABLE HOLDER	STAINLESS STEEL
12	MOTOR RATING	NEMA MG1, INVERTER	31		
13	PUMP BODY	CAST IRON A-48	32		
14	IMPELLER MATERIAL	HI CHROME IRON	33		
15	PUMP SHAFT	431 STAINLESS STEEL	34		
16			35		

B Spare Equipment

D Options Included

17		36	
18		37	
19		38	

Drawing Number	Showing	Notes
	PUMP DIMENSIONS	MANUFACTURER'S STARTUP AND TRAINING SERVICES

Flygt Concertor NX 6020

Submersible wastewater pump for stationary submerged installation
The pump shall be equipped with a 5.5 HP submersible electric motor, connected for operation on a 200-240 volt, 3 phases, 60 hertz. The pump shall be supplied with a mating cast iron 4 inch discharge connection and be capable of delivering 235 GPM at 46.7 feet TDH. Shut off head shall be 66 feet (minimum).

The motor horsepower shall be adequate so that the pump is non-overloading throughout the entire pump performance curve from shut-off through run-out. The motor shall be able to operate non-submerged without damage while pumping under load.

Starting method: Speed ramp up at reduced current. All devices to soft start the pump via reduced voltage shall be incorporated within the pump/motor housing. These same devices shall also provide for a “soft stop” of the pumping element.

Pump / Motor design
Single-stage close-coupled submersible centrifugal pump with of semi open multi vane impeller designed to transport wastewater with fibrous materials and heavy sludge. It shall be submersible up to 50 feet (20m) according IEC 60034 and protection class IP 68.

The impeller blades shall be self-cleaning upon each rotation as they pass across a sharp relief groove in the Insert ring cast integrally into pump volute’s replaceable bottom wear plate and shall keep the impeller blades clear of debris. The impeller shall move axially upwards on its shaft to allow larger debris to pass through and immediately return to normal operating position.

The pump shall be operated by a synchronous motor and an integrated control system and be capable to run at constant power at any point of the performance field without being overloaded. Motor shall utilize a permanent magnet rotor to maintain synchronous speed and maintain level IE-4 premium efficiency standards. The motor shall withstand at least 60 starts per hour.

An integrated pump control system installed in the pump/motor housing shall slowly ramp up the speed at start-up of the pump to reduce the start-up current and secure that the direction of the impeller rotation is always correct. There shall be no need for any human intervention to ensure that the impeller is rotating in the correct direction within the volute. The control system that is integrated within the pump/motor housing shall be encapsulated to protect it against moisture ingress, and vibrations. Motor, pump and control system shall be designed and produced by the same manufacturer.

The integral control system mounted within the pump/motor housing shall be capable of adjusting the motor/impeller speed so that the pump can safely operate without overloading anywhere within the pumps operating envelope.

The pump shall incorporate a “pump-cleaning” function to remove debris from the impeller. The cleaning function shall be initiated when the integral control system senses an increase in current draw due to debris in the pump. The cleaning function shall consist of forced stopping, reversal and forward runs timed to allow for debris to fall from the impeller. After cleaning cycle is complete, the pump shall resume to automatic operation. If the pump impeller/volute does not clear itself after the programmed number of attempts, the control will initiate and alarm to notify that the impeller is clogged.

The cooling system shall be based on heat conductivity and provide sufficient cooling to run the pump at continuous pump duty (S1) in a liquid temperature of up to 104°F (40°C). Operational restrictions at temperatures below 104°F (40°C) or the demand of auxiliary cooling systems like fans or blowers are not acceptable.

Stator shall be insulated with class H trickle impregnated insulation rated at 356°F (180°C)

Cable
The motor shall be equipped with 50 feet of shielded submersible cable. The shield within the cable shall allow for a control panel mounted interface component to communicate both ways with the integrally mounted control unit within the pump/motor housing. The power cable shall be sized according to the NEC and ICEA standards and shall be of sufficient length to reach the junction box without the need of any splices. The outer jacket of the cable shall

be oil resistant chlorinated polyethylene rubber. The cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet or greater.

Motor protection
The integrated control system shall continuously monitor the leakage sensor in the stator housing and the temperature of the motor. If the motor temperature is too high, the pump shall continue to operate at reduced power until conditions are normalized. The operator shall be able to modify the setting of the control system to decide if the active leakage signal shall stop or not stop the pump. External trips or overload devices for motor protection shall not be required.

Bearings
The shaft shall rotate on two bearings. The motor bearings shall be sealed and permanently grease lubricated with high temperature grease. The upper motor bearing shall be a single row ball bearing to handle radial loads. The lower bearing shall be a double row angular contact ball bearing to handle the thrust and radial forces. **Single row lower bearings are not acceptable.** The minimum L10 bearing life shall be 50,000 hours at any usable portion of the pump performance field.

Motor sealing
The cable entry shall be threaded and sealed by a grommet. A nylon clamp shall secure a strain relief function. Epoxies, silicones, or other secondary sealing systems shall not be considered acceptable.

The shaft shall be sealed by two seals in a tandem arrangement, incorporated into a single unit assembly. The seals shall require neither maintenance nor adjustment and shall be capable of operating in either clockwise or counter clockwise direction of rotation without damage or loss of seal function. The seal unit shall be designed as Plug-in unit which can be replaced without any special tools. The upper seal rotating surface shall include vanes etched into the seal surface to push any potential seal leakage back towards the pump volute.

Shaft seals material of construction:
- Pump side: - Corrosion and abrasion resistant Tungsten carbide WCCR /WCCR
- Motor side: - Corrosion and abrasion resistant Tungsten carbide WCCR / WCCR

PUMP CONSTRUCTION
Major pump components shall be of grey cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities. The lifting handle shall be of stainless steel. All exposed nuts or bolts shall be AISI type 316 stainless steel construction.

Sealing design shall incorporate **metal-to-metal contact** between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile or optional Viton rubber O-rings. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific torque limit.

Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease or other devices shall be used.

Coating
All metal surfaces coming into contact with the pumpage, other than stainless steel or brass, shall be blasted before coating. All wet surfaces are to be coated with two-pack oxyrane ester Duasolid 50. The total layer thickness should be at least 120 microns. Zink dust primer shall not be used.

Impeller
Due to the likely presence of sand and or grit the impeller shall be of Hard-Iron™ ASTM A-532 Alloy III A 25% chrome cast iron, semi-open, multi-vane, back swept, screw-shaped, non-clog design. The impeller leading edges shall be mechanically self-cleaned automatically upon each rotation as they pass across a spiral groove located on the volute suction. The leading edges of the impeller shall be hardened to Rc 60 and shall be capable of handling solids, fibrous materials, heavy sludge and other matter normally found in wastewater. The screw shape of the impeller inlet shall provide an inducing effect for the handling of up to 5% sludge and rag-laden wastewater. The impeller to volute clearance shall be readily adjustable by the means of a single trim screw. The impeller shall be locked to the shaft, held by an impeller bolt.

Volute / Suction Cover
The pump volute shall be a single piece gray cast iron, ASTM A-48, Class 35B, non-concentric design with smooth passages of sufficient size to pass any solids that may enter the impeller. Minimum inlet and discharge size shall be as specified. The volute shall have a replaceable suction cover insert ring in which are cast spiral-shaped, sharp-edged groove(s). The spiral groove(s) shall provide trash release pathways and sharp edge(s) across which each impeller vane leading edge shall cross during rotation so to remain unobstructed. Due to the likely presence or sand or grit the insert ring shall be cast of Hard-Iron™ ASTM A-532 Alloy III A 25% chrome cast iron and provide effective sealing between the multi-vane semi-open impeller and the volute housing.

Pump Shaft
Pump and motor shaft shall be the same unit. The pump shaft is an extension of the motor shaft. Couplings shall not be acceptable. The pump shaft shall be stainless steel – ASTM A479 S43100-T.

If a shaft material of lower quality than stainless steel – ASTM A479 S43100-T is used, a shaft sleeve of stainless steel – ASTM A479 S43100-T is used to protect the shaft material. However, shaft sleeves only protect the shaft around the lower mechanical seal. No protection is provided in the lubricant housing and above. Therefore, the use of stainless steel sleeves will not be considered equal to stainless steel shafts.

Standard Pump Factory Test
Following tests shall be done on each pump prior to shipment:
- Minimum 3-point hydraulic performance test
- No-Leak seal integrity test
- Electrical integrity test

Model: Flygt Concertor N100 (NX 6020) or equivalent
Pump design based on Flygt a Xylem brand. Other manufactures meeting the materials of construction and above specifications must be approved by the Engineer 48hrs prior to bid.

Lifting and Installation equipment
Each pump shall be supplied with a mating cast iron ___ inch discharge connection. The pump shall be automatically and firmly connected to the discharge connection, guided by no less than two guide bars extending from the top of the station to the discharge connection. Sealing of the pumping unit to the discharge connection shall be accomplished by a machined metal to metal watertight contact. There shall be no need for personnel to enter the wet-well.
No portion of the pump shall bear directly on the sump floor. Each pump shall be fitted with _____ feet of stainless steel lifting chain or cable. The working load of the lifting system shall be 50% greater than the pump unit weight.

CLOG-FREE GUARANTEE
The supplier of the system, pumps and controllers, shall guarantee clog-free operation for a period of 24 months from the date of start-up. A certificate shall be provided to the Owner on the day of start up with the local contact information and effective date. Should the impeller clog with typical solids and/or modern trash debris normally found in domestic wastewater during this period, an authorized representative shall either travel to the jobsite remove the pump, clear the obstruction and reinstall the pump at no cost or reimburse the Owner for reasonable cost to provide this service. A written report shall be provided to the Owner detailing the service call with pictures for verification purposes

START-UP SERVICE
A factory authorized start up technician shall be provided to visit the site for a minimum of 8 hours on-site and confirm pump/s and controls operation meets or exceeds the specifications. The name of the technician along with the qualifications shall be submitted prior to start up upon Engineer/Owner request. The service technician shall be outfitted with a service crane truck capable of pulling the pumps to verify rotation and perform a visual check of the pump(s).

Services shall include, but not be limited to, inspection of the completed pump station installation to ensure that it has been performed in accordance with the manufacturer's instructions and recommendations, supervision of all field-testing and activation of the Pump Manufacturer's Warranty. The test shall demonstrate to the satisfaction of the Owner that the equipment meets all specified performance criteria, is properly installed and anchored, and

operates smoothly without exceeding the full load amperage rating of the motor. The Contractor shall be responsible for coordinating the required field services with the Pump Manufacturer.

The factory start up form shall be submitted for approval prior to start up and approved by the Engineer/Owner. The Engineer/Owner, at their discretion, may add items to be completed at start up that they feel proves compliance with all project requirements and will notify the Contractor of these items prior to start up.
During this initial inspection, the manufacturer's service representative shall review recommended operation and maintenance procedures with the Owner's personnel.

WARRANTY
Refer to the General Guide Specifications for additional information.

PUMP STATION CONTROL CABINET
The cabinet shall be made of Reinforced plastic or stainless steel and it shall be prepared for an installation on a concrete floor.
It shall be isolated according protection class IP 44.
The inner dimension of the cabinet shall reserve at least 10% back panel space for future adjustments.
All components on the front of the machine should be provided with function plate.

The control panel shall contain following equipment:

1 Power switch, which can be locked in the off position
1 light group with socket
1 backup battery for the telemetry unit.
1 Control power transformer to 24 V DC
Circuit breakers (Main, Pump and Control Power)
1 Intrinsically safe barrier for UL 913 requirements
1 Modem for telemetry communications
1 Red-dome style flashing alarm light
1 Alarm Horn with silence button

Per Pump it shall include 1 Pump gateway which shall offer at least following interfaces:
1 x USB, 1 x RS485 1 x Ethernet RJ 45 1 x Display interface, 4 x Digital outputs, 4 x Digital inputs, 1 x Analog input & output. 2 wire connections for pump communication.
Housing isolated according protection class IP 20.Applicable to operate in ambient temperature: -20 ˚C to +60˚C
Power supply: 24 V DC

The Pump gateway shall allow to control of the pump through I/O or Modbus RTU or TCP. It shall have emergency run relay functionality which secures that the pump will operate when the main controller fails.

LED lamps shall show pump alarms and the Unit shall communicate these alarms to a higher level control unit.

The unit shall be tested and approved in accordance with international standards CE, UL, RCM and CSA and be designed and manufactured by the pump supplier.
Model: FLYGT FPG 412 (DP) or equivalent

1 HMI unit for 1-4 pumps
The HMI Unit shall display drive operating status, liquid level and following alarms:

- Motor Temperature too high
- Leakage in stator housing
- High sump Level (via float switch or transducer)
- Transducer sensor error (connection failure, faulty values)
- overcurrent, over- or under voltage

Housing isolated according protection class IP 20.
Applicable to operate in ambient temperature: -20 ˚C to +60˚C
Power supply: 24 V DC

It shall allow the operator to modify parameters and a set-up wizard shall guide the user through the entire commissioning process. The unit shall be tested and approved in accordance with international standards CE, UL, RCM and CSA and be designed and manufactured by the pump supplier.
Model: FLYGT FOP 312 or equivalent

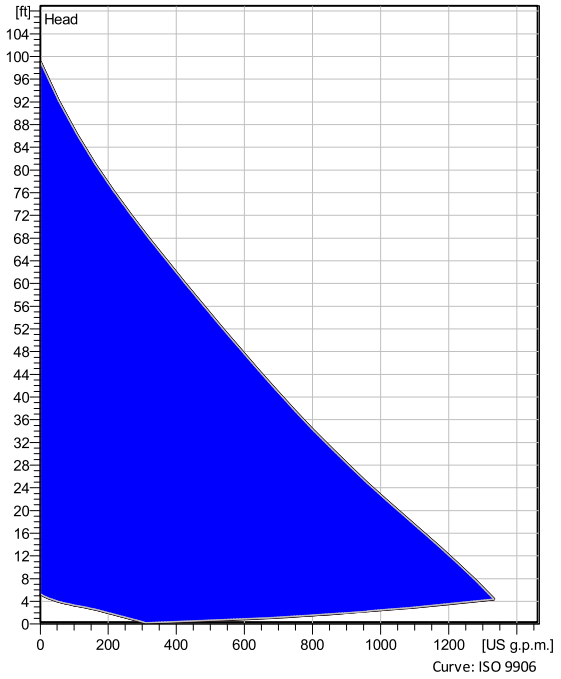
The supplier shall offer an alarm Transmission Service via CLOUD (Internet) to enable the operator receiving information via SMS or email (24 hours / 7 days) with an update interval of 60 seconds. Monthly rate.....
The Manufacturer shall be able to offer Alarm Transmission Service via CLOUD (Internet) for a monthly fee.
Information such as SMS or email shall be available 24 hours / 7 days with and update interval: 60 seconds.

Concertor DP N100-4350

A process-controlled wastewater pumping system suitable for customers who utilize specially designed process control algorithms and want to benefit from lower capital costs, smaller control cabinets and higher pump system efficiencies. Concertor DP is also suitable as a reliabl and energy efficient on/off controlled wastewater pumping system for customers who want t benefit from easily adjustable pump performance, soft start/soft stop, constant power and motor protection. This system is scalable to as many pumps as required by your application, with one gateway per pump.

Technical specification

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Curve: ISO 9906

Configuration

Motor number
N6020.091 18-08-1AZ-W 5.5hp

Installation type
P - Semi permanent, Wet

Impeller diameter
200 mm

Discharge diameter
4 inch

Pump information

Impeller diameter
200 mm

Discharge diameter
4 inch

Inlet diameter
120 mm

Maximum operating speed
500-1765.5 rpm

Number of blades
2

Max. fluid temperature
40 °C

Materials

Impeller
Hard-Iron

Project	**Created by**	Dave Bobbett		
Block	**Created on**	11/9/2022	**Last update**	11/9/2022

Concertor DP N100-4350

Technical specification

Motor - General

Motor number N6020.091 18-08-1AZ-W 5.5hp	**Phases** 3~	**Rated speed** 500-1765 rpm	**Rated power** 5.5 hp
Approval FM	**Insulation class** H	**Rated current** 12.1 A	**Type of Duty** S1
Frequency 60 Hz	**Rated voltage** 230 V	**Motor efficiency class** IE4 according to IEC/TS 60034-30-2 Ed. 1	

Motor - Technical

Power factor - 1/1 Load 0.95	**Motor efficiency - 1/1 Load** 88.0 %	**Nominal speed - 1/1 Load (200-240V)** 1150	**Nominal speed - 1/1 Load (380-480V)** 2300
Power factor - 3/4 Load 0.95	**Motor efficiency - 3/4 Load** 89.0 %	**Nominal speed - 3/4 Load (200-240V)** 1035	**Nominal speed - 3/4 Load (380-480V)** 2070
Power factor - 1/2 Load 0.95	**Motor efficiency - 1/2 Load** 89.0 %	**Nominal speed - 1/2 Load (200-240V)** 920	**Nominal speed - 1/2 Load (380-480V)** 1840

Starting current
12.1 A

Project	**Created by**	Dave Bobbett		
Block	**Created on**	11/9/2022	**Last update**	11/9/2022

Concertor DP N100-4350

Monitoring and Control equipment

Gateway

Yes

Power Supply	24 V DC
Ports	1 x USB
	1 x RS485
	1 X Ethernet RJ 45
	1 x Display interface, CAN
Communication	Modbus RTU
	Modbus TCP
Standard I/O	4 x Digital outputs
	4 x Digital inputs
	1 x Analog input
	1 x Analog output
Pump Interface	1 x Pump Communication Port
User Interface	14 x LED
	1 x Rotator Switch
Data Logging	1000 data points
Environment Class	Protection class: IP 20
	Operation temperature: -20˚C to +65˚C
Software Version	DP software – Variable performance control via external signal, status and alarms
Approvals	CE, UL, CSA

Interface (HMI)

None

Project	**Created by**	Dave Bobbett		
Block	**Created on**	11/9/2022	**Last update**	11/9/2022

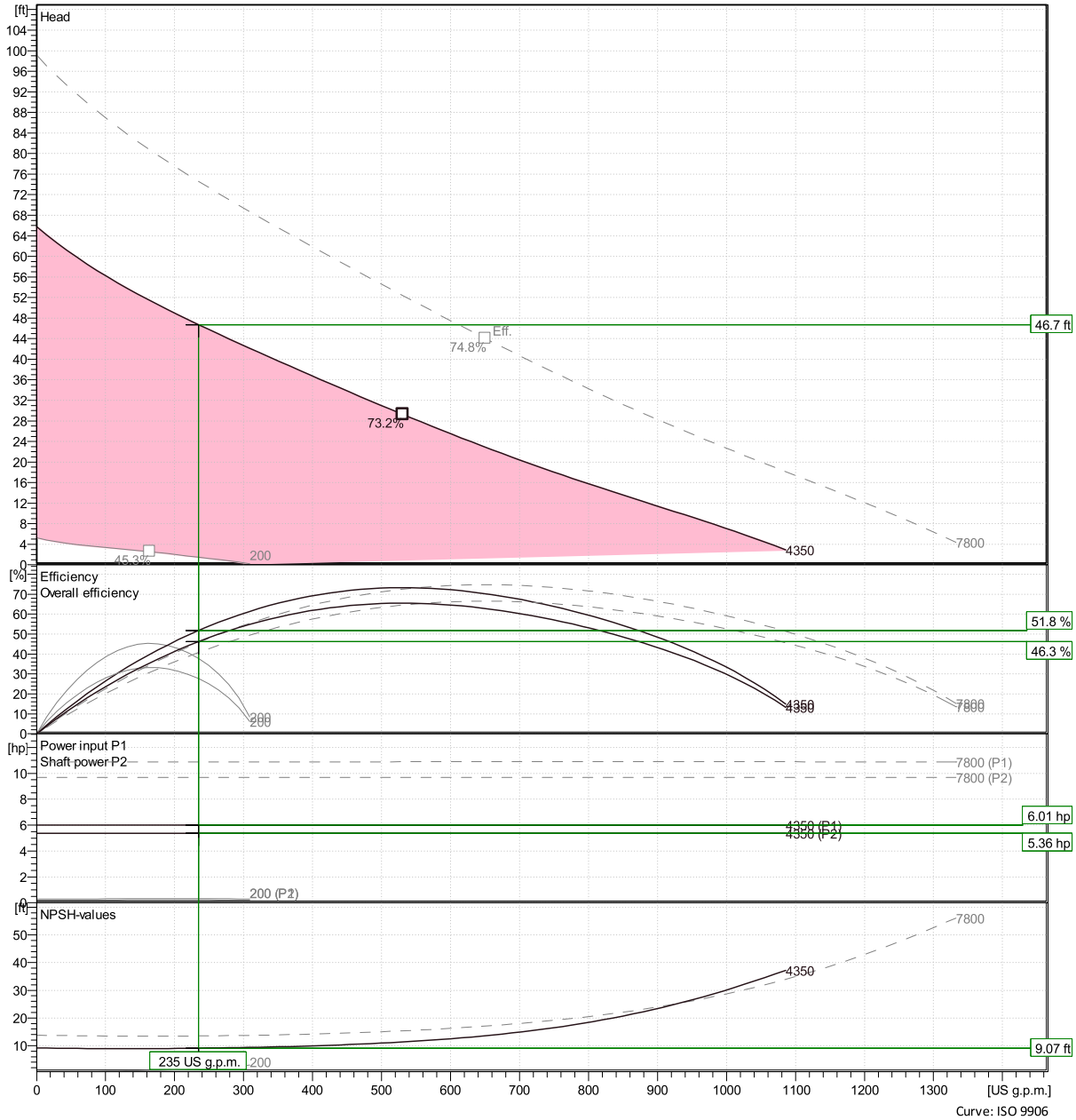
Concertor DP N100-4350

Performance curve

Duty point

Flow	Head
235 US g.p.m.	46.7 ft

Curves according to: Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



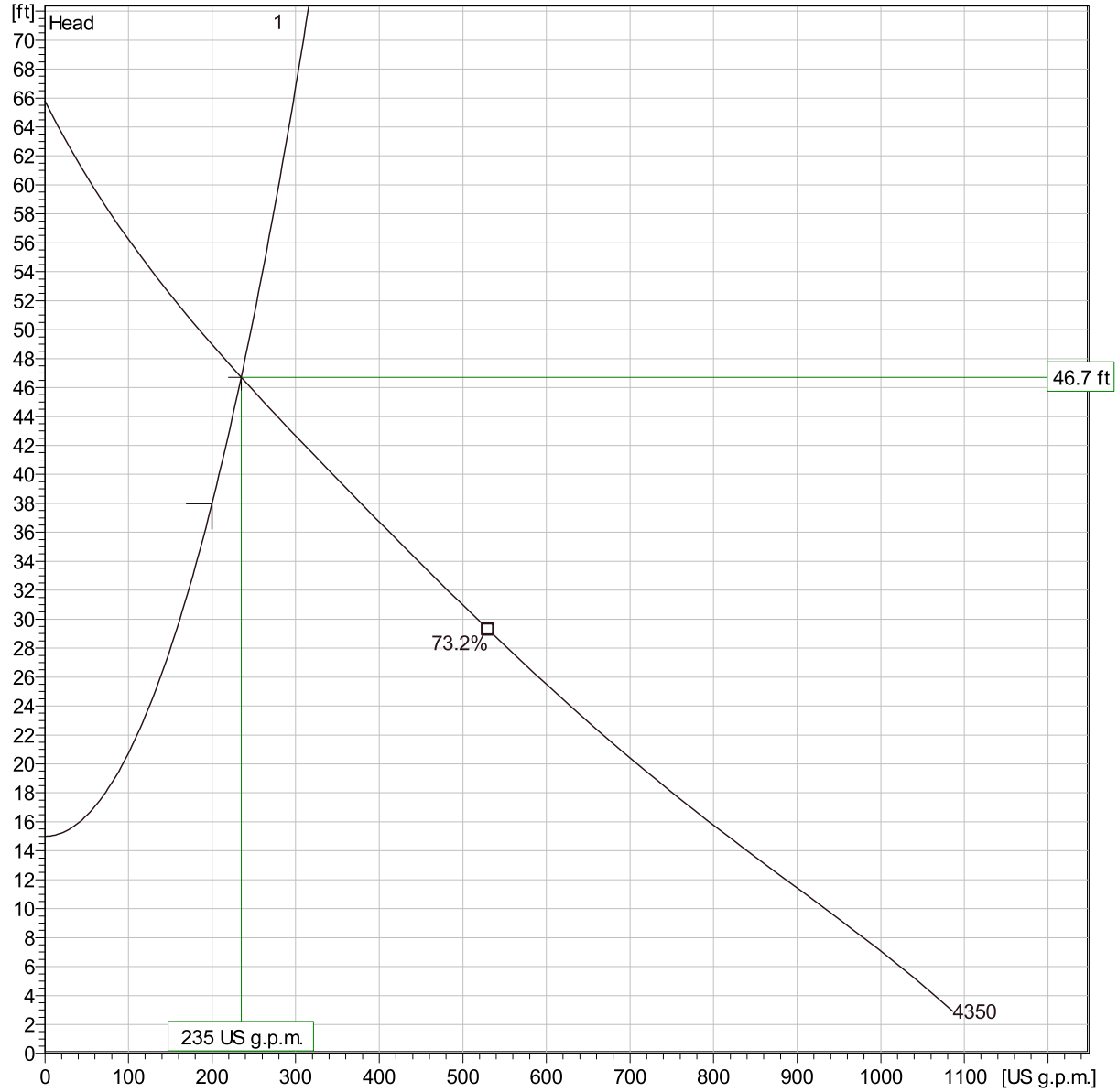
Curve: ISO 9906

Project		**Created by**	Dave Bobbett	**Last update**	11/9/2022
Block		**Created on**	11/9/2022		

Concertor DP N100-4350

Duty Analysis

Curves according to: Water, pure [100%] ; 39.2°F; 62.42lb/ft³; 1.6891E-5ft²/s



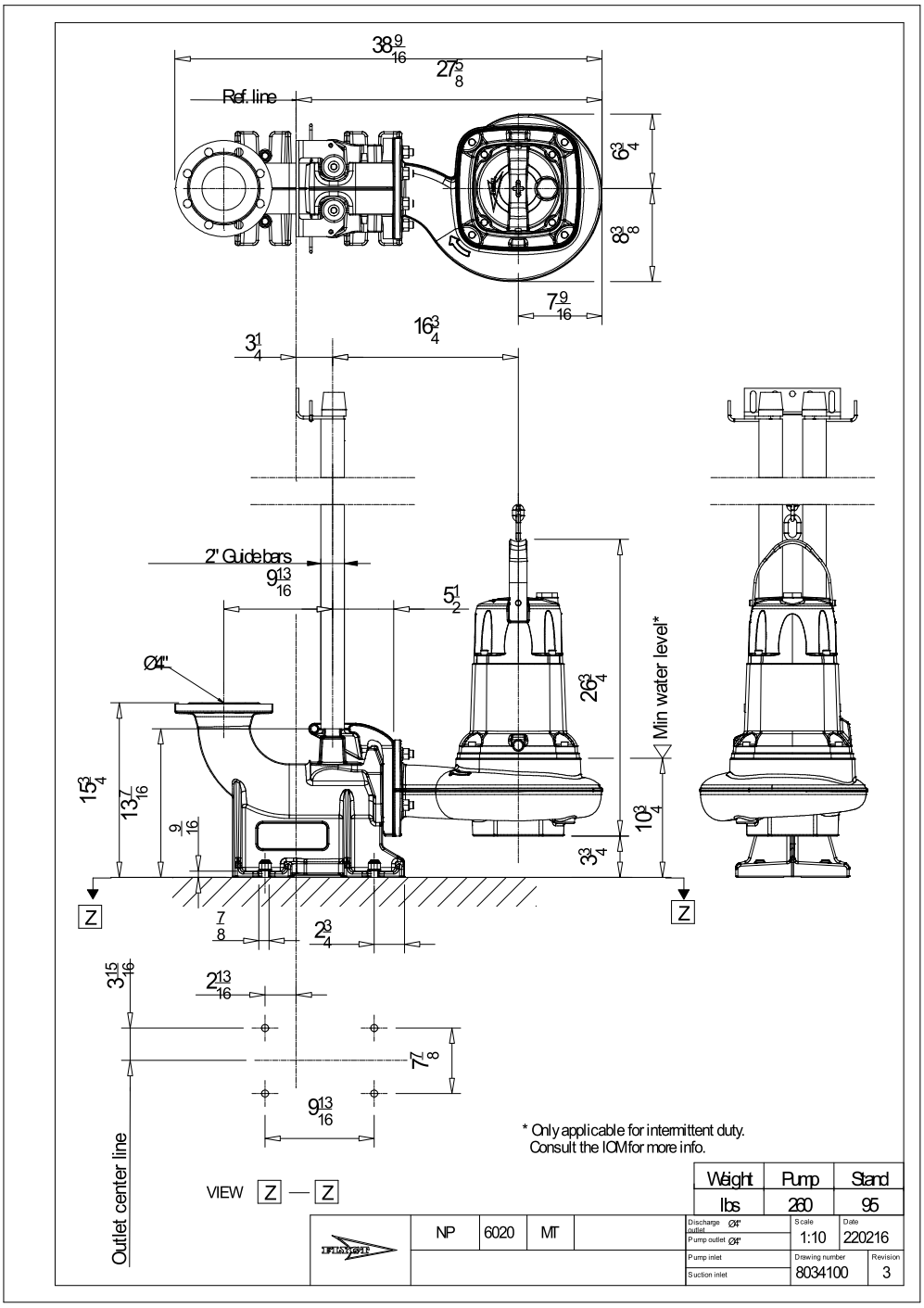
Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHre
	US g.p.m.	ft	hp	US g.p.m.	ft	hp		kWh/US MG	ft
1	235	46.7	5.36	235	46.7	5.36	51.8 %	318	9.07

Project		**Created by**	Dave Bobbett		
Block		**Created on**	11/9/2022	**Last update**	11/9/2022

Concertor DP N100-4350

Dimensional drawing



Project	**Created by**	Dave Bobbett	
Block	**Created on**	11/9/2022	**Last update** 11/9/2022

6020 Standard Pump Cable

Pump Model	HP	Volts	Ø	Cable Size/ Nominal O.D.	Part Number	No. of Cables	Max. Cable Length (Ft)
6020	5.5	200 - 240	3	S3x6+3x6/3+S(4x0.5) 0.83"(21mm)	94 19 91	1	200
	7.5	380 - 480	3	S3x2.5+3x2.5/3+S(4x0.5) 0.75"(19mm)	94 19 90	1	280
	10	380 - 480	3	S3x2.5+3x2.5/3+S(4x0.5) 0.75"(19mm)	94 19 90	1	215

See last page for break down of conductors used in one cable.

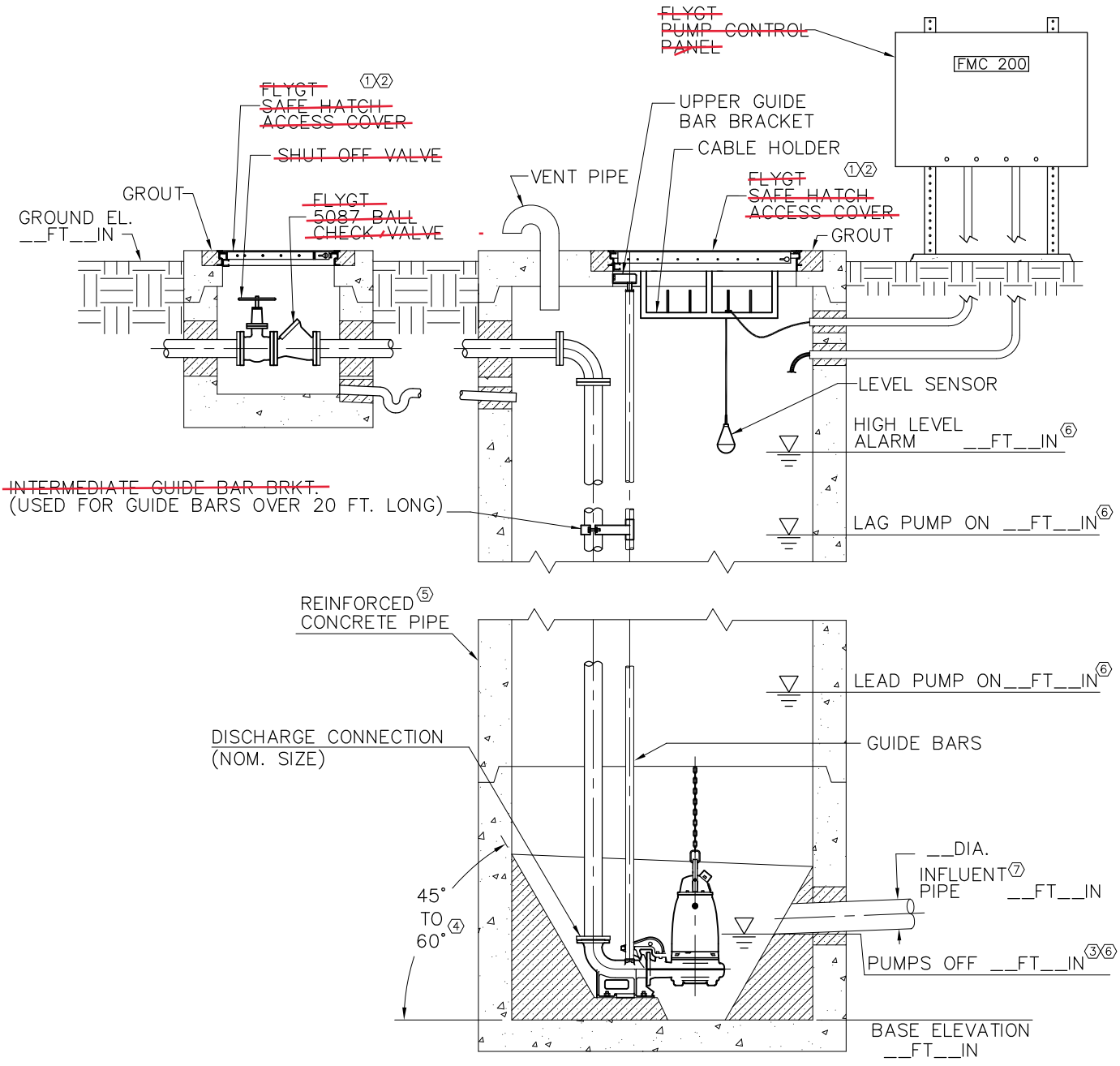
MEDIUM-LIGHT DUTY CABLE GRIPS

OS TYPE – OFFSET EYE CABLE GRIP

Similar to the SE Type single eye cable grip, but for when offset positioning is required. Excellent for pulling slack out of lines that have been pulled. May also be used for removing underground cables when end of cable is available.

Slingco Part No	Range		Lattice Weave	Lattice Length		Overall Length		Approx. Break Load	
	in	mm		in	mm	in	mm	lb	kg
OFFSET EYE STANDARD GRIP - GALVANIZED									
ZCS1860	0.25 - 0.50	6-13	Single	9	230	12	305	1,680	760
ZCS1861	0.50 - 0.75	13-19	Single	14	355	17	430	2,240	1,015
ZCS1862	0.75 - 1.00	19-25	Single	16	405	20	510	5,600	2,540
ZCS1863	1.00 - 1.50	25-38	Single	18	455	24	610	7,840	3,555
ZCS1864	1.50 - 2.00	38-50	Double	21	535	29	735	11,200	5,080
ZCS1865	2.00 - 2.50	50-63	Double	24	610	34	865	11,200	5,080
ZCS1866	2.50 - 3.50	63-89	Double	27	685	39	990	13,440	6,095
ZCS1867	3.50 - 4.50	89-115	Double	27	685	39	990	15,680	7,110
ZCS1974	4.50 - 5.50	115-140	Double	27	685	39	990	15,680	7,110
OFFSET EYE STANDARD GRIP - 316 STAINLESS STEEL									
ZCS1986	0.25 - 0.50	6-13	Single	9	230	12	305	1,344	610
ZCS1987	0.50 - 0.75	13-19	Single	14	355	17	430	1,792	810
ZCS1988	0.75 - 1.00	19-25	Single	16	405	20	510	4,480	2,030
ZCS1989	1.00 - 1.50	25-38	Single	18	455	24	610	6,272	2,845
ZCS1990	1.50 - 2.00	38-50	Double	21	535	29	735	8,960	4,065
ZCS1991	2.00 - 2.50	50-63	Double	24	610	34	865	8,960	4,065
ZCS1992	2.50 - 3.50	63-89	Double	27	685	39	990	10,752	4,875
ZCS1993	3.50 - 4.50	89-115	Double	27	685	39	990	12,544	5,690
ZCS1994	4.50 - 5.50	115-140	Double	27	685	39	990	12,544	5,690
ZCS3994	5.50 - 7.00	140-180	Double	24	610	39	990	4,500	2,009
ZCS4069	8.0 - 9.0	203-229	Double	59	1,500	74	1,880	20,000	8,928

Generic Duplex Lift Station Layout



NOTES:

1. COVER SHOWN IS A STANDARD DUTY SAFE HATCH WITH ANGLE FRAME. FOR DIMENSIONS ON ACCESS COVERS WITH SAFE HATCH OR WITHOUT SAFE HATCH AS WELL AS HEAVY DUTY OR OTHER TYPES, CONSULT FLYGT ENGINEERING.
2. INSTALL ACCESS COVERS PER MANUFACTURER'S INSTRUCTIONS.
3. MIN. LIQUID LEVEL MUST NOT FALL BELOW TOP OF VOLUTE.
4. 60° RECOMMENDED.
5. OTHER MATERIALS AVAILABLE. CONSULT FLYGT ENGINEERING.
6. FLYGT LIQUID LEVEL CONTROL MONITORING SYSTEM.
7. GOOD DESIGN PRACTICE DICTATES THAT INFLUENT PIPE ELEVATIONS HIGHER THAN LWL SHOULD BE AVOIDED DUE TO RISK OF AIR ENTRAINMENT, UNLESS SPECIAL ARRANGEMENTS ARE MADE.

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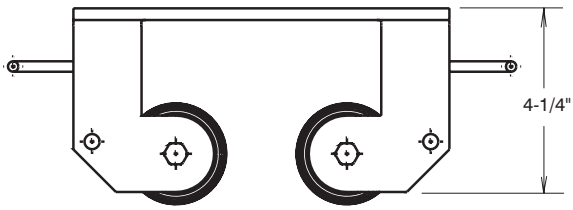
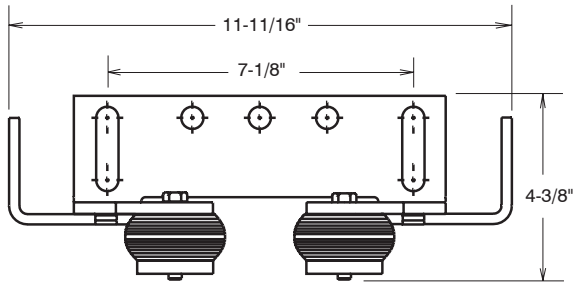
Issued: 4/18 Supersedes: 6/15

Upper Guide Bar Bracket (for 3000, 5500 & 8000 Series Pumps)

2" UPPER GUIDE BAR BRACKET

613 68 00	Galvanized Steel
613 68 04v	304 Stainless Steel

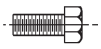




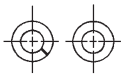
Note: use with 2" nominal guide bars

MOUNTING HARDWARE
14-59 00 00 (stainless steel)

3/8"-16 LATERAL NUT
14-46 37 05



HEX. HEAD BOLT (2),
3/8"-16 x 7/8"
14-46 20 25



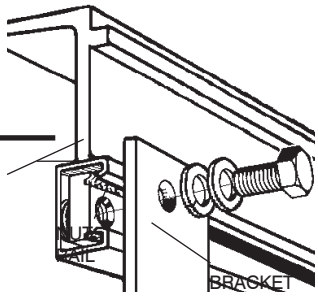
3/8" PLAIN WASHER (2)
14-46 50 07

3/8" LOCK
WASHER (2)
14-46 50 67

Standard for the following pumps:

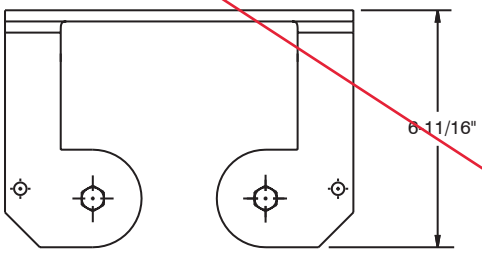
DP/NP-3069
DP-3080
CP/DP/FP/NP-3085
CP/FP/NP-3102
CP/FP/NP-3127
NP/FP-3153
NP/FP-3171
HP-5520, 5530
NP-6020
DP-8050, 8053, 8056, 8058

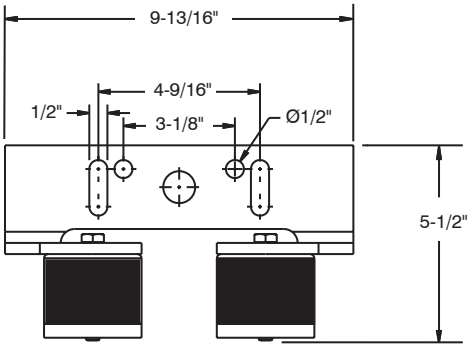
OPTIONAL:
NUT RAIL FEATURE



3" UPPER GUIDE BAR BRACKET

661 54 00	Galvanized Steel
661 54 01	304 Stainless Steel

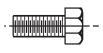




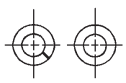
Note: use with 3" nominal guide bars

MOUNTING HARDWARE
14-59 00 00 (stainless steel)

3/8"-16 LATERAL NUT
14-46 37 05



HEX. HEAD BOLT (2),
3/8"-16 x 7/8"
14-46 20 25



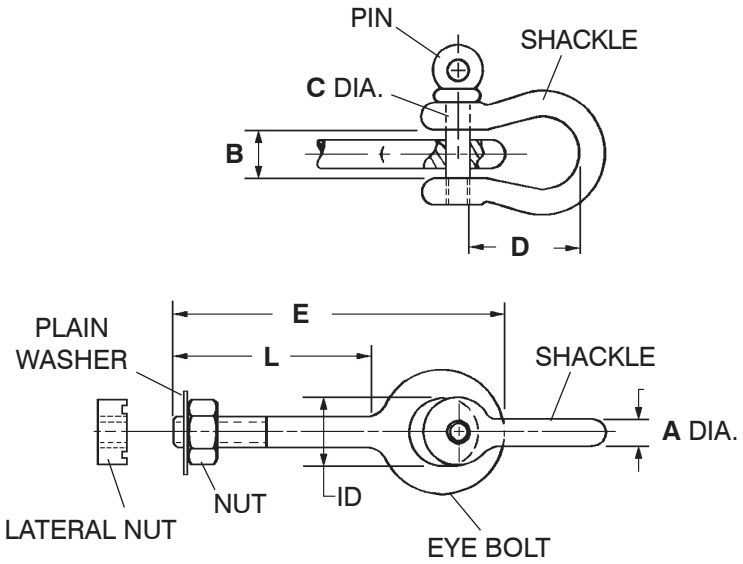
3/8" PLAIN WASHER (2)
14-46 50 07

3/8" LOCK
WASHER (2)
14-46 50 67

Standard for the following pumps:

NP/FP-3171	**CP-3351**
NP/FP-3202	**CP/NP-3356**
CP/NP/RP-3231	**CP/NP-3400**
CP-3240	**CP-3501**
NP-3301	**CP/NP-3531**
CP/NP-3306	**CP-3602**
CP/NP-3312	**CP-3800**
NP-3315	**HP-5570**

Safety Hooks



PUMP MODELS	KIT No.	MATERIAL	A	B	C	D	E	L	ID	LATERAL NUT	EYE BOLT	SHACKLE
3045 thru 3202												
5520 and 5530	14 58 91 05	Galvanized Steel	5/16"	9/16"	3/8"	1-1/4"	4"	2-1/2"	3/4"	3/8-16 UNC	3/8-16 UNC	5/16"
	14 58 91 06	Stainless Steel	3/8"	11/16"	7/16"	1-7/16"	4"	2-1/2"	3/4"	3/8-16 UNC	3/8-16 UNC	3/8"
6020												
8050 thru 8058												
3231 thru 3602	14 58 91 10	Galvanized Steel	5/8"	1-1/16"	3/4"	2-1/2"	6-1/2"	4"	1-1/4"	5/8-11 UNC	5/8-11 UNC	5/8"
	14 58 91 11	Stainless Steel	5/8"	1-1/16"	3/4"	2-7/16"	6-1/2"	4"	1-1/4"	5/8-11 UNC	5/8-11 UNC	5/8"
5570												

Flygt Pump Lift™

Pump Lifting System

The normal method of lowering and raising a NP/CP pump in and out of a lift station is by use of a chain or cable attached to the pump. The length of the chain or cable is dependent on the depth of the station. The average length would probably be between 18 to 20 ft. and in certain cases may be much longer. In many cases, depending on the lifting device (usually a hoist), the operator may have to take a second or third bite on the pump chain in order to lift the pump clear of the station.

An added accessory to the Flygt line is the patented **Flygt Pump Lift™** System which consists of a Nylon or stainless steel guide rope, a short length of high tensile strength carbon steel or stainless steel chain and a forged "Grip-Eye" of wrought alloy steel.

The pump raising operation using this positive recovery system is accomplished as follows:

1. Connect the small eye of the Grip-Eye to the end of the hoist cable.
2. Slip the top end of the guide rope through the large eye of the Grip-Eye. The guide rope simply acts as a guide for the Grip-Eye on its way down to the short length of the pump lifting chain.
3. While keeping the guide rope taut, proceed to lower the Grip-Eye until it is well positioned over the pump lifting chain.
4. Release the tension on the guide rope. The lifting chain will now take a position to become engaged in the Grip-Eye.
5. Gradually take up tension on the hoist cable and the Grip-Eye will make a positive grip on the pump lifting chain. Continue hoisting until the pump is clear of the station.

Guiding the Grip-Eye to the chain

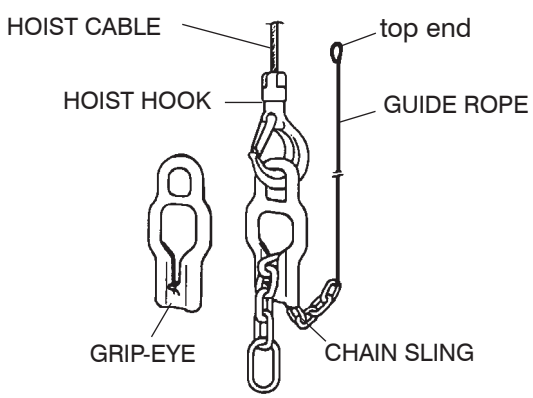
Hoisting

Caution: The Grip-Eyes may only be used with the corresponding special Flygt Chain Sling Units.

Grip-Eyes are not covered under warranty if other chains are used.

Guide Ropes are <u>not</u> to be used for lifting the pump.

Refer to the following pages for pump models and correct assembly.



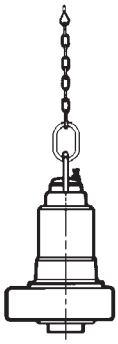


FIG. 1

(Standard) The end ring of the Chain Sling is slipped over the pump lifting handle.

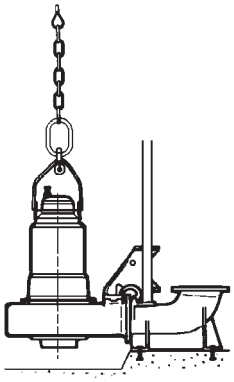


FIG. 2

(Customer to supply extra shackle) A shackle of capable strength can be used in conjunction with the standard ring should customer choose not to remove and replace pump handle.

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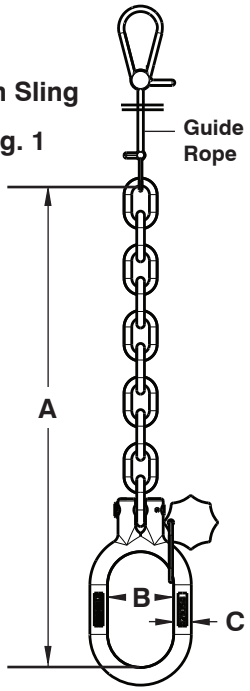
Issued: 1/14 Supersedes: 8/00

Flygt Pump Lift™

Pump Lifting System

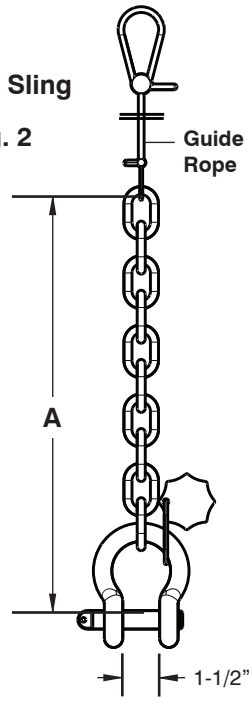
Chain Sling

Fig. 1

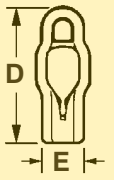


Chain Sling

Fig. 2



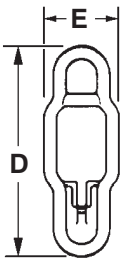
Grip-Eye



620 09 00

Grip-Eye

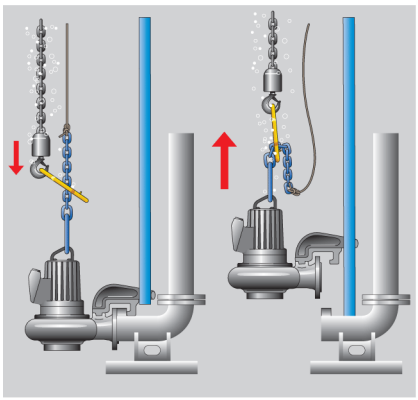
Material:
forged wrought alloy steel



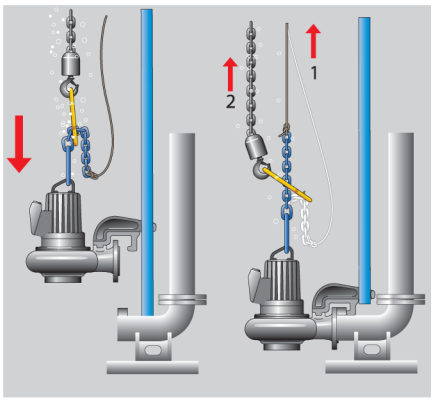
620 09 01

Chain Sling Ass'y	Fig.	Chain Sling Dimensions (in)			Grip-Eye	Grip-Eye Dimensions (in)		Guide Rope (ft)	Max. Load (lbs)
		A	B	C		D	E		
442 18 00* ^	1	13-1/2	2-3/8	5/8	620 09 00	7-7/8	2-3/8	33	2,645
442 18 02* ^	2	21-7/8	--	--	620 09 01	13-3/4	4-3/4	49	9,260
442 18 05** ^	1	27-1/2	2-3/8	7/8	620 09 01	13-3/4	4-3/4	33	4,410
442 18 06** ^	1	16	2-3/8	1/2	620 09 00	7-7/8	2-3/8	33	1,190
442 18 16**†	1	16	2-3/8	1/2	620 09 00	7-7/8	2-3/8	33	1,190
442 18 17**†	1	16	2-3/8	1/2	620 09 00	7-7/8	2-3/8	25	1,190
442 18 18**†	1	16	2-3/8	1/2	620 09 00	7-7/8	2-3/8	20	1,190
442 18 19**†	1	16	2-3/8	1/2	620 09 00	7-7/8	2-3/8	15	1,190
14-587035**††	1	16	2-3/8	1/2	620 09 00	7-7/8	2-3/8	30	1,190

*Carbon Steel **AISI 316 Stainless Steel ^ with Nylon guide rope † with 1/4"ø AISI 316 Stainless Steel guide rope †† with 3/32"ø AISI 316 Stainless Steel guide rope



Lifting the pump



Lowering the pump

SERIES J CABLE HOLDER

HALLIDAY PRODUCTS
www.HallidayProducts.com
Phone 800–298–1027
Fax 407–298–4534
Sales@HallidayProducts.com

STANDARD FEATURES:

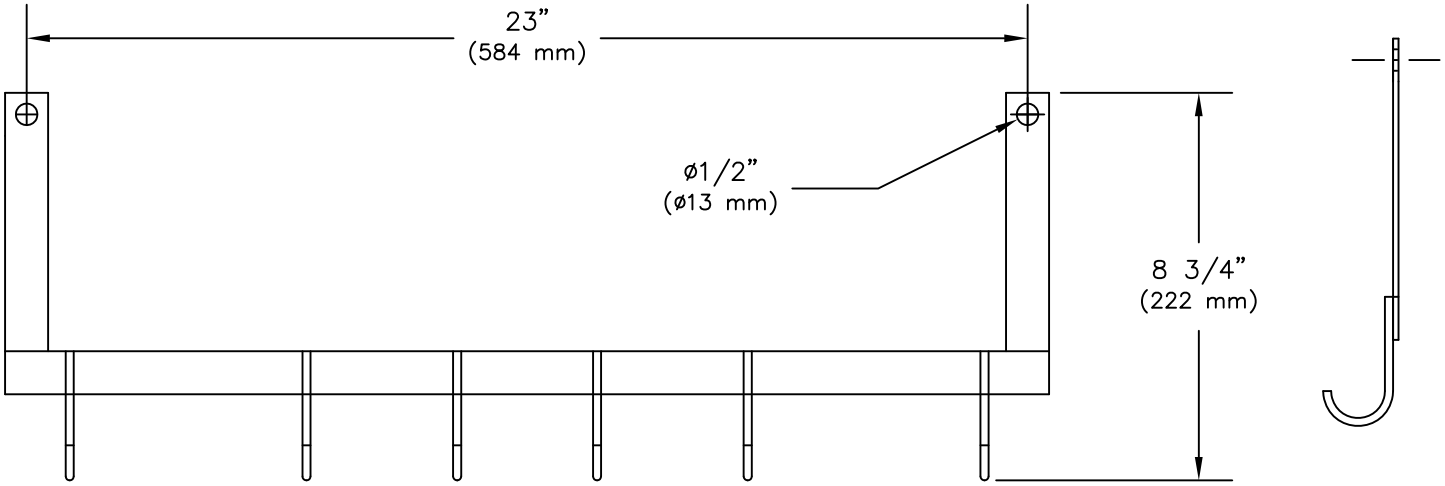
- STAINLESS STEEL CONSTRUCTION
- 6 HOOKS STANDARD – FOR FLOAT SWITCHES
- AVAILABLE STANDARD DUTY OR HEAVY DUTY

QUANITITY
J6A

QUANITITY
J4J

QUANITITY
J6J

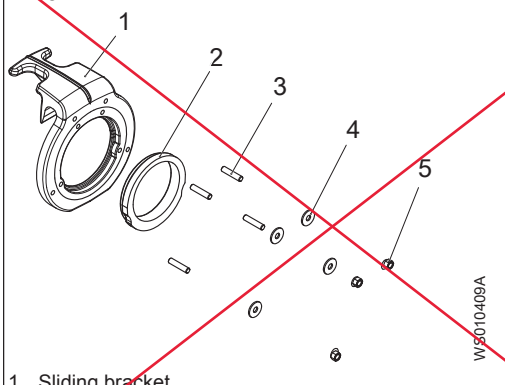
MODEL	CABLE HOLDER
J6A	STD., 1/8" (3 mm) BODY, ø3/16" (4 mm) HOOK (T–316 S.STL. ONLY)
J4J	H.D., 3/16" (4 mm) BODY, ø1/4" (7 mm) HOOKS (T–304 S.STL)
J6J	H.D., 3/16" (4 mm) BODY, ø1/4" (7 mm) HOOKS (T–316 S.STL)



2 P-installation

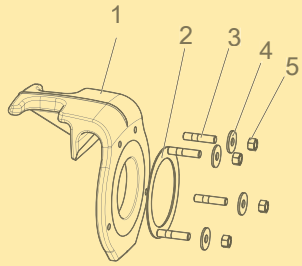
2.1 Sliding bracket kits

Flange surface: Rubber



1. Sliding bracket
2. Seal ring, rubber
3. Stud
4. Washer
5. Nut

Flange surface: Metal



1. Sliding bracket
2. Gasket
3. Stud
4. Washer
5. Nut

All installation kits are applicable to guide system 2 in.

Kit part No.		Pump outlet DN (in.)	Flange surface	Discharge connection inlet, mm (in.)
Standard coating	Special coating			
748 18 15	748 18 45	DN 80 (3)	Metal	80 (3)
748 18 10	748 18 90	DN 80 (3)	Rubber	80 (3)
748 18 15	748 18 45	DN 80 (3)	Metal	100 (4)
748 18 63	748 18 64	DN 80 (3)	Rubber	100 (4)
748 18 25	748 18 46	DN 100 (4)	Metal	100 (4)
748 18 63	748 18 64	DN 100 (4)	Rubber	100 (4)
748 18 25	748 18 46	DN 100 (4)	Metal	150 (6)
748 18 33	748 18 49	DN 100 (4)	Rubber	150 (6)
748 18 35	748 18 48	DN 150 (6)	Metal	150 (6)
748 18 33	748 18 49	DN 150 (6)	Rubber	150 (6)

WARRANTY
Xylem Water Solutions USA, Inc.

For the period defined, Xylem Water Solutions USA, Inc. offers a commercial warranty to the original End Purchaser against defects in workmanship and material on Flygt Products. Warranty covers Flygt parts and labor as outlined in **ADDENDUM – A**.

COVERAGE:
Xylem Water Solutions USA, Inc. will pay the cost of parts and labor during the warranty period, provided that the Flygt product, with cable attached, is returned prepaid to a Xylem Water Solutions USA, Inc. Authorized Service Facility for Flygt Product repairs. Coverage for Flygt parts and labor will be provided for the period shown in **ADDENDUM - A.** The warranty period will begin from date of shipment or date of a valid Start-up (For permanently installed pumps only). In cases where the Start-up date is used as the beginning of the warranty on a permanently installed Flygt pump, a Start-up Report completed by an approved service technician from a Xylem Water Solutions USA, Inc. Authorized Service Facility for Flygt products must be received by the Xylem Water Solutions USA, Inc. Area Service Manager for Flygt Products within thirty (30) days of the initial onset of the unit placed into service. If not received, the beginning of the warranty coverage will default to the Flygt product ship date. A Start-up for a permanently installed Flygt pump must occur within one (1) year from the date of shipment from a Xylem Water Solutions USA, Inc. authorized facility for Flygt Products or warranty will automatically default to ship date as start of warranty. (See **STORAGE** section) When using the start-up date as the beginning of the warranty, a copy of the Start-up Report will be required to support any Warranty Claims. Warranty on Flygt Dewatering pumps will begin with ship date only. No other date on Flygt Dewatering pumps will be considered.

Xylem Water Solutions USA, Inc.'s sole obligation under this Warranty for Flygt Products shall be to replace, repair or grant credit for Flygt Products upon Xylem Water Solutions USA, Inc.'s exclusive determination that the Flygt Product does not conform to the above warranty. In the event that the Flygt product is replaced, warranty on the replacement product will be equal to the balance remaining on the original product or ninety (90) days, whichever is greater.

MISUSE:
This Warranty shall not apply to any Flygt product or part of Flygt product which (i) has been subjected to misuse, misapplication, accident, alteration, neglect, or physical damage (ii) has been installed, operated, used and/or maintained in a manner which is in an application that is contrary to Xylem Water Solutions USA, Inc.'s printed instructions as it pertains to installation, operation and maintenance of Flygt Products, including but without limitation to (iii) operation of equipment without being connected to monitoring devices supplied with specific products for protection; or (iv) damaged due to a defective power supply, improper electrical protection, faulty installation or repair, ordinary wear and tear, corrosion or chemical attack, an act of God, an act of war or by an act of terrorism; or (v) has been damaged resulting from the use of accessory equipment not sold by Xylem Water Solutions USA, Inc. or not approved by Xylem Water Solutions USA, Inc. in connection with Flygt products.

WEAR PARTS:
This warranty does not cover costs for standard and/or scheduled maintenance performed, nor does it cover Flygt parts that, by virtue of their operation, require replacement through normal wear (aka: Wear Parts), unless a defect in material or workmanship can be determined by Xylem Water Solutions USA, Inc.. Wear Parts are defined as Cutters, Cutting Plates, Impellers, Agitators, Diffusers, Wear Rings (Stationary or Rotating), Volutes (when used in an abrasive environment), oil, grease, cooling fluids and/or any items deemed necessary to perform and meet the requirements of normal maintenance on all Flygt equipment.

WARRANTY
Xylem Water Solutions USA, Inc.

DISCLAIMERS:
(i) Xylem Water Solutions USA, Inc.'s warranties are null and void when Flygt Products are exported outside of the United States of America without the knowledge and written consent of Xylem Water Solutions USA, Inc.; (ii) Xylem Water Solutions USA, Inc. makes no independent warranty or representation with respect to parts or products manufactured by others and provided by Xylem Water Solutions USA, Inc. (however, Xylem Water Solutions USA, Inc. will extend to the Purchaser any warranty received from Xylem Water Solutions USA, Inc.'s supplier for such parts or products).

LIMITATIONS:
XYLEM WATER SOLUTIONS USA, INC. NEITHER ASSUMES, NOR AUTHORIZES ANY PERSON OR COMPANY TO ASSUME FOR XYLEM WATER SOLUTIONS USA, INC., ANY OTHER OBLIGATION IN CONNECTION WITH THE SALE OF ITS FLYGT EQUIPMENT. ANY ENLARGEMENT OR MODIFICATION OF THIS WARRANTY BY A FLYGT PRODUCT DISTRIBUTOR, OR OTHER SELLING AGENT SHALL BECOME THE EXCLUSIVE RESPONSIBILITY OF SUCH ENTITY.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ANY AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, GUARANTEES, CONDITIONS OR TERMS OF WHATEVER NATURE RELATING TO FLYGT PRODUCT(S), INCLUDING AND WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH ARE HEREBY EXPRESSLY DISCLAIMED AND EXCLUDED. PURCHASER'S EXCLUSIVE REMEDY AND XYLEM WATER SOLUTIONS USA, INC.'S AGGREGATE LIABILITY FOR BREACH OF ANY OF THE FOREGOING WARRANTIES IS LIMITED TO REPAIRING OR REPLACING FLYGT PRODUCTS AND SHALL IN ALL CASES BE LIMITED TO THE AMOUNT PAID BY THE PURCHASER HEREUNDER. IN NO EVENT IS XYLEM WATER SOLUTIONS USA, INC. LIABLE FOR ANY OTHER FORM OF DAMAGES, WHETHER DIRECT, INDIRECT, LIQUIDATED, INCIDENTAL, CONSEQUENTIAL, PUNITIVE, EXEMPLARY OR SPECIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LOSS OF USE, LOSS OF PROFIT, LOSS OF ANTICIPATED SAVINGS OR REVENUE, LOSS OF INCOME, LOSS OF BUSINESS, LOSS OF PRODUCTION, LOSS OF OPPORTUNITY OR LOSS OF REPUTATION.

XYLEM WATER SOLUTIONS USA, INC. WILL NOT BE HELD RESPONSIBLE FOR TRAVEL EXPENSES, RENTED EQUIPMENT, OUTSIDE CONTRACTOR'S FEES, OR ANY EXPENSES ASSOCIATED WITH A FLYGT PRODUCT REPAIR SHOP NOT AUTHORIZED BY XYLEM WATER SOLUTIONS USA, INC. U.S.A., INC. REIMBURSEMENT COSTS FOR CRANES AND/OR ANY SPECIAL EQUIPMENT USED IN CONJUNCTION FOR THE REMOVAL AND/OR REINSTALLATION OF ANY FLYGT EQUIPMENT IS NOT COVERED UNDER THIS WARRANTY.

ANY UNAUTHORIZED ALTERATIONS TO SUPPLIED FLYGT EQUIPMENT USED WITHOUT XYLEM WATER SOLUTIONS USA, INC. SUPPLIED FLYGT BRAND CABLE OR CONTROLS WILL NOT BE COVERED UNDER THIS WARRANTY, UNLESS IT CAN BE PROVEN SUCH ANCILLARY EQUIPMENT IS SUITABLE FOR THE PURPOSE AND EQUAL TO XYLEM WATER SOLUTIONS USA, INC. SUPPLIED FLYGT BRAND CABLES OR CONTROLS THAT WOULD ORIGINALLY HAVE BEEN SUPPLIED WITH THE TYPE OF EQUIPMENT IN USE.

REQUIREMENTS:
A copy of Electrical System Schematics of the Control used (including a Control's Bill of Material) could be required to support a Warranty Claim when a non Flygt Brand Control is used. In addition, a written record, hereby known as "the log", will be associated with each unit serial number and must be maintained by the organization having product maintenance responsibility. The log must record each preventative maintenance activity and any repair activity during the life of the warranty or verification that a Xylem Water Solutions USA, Inc. authorized Service Contract for Flygt Products is in force and must be available for review and/or auditing. Failure to meet these conditions could render this warrant null and void. Such logs could be required to determine warranty coverage.

WARRANTY
Xylem Water Solutions USA, Inc.

STORAGE:
Should a delay occur between ship date and the date of start-up, maintenance as outlined in Xylem Water Solutions USA, Inc.'s Care & Maintenance Manual for Flygt Products must be performed by the "CONTRACTOR" and/or "OWNER" during any such period of storage. Documentation providing proof and outlining what maintenance was performed must be provided to Xylem Water Solutions USA, Inc. or its Flygt Products representative within thirty (30) days of said maintenance, or the Xylem Water Solutions USA, Inc. warranty for Flygt Products could be considered void.

CONTROLS:
Warranty coverage for permanently installed controls will start for the end purchaser on the date of shipment. This warranty does not apply to controls that have been damaged due to a defective and/or improper input power supply, improper electrical protection, accidental damage, improper or unauthorized installation and/or repair, unauthorized alteration, negligence, environmental corrosion or chemical attack, improper maintenance or storage of control, any act of God, an act of war, an act of terrorism or damage resulting from the use of accessory equipment not approved by Xylem Water Solutions USA, Inc.. Further, this warranty does not apply in the event an adjustment is found to correct the alleged defect.

Solid state devices will be covered for a period of one (1) year. Electrical control panels containing controllers, PLC's, drives, soft starts, and other computerized equipment will require Transient Voltage Surge Suppression (TVSS) protection in order to satisfy the requirements of this warranty. The protection equipment associated with the control must be kept in working condition during the life of the warranty. Auxiliary equipment supplied with the control (air-conditioners etc.) is limited by the respective original equipment manufacturer's warranty offered. Consumable items such as: light bulbs, fuses, and relays are covered under normal operating conditions. Electrical surges experienced during startups and/or during normal operating use of the control panel will cause the consumable items not to be covered under this warranty policy. Components not supplied by Xylem Water Solutions USA, Inc. will not covered by this warranty.

TOP (The Optimum Pump Station)
Xylem Water Solutions USA, Inc. will warrant the Flygt TOP pre-engineered fiberglass pump station components against defects in material and workmanship for a period of one (1) year from date of start-up or eighteen (18) months from date of shipment and is valid only to the original owner of the station. Warranty shall cover the cost of labor and materials required to correct any warrantable defect, excluding any removal and reinstallation costs, FOB Xylem Water Solutions USA, Inc.'s authorized warranty service location for Flygt's TOP.

Flygt Products contained within a TOP pre-engineered fiberglass pump station will carry the standard Xylem Water Solutions USA, Inc. warranty for Flygt products and/or accessories installed in the TOP pre-engineered fiberglass pump station.

All Flygt Product restrictions and/or limitations as outlined and described within the context of this warranty are germane to all sections of this Xylem Water Solutions USA, Inc. Warranty document.

Xylem Water Solutions USA, Inc.
National Quality Assurance - US Corporate

FLYGT
a xylem brand

WARRANTY
Xylem Water Solutions USA, Inc.

ADDENDUM – WARRANTY COVERAGE BY PRODUCT

PRODUCT	PRODUCT SERIES AND CONFIGURATION	MONTHS 1-12	MONTHS 13-18	MONTHS 19-24	MONTHS 25-36	MONTHS 37-39	MONTHS 40-60	MONTHS 61-72	MONTHS 73-84
Axial Flow / Mixed Flow / Centrifugal Pumps & Mixers	3000 Series (CP, NP, DP, CT, NT, CZ, NZ, LL) 4000 Series (SR, PP) 7000 Series (PL)	100%		50%			25%		
Concertor Pumping System	6000 Series (DP)	100%		50%			25%		
	6000 Series (iPS)	100%			50% 25-48 MONTHS			25% 49-84 MONTHS	
ETO Electrical Control Panels	Engineered to Order, Xylem Manufactured Control Panels (permanently installed) - 3 Years	100% 1 YR	LIMITED – 2 YEAR						
Grinder Pumps	3000 Series (MP, MF, MH)	100% - 2 YEAR (From Ship Date)			3 YR (From DOM)	DOM= Date of Manufacture			
Abrasion/Corrosion Resistant & Chopper Pumps	3000 Series (FP, FS, FT, HP, HS) 5000 Series (HP, HS) 8000.280 Series (DP, DZ, DT, DS, DF)	100%							
Centrifugal Pumps	1300 Series	100% (From Ship Date)							
Dewatering Pumps	2000 Series (BS, KS) 3000 Series (CS, NS, DS) 8000.280 Series (DS, DF)	100% (From Ship Date)							
TOPS	Fiberglass Pump Station	100% (From Ship Date)							
Accessories	Permanent / Portable	100% (From Ship Date)							
Hydroejectors/Aerators	HE, JA	100%							
Portable Pump Controls TOPS Control Panels	Control Boxes (Nolta, MSHA etc.) TOPS control panels (permanently installed)	100% (From Ship Date)							
Small Pumps	3045, 3057, SX	100% (From Ship Date)							
Parts - *	All new Flygt parts (mechanical & electrical)	100% (From Ship Date)							

* - Parts that fail where used in a repair are warranted for one (1) year from the date of the repair for the failed part only – no labor; This Includes Flygt pump controllers, Flygt supervision equipment, Flygt submersible level transducers, etc.

WECI
Whitney Equipment Company, Inc

16120 Redmond-Woodinville Road NE, Suite 3 Woodinville, WA 98072 www.weci.com 425-486-9499

Flygt Concertor Pump Wiring Memo

DATE: December 7, 2021
TO: Installation Contractor

The following is Whitney Equipment's requirements regarding the wiring of the Flygt Concertor pumps into the control panel.

The Flygt Concertor has an integrated VFD controller built into the pump, which is wired differently from a standard Flygt submersible pump. Wiring and installation guidance is included in the pump Operation & Maintenance manual.

We are requiring that all power and control connections in the control panel are checked by a Whitney Equipment service technician prior to powering up the control panel or pumps for the first time.

If incorrect connections are made, both the pump and panel components may be damaged. Damaged electrical components in either the pump or the panel may not be covered under warranty if the panel and/or pumps are powered up prior to Whitney Equipment's observation and verification

Please contact our service team with any questions.

Thank you for your business.

Scott Vande Vusse, P.E.
Vice-President
Whitney Equipment

WECI
Whitney Equipment Company, Inc

16120 Woodinville-Redmond Rd NE Ste 3, Woodinville, WA 98072 www.weci.com 425-486-9499

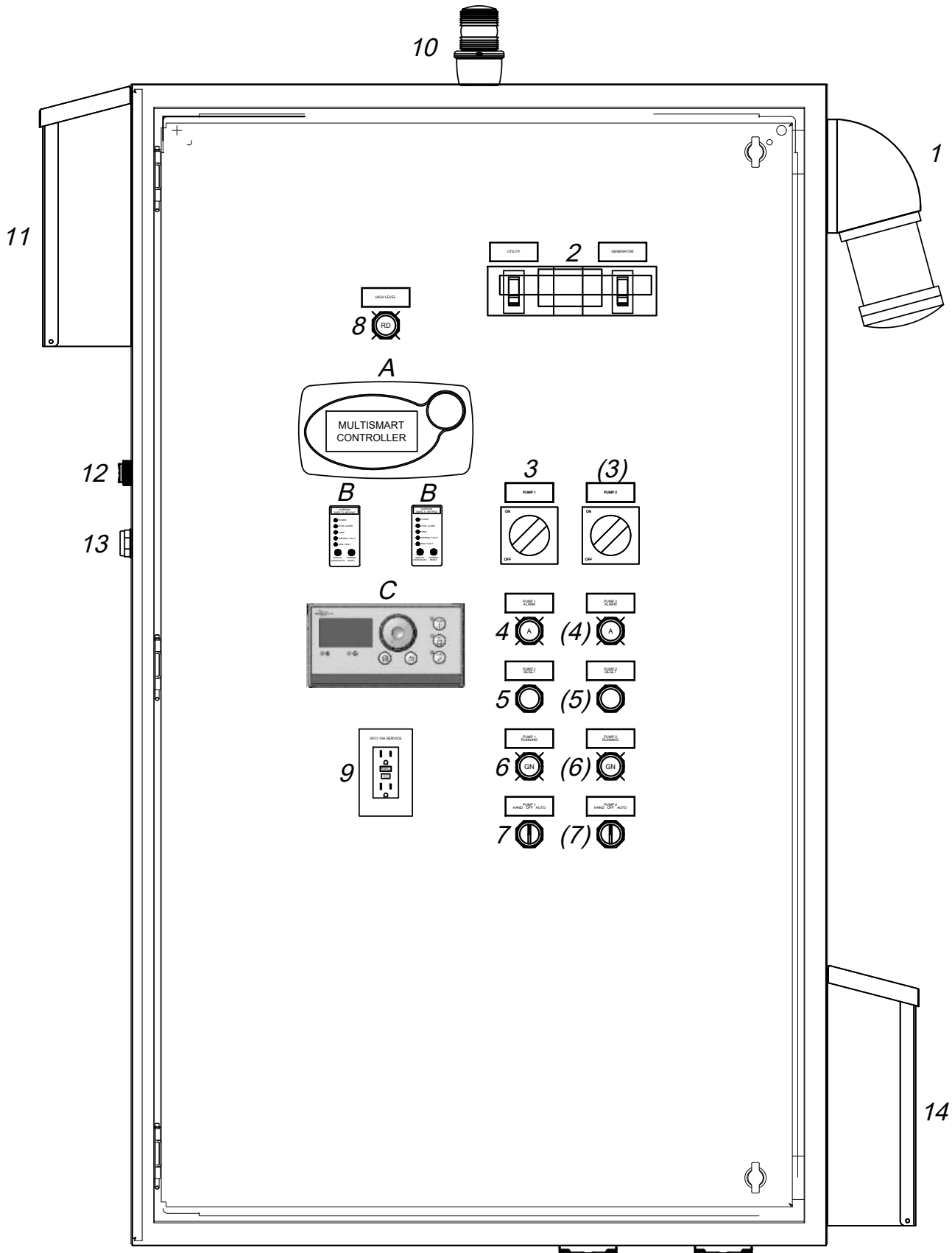
SUBMITTAL

Woodland LS #8 Control Panel
Woodland,WA

Control Panel

Customer: City of Woodland

Date Submitted: 3/20/23



SHOWN WITH EXTERIOR DOOR OPEN

NEMA 4 ENCLOSURE
WITH INNER DOOR
60"H X 36"W X 16"D
UL508A LABELED

REF.	Component	Nameplate	REF.	Component	Nameplate
9	15A GFCI		C	FOP 315 Display	"CUSTOMER SUPPLIED"
8	30mm, Push To Test-illum. - RD	HIGH LEVEL	B	Safe TL Keypad	"CUSTOMER SUPPLIED"
7	30mm, 3 position switch	PUMP 1(2) HAND-OFF-AUTO	A	Multitrode - Pump Control	MSM1 - KEYPAD "CUSTOMER SUPPLIED"
6	30mm, Push To Test-illum. - GN	PUMP 1(2) RUNNING	15	Meltric Receptacles	
5	30mm, Pilot device- Pushbutton	PUMP 1(2) RESET	14	10" Rainhood w/ Fan	
4	30mm, Push To Test-illum. - AM	PUMP 1(2) ALARM	13	30mm, Pilot device- Pushbutton	SILENCE
3	Circuit Breaker Handle	PUMP 1(2)	12	Alarm Horn - 95db	AH
2	Manual Transfer Switch	UTILITY- GENERATOR	11	10" Rainhood w/ Filter	
1	100A Receptacle		10	Alarm Strobe	

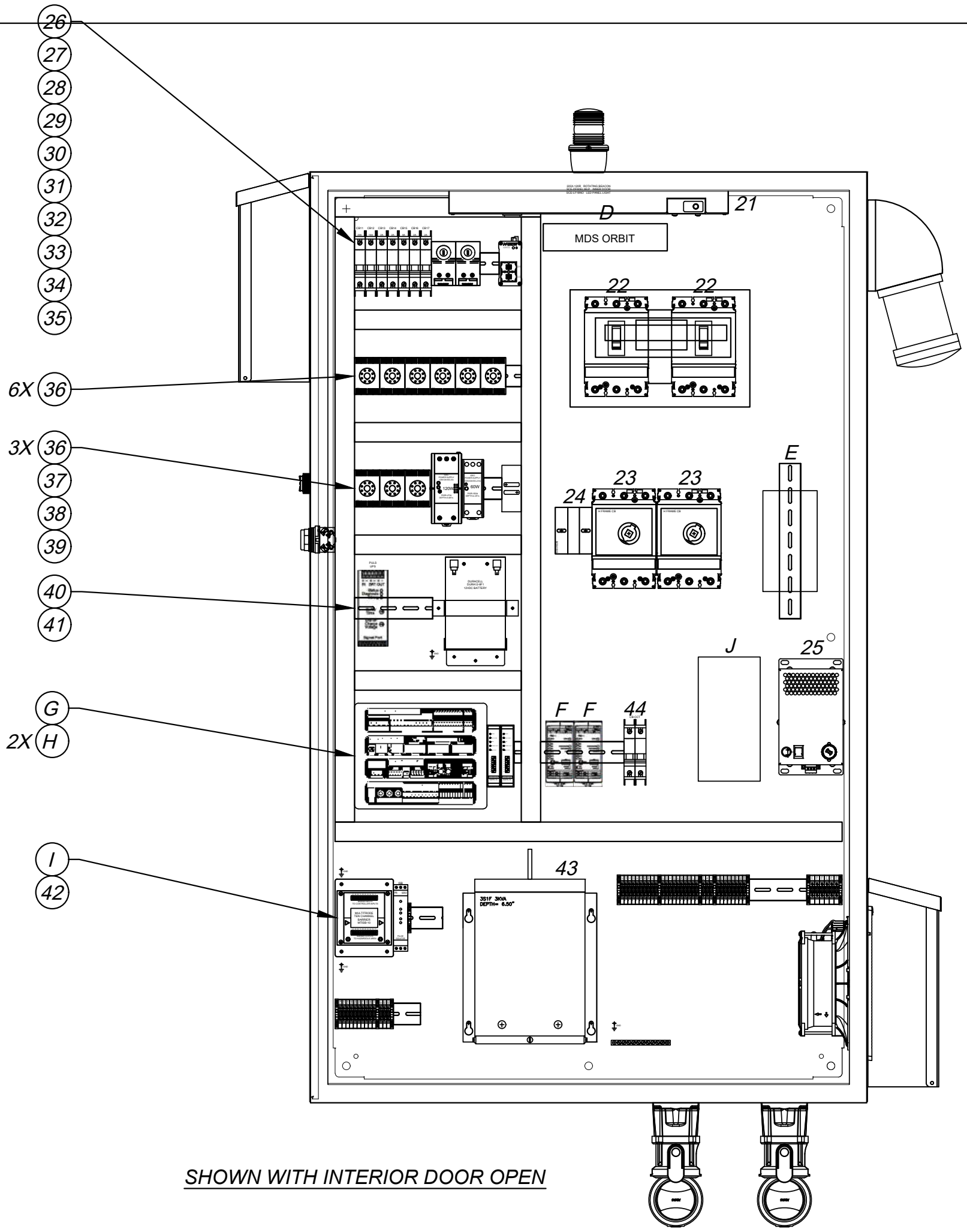
CONTROLS
3070 Bay Vista Court, Benicia, CA 94510
707-746-6255
www.cmcontrols.com

CUSTOMER and PROJECT NAME
Whitney Equipment
Woodland #8 Lift Station Concertor Panel
Duplex Control Panel
Elevation

CUSTOMER PO: P0600624
FILE: 23-2742

REV.	DESCRIPTION:	DATE:	BY:

DRAWN BY: ES
APPROVED BY:
DATE: 3/13/23
SCALE: NONE
DRAWING NO.: 23-2742
SHEET: 1 of 2



36	General Purpose Relays	CR4,5,6,100–102,200–202			
35	Ethernet Switch – 4 Port		J	Flowmeter Transmitter Display	"CUSTOMER SUPPLIED"
34	Cooling Thermostat	TS2	I	Intrinsically Safe Barrier (10P Probe)	MTISB–10 "CUSTOMER SUPPLIED"
33	Heating Thermostat	TS1	H	SAFE–TL Relay	SFTL1,2 "CUSTOMER SUPPLIED"
32	Circuit Breaker – 1P, 6A	CB17	G	Multismart Controller	MSM1 "CUSTOMER SUPPLIED"
31	Circuit Breaker – 1P, 2A	CB16	F	Flygt FGP Module	FGP–1,2 "CUSTOMER SUPPLIED"
30	Circuit Breaker – 1P, 5A	CB15	E	Flygt Surge Suppressor	"CUSTOMER SUPPLIED"
29	Circuit Breaker – 1P, 1A	CB14	D	Orbit Ethernet Radio	"CUSTOMER SUPPLIED"
28	Circuit Breaker – 1P, 4A	CB13	44	Circuit Breaker – 2P, 30A	CB–CCT
27	Circuit Breaker – 1P, 15A	CB12	43	Transformer 480V: 120VAC – 3kVA	CCT
26	Circuit Breaker – 1P, 25A	CB11	42	Intrinsically Safe Barrier	ISB
25	Heater – 400W		41	12VDC Battery	B1,2
24	3–Pole Fuseblock – Class CC	FU1,2,3	40	Uniterruptible Power Supply	UPS
23	Circuit Breaker – 15A	CB1,2	39	1 Pole Fuseblock – Class RK	FU4
22	Main Circuit Breaker – 60A	UTILITY/GENERATOR	38	Power Supply, 120V: 24VDC – 5A	PS2
21	Panel Illumination Light		37	Power Supply, 120V: 24VDC – 2.5A	PS1
REF.	Component	Nameplate	REF.	Component	Nameplate

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SHEET: 2 of 2

"MTS"
60 FLA
MANUAL TRANSFER SWITCH CIRCUIT BREAKERS
W/SLIDE BAR MECHANISM

UTILITY SUPPLY (SOURCE 1)

240V / 3ϕ / 60Hz

L3 L2 L1

GENERATOR RECEPTACLE

GND

GENERATOR SUPPLY (SOURCE 2)

TOTAL FLA: 36.44A

CB1
15A

SHUNT TRIP

MELTRIC

MTR

PUMP 1
5.5 HP / 11.7 FLA

TO PUMP 1 SUM ALARM
PAGE 3

FROM 24-

CB2
15A

SHUNT TRIP

TO PUMP 2 SUM ALARM
PAGE 3

FROM 24-

PUMP 2
5.5 HP / 11.7 FLA

CB-CCT
30A

CCT
240V: 240/ 120V
3kVA

120V

FU4
30A

X1

CB11
25A

11X

FLYGT
SPP
14-400254

FU3
1A

FU2
1A

FU1
1A

TO MULTITRODE 3PC
[MAINS VOLTAGE]

CB12
15A

12X

GFCI 15A SERVICE

CB13
4A

13X

N.C.TEMP

TS1

71

HEATER 400W

N.O.TEMP

TS2

72

FAN

CB14
1A

13X

PANEL ILLUMINATION
LIGHT
120V LED

CB15
5A

15X

LCD YARD LIGHT

120V TO PAGE 2

11X

N

NOTE: TERMINAL NUMBERS ARE ALSO WIRE NUMBERS

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CUSTOMER and PROJECT NAME
Whitney Equipment
Woodland #8 Lift Station Concertor Panel
Duplex Control Panel

CUSTOMER PO: P0600624

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DATE: 3/13/23

SCALE: NONE

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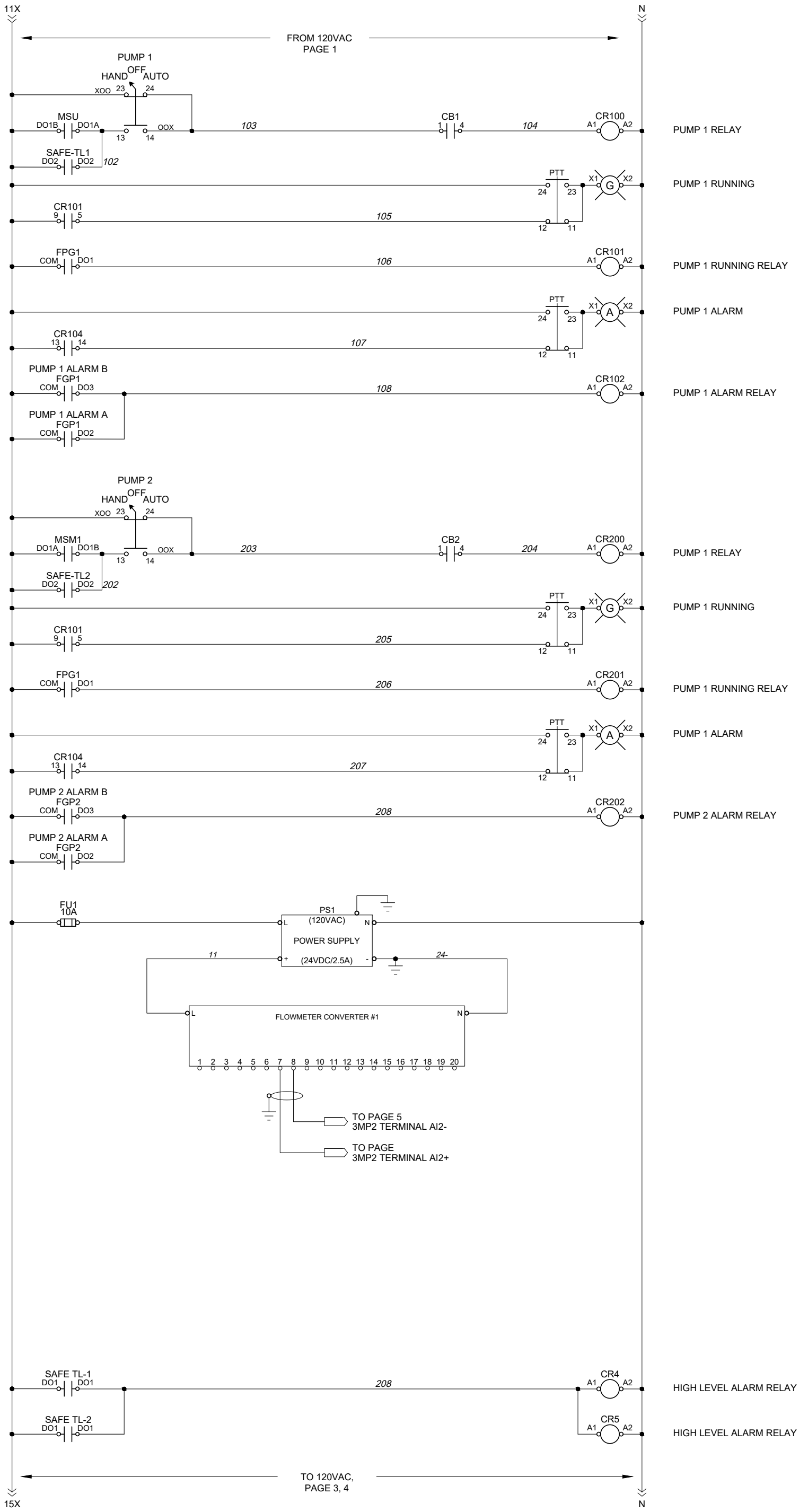
SHEET: 1 of 5



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Woodland #8 Lift Station Concertor Panel
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CUSTOMER PO: P0600624

FILE: 23-2742

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DATE: 3/13/23

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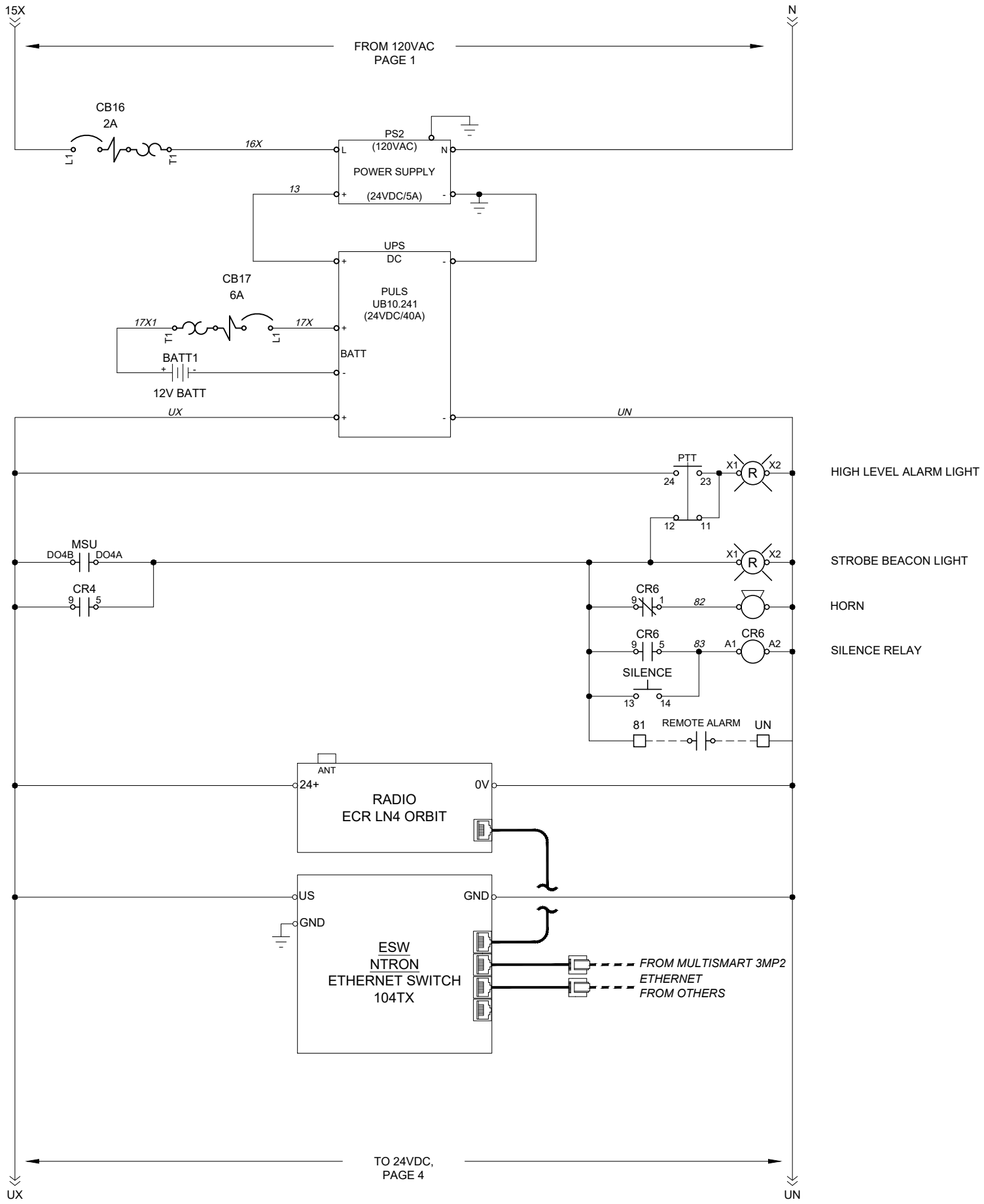
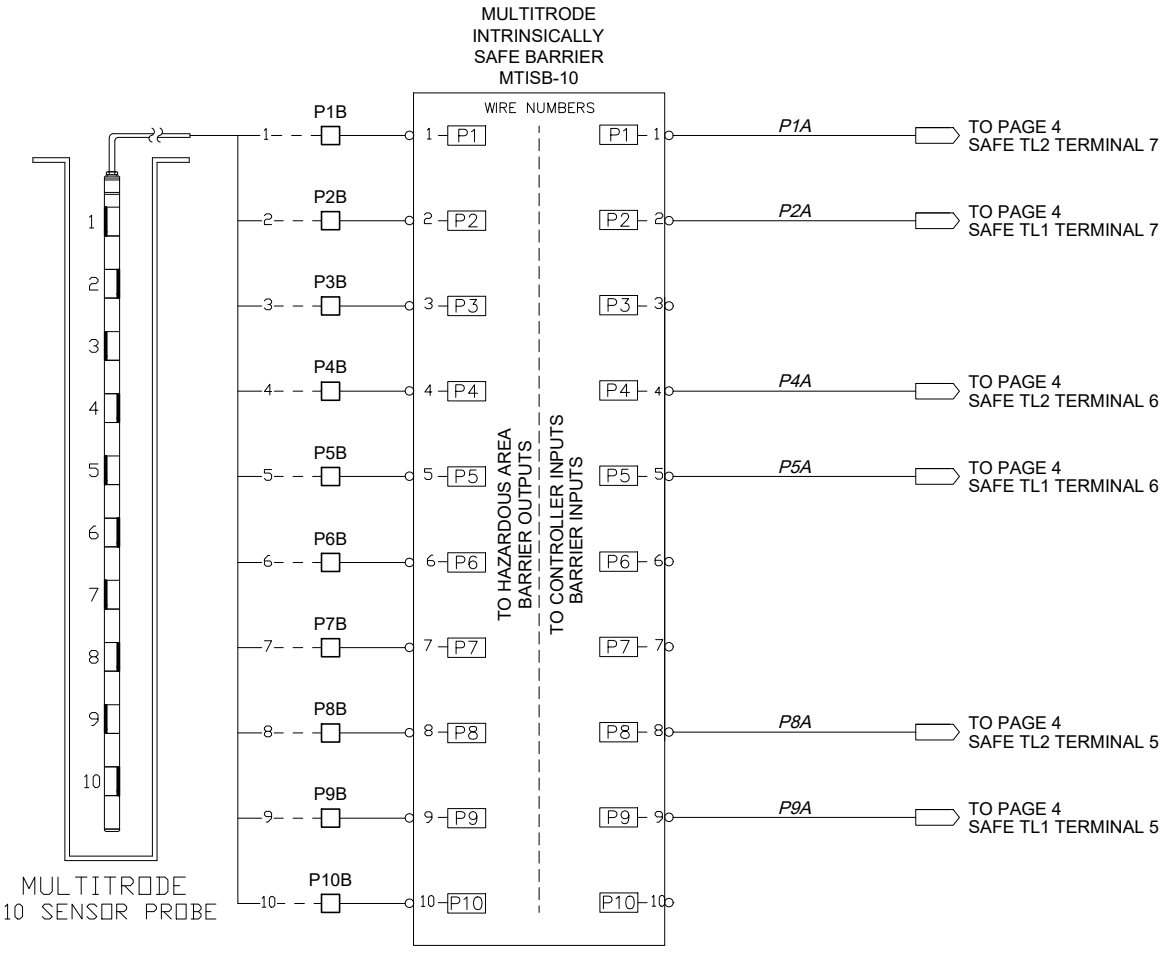
DRAWING NO.: 23-2742

SHEET: 2 of 5





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CUSTOMER PO: PO600624
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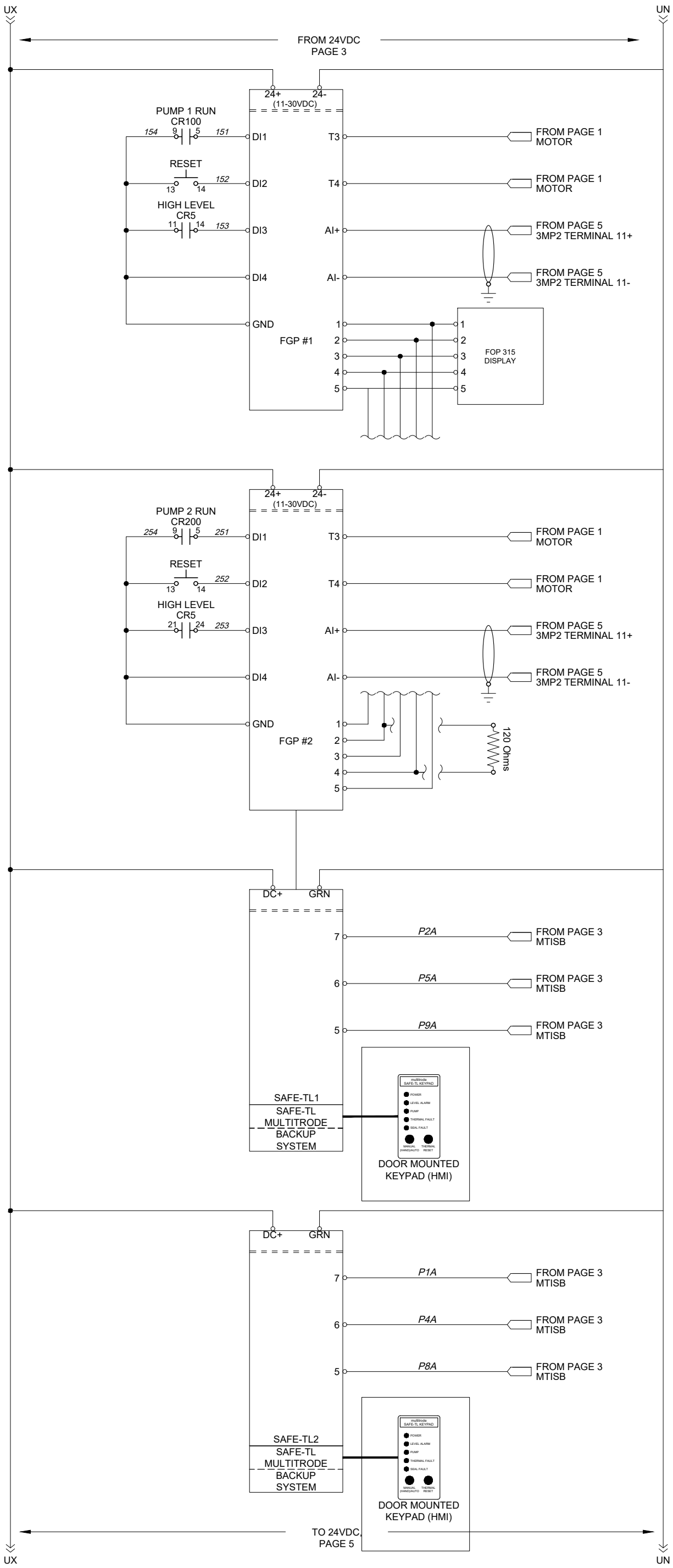

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Whitney Equipment

Woodland #8 Lift Station Concertor Panel

Duplex Control Panel

CUSTOMER PO: P0600624

FILE: 23-2742

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DRAWN BY: ES

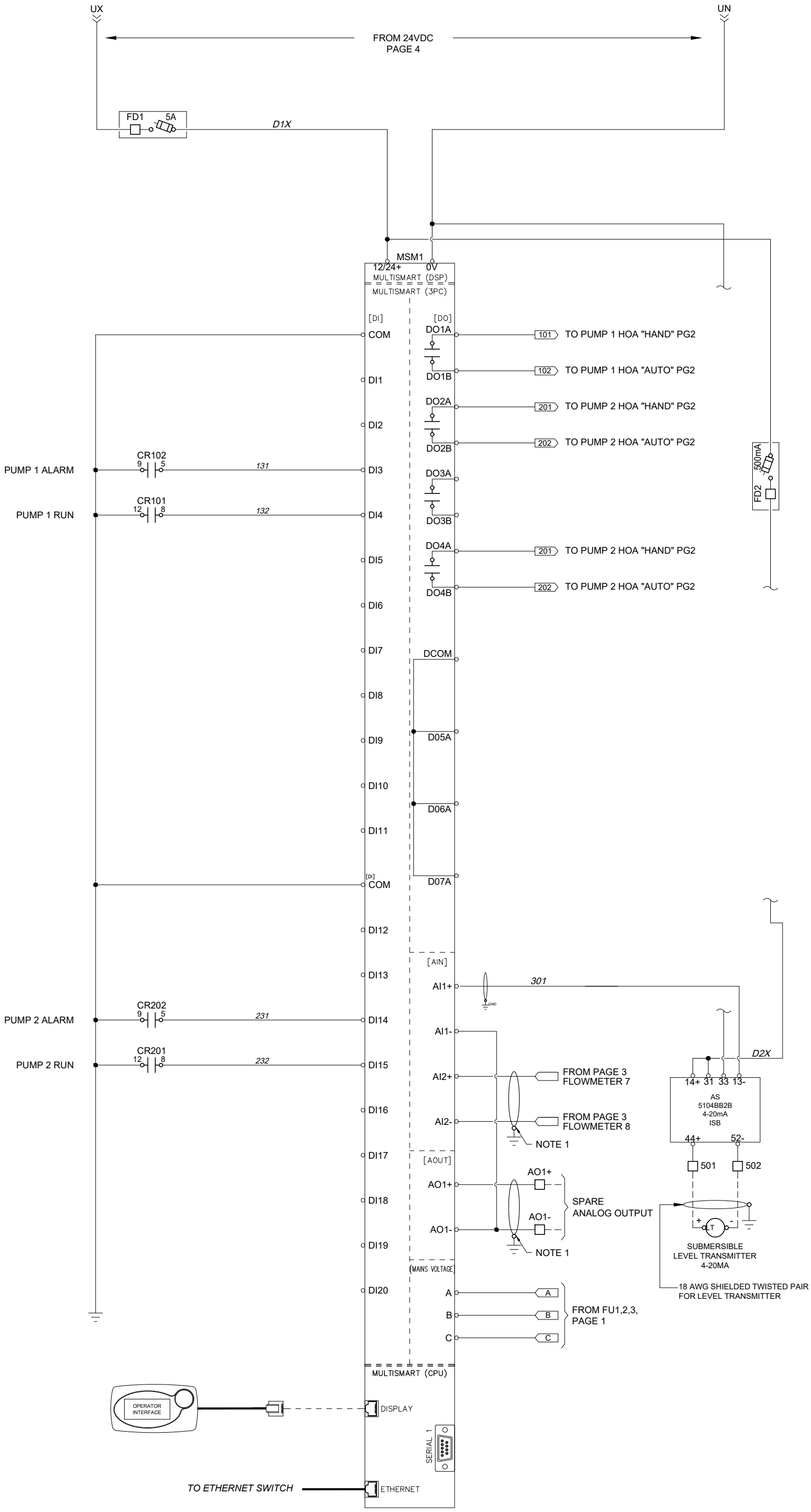
APPROVED BY:

DATE: 3/13/23

SCALE: NONE

DRAWING NO.: 23-2742

SHEET: 4 of 5



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CUSTOMER and PROJECT NAME
Whitney Equipment
Woodland #8 Lift Station Concertor Panel
Duplex Control Panel

CUSTOMER PO: P0600624
FILE: 23-2742

REV.	DESCRIPTION:	DATE:	BY:

DRAWN BY: ES
APPROVED BY:
DATE: 3/13/23
SCALE: NONE
DRAWING NO.: 23-2742
SHEET: 5 of 5

BILL OF MATERIALS

CM ORDER NO.:	23-2742	CUSTOMER ORDER NO.:	PO600624
CM Controls:	Benicia, CA	CUSTOMER:	Whitney Equipment
CM DWG NO:	23-2742	PROJECT:	Woodland #8 Lift Station Concertor Panel
WRITTEN BY:	ES	EQUIPMENT:	Duplex Control Panel
DATE/DUE DATE:	3/15/2023	IDENTIFICATION NO.:	
SYSTEM VOLTAGE:	230V/3ϕ/60	CONTROL VOLTAGE:	120VAC
FAULT CURRENT:	22 kAIC	AUX. VOLTAGE:	12VDC
FULL LOAD AMPS:	2X 11.7A	WIRING NEMA CLASS:	

Notes:
ENCL RATING: NEMA 4

5.5HP

REF	QTY.	TYPE	DESCRIPTION.
		SCE	
Changed to painted steel	1	SCE-60EL3616LP	NEMA 4 enclosure, 60"H x 36"W x 16"D
	1	SCE-60P36	Mounting plate 60" x 36" for NEMA 4 encl.
	1	SCE-DF60EL36LP	Inner door 60"H x 36"W
	1	SCE-HF4001B	Heater 400W
	1	SCE-RH6N12	10" Rainhood, NEMA 3R, gray
		Square D	
NORMAL/EMERGENCY	2	HDL36060	Thermal-mag circuit breaker 60A
	1	S29354	Mechanical interlock for toggle handle H & J frame CB
CB1,2	2	HDL36015	Thermal-mag circuit breaker 15A
	2	S29386	Circuit breaker shunt trip
	2	S29340	Rotary handle for Powerpact H & J type circuit breaker
	1	3S1F	3 KVA Xmfr 240x480/120x240 1ph
H-O-A	2	9001-SKS43B	30MM 3 position selector switch, NEMA 4X w/o contacts, Black
Reset, Silence	3	9001SKR1U	Pushbutton full guard
High level	1	9001-SK2L38LRR	30MM Red P-T-T indicator, NEMA 4X, w/o contacts
P1-2 Run	2	9001-SK2L38LGG	30MM Green P-T-T indicator, NEMA 4X, w/o contacts
P1-2 Alarm	2	9001-SK2L38LYA	30MM Amber P-T-T indicator, NEMA 4X, w/o contacts
	5	9001-KA1	N.O., N.C. contact block for 30MM device
	7	9001-KA2	N.O. contact block for 30MM device
		Appleton	
	1	ADR1034RS	Gen. receptacle 100A 3W, 4P rev. service
	1	AJA100	60A/100A angle mount
		Bussman	
FD1	1	BK/GMA5A	Bussman Fast Act Fuse 5A, 5x20mm
FD2	1	BK/GMA-500MA	Bussman Fast Act Fuse 500MA, 5x20mm
FU4	1	FRS-R-30	30A Class RK Fuse
		Duracell	Amazon, Batteries Plus
	1	12-8F1	Battery 12VDC, 8ah sealed
		Fandis	
	1	FF15A115ZN2	Fan kit, 115VAC, 158.8 CFM, 10"
	1	FF15Z	10" Filter kit
	1	TRT-10A230V-NOF	Thermostat, blue dial
	1	TRT-10A230V-NCF	Heater Thermostat, red dial
		Federal Signal	Galco
AL	1	LP3S-012-048R	Panel strobe light - Red 12-48VDC
		Ferraz	
FU1,2,3	1	30313R	Fuseblock, 600V, 3-Pole
FU4	1	20321	Fuseblock, 1-pole 30A 250V Class R/K
		Floyd Bell	
	1	MW-09-550-Q	Alarm Bell 15-36V, 95db
		Hoffman	
	1	LEDA1S35	LED enclosure light switch
		Idec	
	9	RH2B-ULAC110	General Purpose Relay, 120V, 2PDT, 10A, w/ indicator
	1	RH2B-UDC24V	General Purpose Relay, 24VDC, 2PDT
	10	SR2P-06	Socket 8 pin
	1	SR2P-05C	Socket touch safe 8 pin
	1	PS5R-VF24	Power supply 24VDC 5A
	1	PS5R-VD24	Power supply 24VDC, 2.5A, 60W

BILL OF MATERIALS

CM ORDER NO.:	23-2742	CUSTOMER ORDER NO.:	PO600624
CM Controls:	Benicia, CA	CUSTOMER:	Whitney Equipment
CM DWG NO:	23-2742	PROJECT:	Woodland #8 Lift Station Concertor Panel
WRITTEN BY:	ES	EQUIPMENT:	Duplex Control Panel
DATE/DUE DATE:	3/15/2023	IDENTIFICATION NO.:	
SYSTEM VOLTAGE:	230V/3ϕ/60	CONTROL VOLTAGE:	120VAC
FAULT CURRENT:	22 kAIC	AUX. VOLTAGE:	12VDC
FULL LOAD AMPS:	2X 11.7A	WIRING NEMA CLASS:	

Notes:
ENCL RATING: NEMA 4

5.5HP

REF	QTY.	TYPE	DESCRIPTION.
		Littelfuse	
FU1,2,3	3	KLDR001	Class CC Fuse 600V, 1A
		Meltric	Industrial Electrical
Ship loose	2	63-68073-974	DNS60 plug 60A, 240V Male w/ 4 aux. terminals
Ship loose	2	793P0DS1	Handle DSN60 w/ Cord grip, poly (.077"-.875" cable range
	2	63-64073-974	DNS60 receptacle 60A, 240V female w/ 4 aux. terminals
		N-Tron	
	1	104TX	Ethernet switch 4 port
		Phoenix Contact	
FD1,2	2	3046090	UT4-HESILED 24, 5x20 LED 24V fuse holder
		PR Electronics	
	1	5104BA-B2A	Intrinsically safe barrier 4-20mA single channel
		PULS	Galco
ups	1	UB10.241	UPS 24VDC
		Weidmuller	
CB11	1	BR1D25UC	25A 1-pole miniature circuit breaker
CB12	1	BR1D15UC	15A 1-pole miniature circuit breaker
CB13	1	BR1D4UC	4A 1-pole miniature circuit breaker
CB14	1	BR1D1UC	1A 1-pole miniature circuit breaker
CB15	1	BR1D5UC	5A 1-pole miniature circuit breaker
CB16	1	BR1D2UC	2A 1-pole miniature circuit breaker
CB17	1	BR1D6UC	6A 1-pole miniature circuit breaker
CB-CCT	1	BR2D30UC	Weidmuller 2-pole miniature circuit breaker, 30A
		Miscellaneous	
		Leviton	
	1	GFNT1-W	GFI receptacle 15A
		Customer Supplied	
Changed for Rosemount to ABB		**ABB**	
	1		Flowmeter transmitter
		Flygt	
SPD	1	14-400254	Surge Protector
	2	84-800112	Safe TL Relay
	2	8012000	FPG412 Module
	1	84-8000084	MSM 3MP2 MultiSmart Controller & HMI
	1	84-800060	MTISB 10 point ISB
	1		10 section level probe
	1		Concertor HMI
Changed from GE to Orbit		**Orbit**	
	1	**ECR LN4**	Radio Modem

Whitney

Equipment 23-2742

Woodland #8

Product Cutsheets

Saginaw Control and Engineering
95 Midland Road Saginaw, MI 48638-5770
(800) 234-6871 - Fax: (989) 799-4524
SCE@SaginawControl.com

SCE-60EL3616LP

Product Specifications:

Part Number: SCE-60EL3616LP
Description: EL Enclosure
Height: 60.00"
Width: 36.00"
Depth: 16.00"

Est. Ship Weight: 195.00 lbs

Construction
- 0.075 In. carbon steel.
- Seams continuously welded and ground smooth.
- Flange trough collar around all sides of door opening.
- Oil-resistant gasket.
- Collar studs provided for mounting optional panels.
- Concealed hinges.
- Removable and interchangeable doors.
- Black quarter turn latches.
- Latches are opened or closed with a screwdriver.
- Mounting holes in back of enclosure.
- Mounting hardware, sealing washer and hole plug included.
- Removable print pocket furnished if height and width of enclosure is greater than 12 inches.
- Ground studs on door and body.

Application
Designed to house electrical and electronic controls, instruments and components. Provides protection from dust, oil and water. For outdoor application a drip shield is recommended.

Options
- Optional tamper-resistant inserts are available. - Optional mounting feet available. - Door hardware available. - Interchangeable latches and handles available in the accessory section.

Finish
ANSI-61 gray powder coating inside and out. Optional sub-panels are powder coated white.

Industry Standards - (IS4)
- NEMA Type 3R, 4, 12 and Type 13
- UL Listed Type 3R, 4 and 12
- CSA Type 3R, 4 and 12
- IEC 60529
- IP 66

Notes
Provision for Lifting Lugs will be included on enclosures with Height >48" and with Depth >16". The Lifting Lug assembly will be included with the enclosure bolt pack.

Special Instructions apply for IS3, IS4 and IS6 to maintain the environmental rating of Type 3R for these parts. Instructions are located on the enclosure door. Drip shield is required on IS3, drip shield is recommended on IS4 and IS6. Drain holes are required on all.

Optional Accessories
SCE-60P36 Subpanel, Bent
SCE-BVK Breather Vent
SCE-DF60EL36LP Panel, Dead Front (Wall Mount)
SCE-DS36N4 Shield, Drip
SCE-ELMFK4 Foot Kit, EL Mounting (4pc.)
SCE-ELSP3 KIT, Swing-Out Panel (20 High & Up)

Saginaw Control and Engineering
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(800) 234-6871 - Fax: (989) 799-4524
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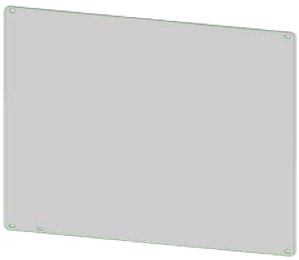
SCE-60P36

Product Specifications:



Part Number: SCE-60P36
Description: Subpanel, Bent
Height: 57.00"
Width: 33.00"
Depth: 0.88"

Est. Ship Weight: 58.00 lbs
Edge Flanges: Four
Configuration: C

Finish
Powder Coated White.

Industry Standards - (IS17)
- NEMA Not Applicable
- UL Not Applicable
- CSA N/A

Saginaw Control and Engineering
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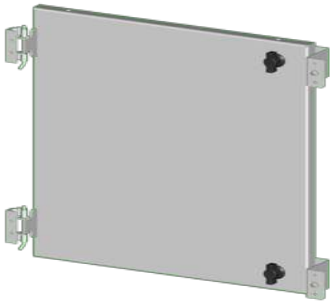
SCE@SaginawControl.com

SCE-DF60EL36LP



Product Specifications:

Part Number: SCE-DF60EL36LP
Description: Panel, Dead Front (Wall Mount)
Height: 56.00"
Width: 32.63"
Depth: 0.83"

Est. Ship Weight: 88.00 lbs

Application
Designed for use in Wall Mount Enclosures with SCE concealed hinges.

Dead front panels are designed as a fixed depth panel to be mounted directly behind the existing hinged door. This allows space to mount gages, meters and push buttons directly behind the front door making them easily visible when mounting them through the main door is not an option. Dead front panels also provide a barrier against incidental contact with live components during routine monitoring or maintenance of equipment.

Dead front panels are installed by mounting hinges back to back with the existing door hinge of the enclosure and only adding two additional holes on the latching side of the enclosure to mount the latch brackets. Dead Front panels include quarter turn wing knobs for easy entry to the interior and mounting hardware to maintain the environmental rating of the enclosure.

Finish
Powder coated white inside and out.

Industry Standards - (IS17)
- NEMA Not Applicable
- UL Not Applicable
- CSA N/A

Notes
Cutout will need to be added for clearance of Defeater and defeater hook when use in Flange mount disconnect enclosure

Saginaw Control and Engineering
95 Midland Road Saginaw, MI 48638-5770
(800) 234-6871 - Fax: (989) 799-4524
SCE@SaginawControl.com

SCE-HF4001B

Product Specifications:

Part Number: SCE-HF4001B
Description: Heater W/ Thermostat
Height: 7.47"
Width: 4.38"
Depth: 4.56"

Est. Ship Weight: 4.00 lbs
Model No.: KH 801
Volt: 120 VAC

Construction
- Brushed Aluminum housing.
- Thermostat Range 0° to 100°F (-18° to 38°C).
- Heat discharge at the top of the heater.
- Panel mount.
- Air volume of 16 CFM on 125 & 200 Watt Heaters, 26 CFM on 400 & 800 Watt Heaters.
- Heat Indicator Light.
- Switch for Auto tuning on and off with the heating thermostat or set to - Fan - to run continuous & independent of the heating thermostat.
- Temperature differential hysteresis 5.4°F
- UL Recognized Component.

Application
Designed to protect electrical controls, instruments and sensitive components from low temperatures and the effects of condensation and corrosion by maintaining a stable temperature within the electrical enclosure. These heaters are not intended for use in hazardous, wet, dusty or dirty locations.

Finish
Brushed Aluminum

Industry Standards - (IS24)
- UL Component Recognized

Notes
UL File #E358386

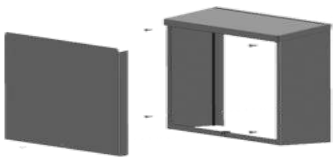
Similar Part Numbers
SCE-HF1251AHeater W/Thermostat
SCE-HF1252AHeater W/ Thermostat (230 Volt)
SCE-HF2001AHeater W/ Thermostat
SCE-HF2002AHeater W/ Thermostat (230 Volt)
SCE-HF4002BHeater W/ Thermostat (230 Volt)
SCE-HF8001BHeater W/ Thermostat
SCE-HF8002BHeater W/ Thermostat (230 Volt)

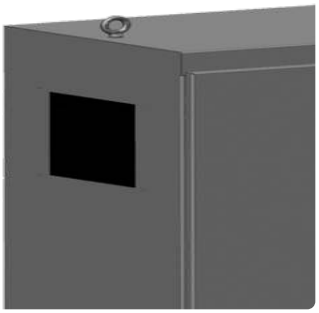
Installation Information
- Fan/Heater with Thermostat

Saginaw Control and Engineering
95 Midland Road Saginaw, MI 48638-5770
(800) 234-6871 - Fax: (989) 799-4524
SCE@SaginawControl.com

SCE-RH6N12

Product Specifications:





Part Number: SCE-RH6N12
Description: Hood, Rain
Height: 13.44"
Width: 11.81"
Depth: 4.50"

Catalog Page: 378
Est. Ship Weight: 3.66 lbs

Application
Designed for use with Type 12 fan and filter kits to prevent rain, sleet, snow, dropping water or fluids from being drawn into the enclosure. Removable cover for easy access to fan and filter kits. Made of heavy gauge galvannealed steel. "SS" parts are made of Type 304 stainless steel.

Finish
ANSI-61 gray powder coat.
"SS" parts with #4 brushed finish.

Industry Standards - (IS11)
- UL Component Recognized Type 3R

Notes
UL File # E69392

Fan and Filter Kit are sold separately.

Optional Accessories
- SCE-N12FA66 Fan Assembly (115v)
- SCE-N12FA66-230 Fan Assembly (230v)
- SCE-N12FA66-24VDC Fan Assembly (24VDC)
- SCE-N12FA66LG Fan Assembly (115v) Type 12 RAL 7035
- SCE-N12FGA66 Filter & Grille Assy. (Black)
- SCE-N12FGA66LG Filter & Grille Assy. Type 12 RAL 7035

Similar Part Numbers
- SCE-RH10N12Hood, Rain
- SCE-RH10N12SSHood, S.S. Rain
- SCE-RH4N12Hood, Rain
- SCE-RH4N12SSHood, S.S. Rain
- SCE-RH6N12SSHood, S.S. Rain

Installation Information
- Rain Hood with Removable Cover

PowerPact H- and J-Frame Circuit Breakers

HD and HG 2P
Thermal-Magnetic Trip Unit
(2P HJ, HL in 3P module)

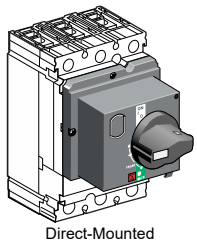
H-Frame
Thermal-Magnetic Trip Unit

Table 7.53: H-Frame 150 A Thermal-Magnetic UL Current-Limiting *[5]* Circuit Breakers (600 Vac, 250 Vdc) *[6]* With Factory Sealed Trip Unit Suitable for Reverse Connection *[7]*

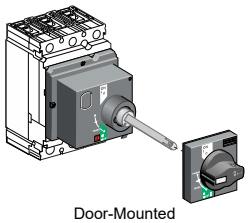
Current Rating @ 40° C	Fixed AC Magnetic Trip		Interrupting Rating							
			D		G		J *[6]*		L *[6]*	
	Hold	Trip	Standard (80% Rated)	100% Rated	Standard (80% Rated)	100% Rated	Standard (80% Rated)	100% Rated	Standard (80% Rated)	100% Rated
H-Frame, 150A 2P, 600 Vac 50/60 Hz, 250 Vdc *[8]*										
15 A	350 A	750 A	HDL26015	HDL26015C	HGL26015	HGL26015C	HJL26015	HJL26015C	HLL26015	HLL26015C
20 A	350 A	750 A	HDL26020	HDL26020C	HGL26020	HGL26020C	HJL26020	HJL26020C	HLL26020	HLL26020C
25 A	350 A	750 A	HDL26025	HDL26025C	HGL26025	HGL26025C	HJL26025	HJL26025C	HLL26025	HLL26025C
30 A	350 A	750 A	HDL26030	HDL26030C	HGL26030	HGL26030C	HJL26030	HJL26030C	HLL26030	HLL26030C
35 A	400 A	850 A	HDL26035	HDL26035C	HGL26035	HGL26035C	HJL26035	HJL26035C	HLL26035	HLL26035C
40 A	400 A	850 A	HDL26040	HDL26040C	HGL26040	HGL26040C	HJL26040	HJL26040C	HLL26040	HLL26040C
45 A	400 A	850 A	HDL26045	HDL26045C	HGL26045	HGL26045C	HJL26045	HJL26045C	HLL26045	HLL26045C
50 A	400 A	850 A	HDL26050	HDL26050C	HGL26050	HGL26050C	HJL26050	HJL26050C	HLL26050	HLL26050C
60 A	800 A	1450 A	HDL26060	HDL26060C	HGL26060	HGL26060C	HJL26060	HJL26060C	HLL26060	HLL26060C
70 A	800 A	1450 A	HDL26070	HDL26070C	HGL26070	HGL26070C	HJL26070	HJL26070C	HLL26070	HLL26070C
80 A	800 A	1450 A	HDL26080	HDL26080C	HGL26080	HGL26080C	HJL26080	HJL26080C	HLL26080	HLL26080C
90 A	800 A	1450 A	HDL26090	HDL26090C	HGL26090	HGL26090C	HJL26090	HJL26090C	HLL26090	HLL26090C
100 A	800 A	1700 A	HDL26100	HDL26100C	HGL26100	HGL26100C	HJL26100	HJL26100C	HLL26100	HLL26100C
110 A	900 A	1700 A	HDL26110	HDL26110C	HGL26110	HGL26110C	HJL26110	HJL26110C	HLL26110	HLL26110C
125 A	900 A	1700 A	HDL26125	HDL26125C	HGL26125	HGL26125C	HJL26125	HJL26125C	HLL26125	HLL26125C
150 A	900 A	1700 A	HDL26150	HDL26150C	HGL26150	HGL26150C	HJL26150	HJL26150C	HLL26150	HLL26150C
H-Frame 150A 3P, 600 Vac 50/60 Hz, 250 Vdc										
15 A	350 A	750 A	HDL36015	HDL36015C	HGL36015	HGL36015C	HJL36015	HJL36015C	HLL36015	HLL36015C
20 A	350 A	750 A	HDL36020	HDL36020C	HGL36020	HGL36020C	HJL36020	HJL36020C	HLL36020	HLL36020C
25 A	350 A	750 A	HDL36025	HDL36025C	HGL36025	HGL36025C	HJL36025	HJL36025C	HLL36025	HLL36025C
30 A	350 A	750 A	HDL36030	HDL36030C	HGL36030	HGL36030C	HJL36030	HJL36030C	HLL36030	HLL36030C
35 A	400 A	850 A	HDL36035	HDL36035C	HGL36035	HGL36035C	HJL36035	HJL36035C	HLL36035	HLL36035C
40 A	400 A	850 A	HDL36040	HDL36040C	HGL36040	HGL36040C	HJL36040	HJL36040C	HLL36040	HLL36040C
45 A	400 A	850 A	HDL36045	HDL36045C	HGL36045	HGL36045C	HJL36045	HJL36045C	HLL36045	HLL36045C
50 A	400 A	850 A	HDL36050	HDL36050C	HGL36050	HGL36050C	HJL36050	HJL36050C	HLL36050	HLL36050C
60 A	800 A	1450 A	HDL36060	HDL36060C	HGL36060	HGL36060C	HJL36060	HJL36060C	HLL36060	HLL36060C
70 A	800 A	1450 A	HDL36070	HDL36070C	HGL36070	HGL36070C	HJL36070	HJL36070C	HLL36070	HLL36070C
80 A	800 A	1450 A	HDL36080	HDL36080C	HGL36080	HGL36080C	HJL36080	HJL36080C	HLL36080	HLL36080C
90 A	800 A	1450 A	HDL36090	HDL36090C	HGL36090	HGL36090C	HJL36090	HJL36090C	HLL36090	HLL36090C
100 A	800 A	1700 A	HDL36100	HDL36100C	HGL36100	HGL36100C	HJL36100	HJL36100C	HLL36100	HLL36100C
110 A	900 A	1700 A	HDL36110	HDL36110C	HGL36110	HGL36110C	HJL36110	HJL36110C	HLL36110	HLL36110C
125 A	900 A	1700 A	HDL36125	HDL36125C	HGL36125	HGL36125C	HJL36125	HJL36125C	HLL36125	HLL36125C
150 A	900 A	1700 A	HDL36150	HDL36150C	HGL36150	HGL36150C	HJL36150	HJL36150C	HLL36150	HLL36150C

[5] Circuit breakers with J and L interrupting ratings are UL certified as current limiting.
[6] Standard lug kit: AL150HD. Terminal wire range: 14–3/0 AWG Al or Cu.
[7] See Supplemental Digest Section 3 for circuit breakers with field interchangeable trip units.
[8] HD and HG circuit breakers are true two-pole construction.

Rotary Handles



Direct-Mounted Handle



Door-Mounted Handle

Table 7.128: Rotary Operated Handles

Device		Description	B-Frame		H- and J-Frame [9]		L-Frame		P-Frame
			Factory Installed Cat. No. Suffix	Field-Installable Cat. No.	Factory Installed Cat. No. Suffix	Field-Installable Cat. No.	Factory Installed Cat. No. Suffix	Field-Installable Cat. No.	Factory Installed Cat. No. Suffix
Direct Mounted	Standard black handle	Operating mechanism kit	RD10	LV426930	RD10	S29337	RD10	S32597	RD10
	Standard black handle with	Two early-break and two early make switches	—	—	—	—	—	—	RD16
		One early-break switch	—	—	RD12	S29337 + S29345	RD12	S32597 + S32605	—
		Two early-make switches	—	—	RD13	S29337 + S29346	RD13	S32597 + S29346	—
	Red handle on yellow bezel	Operating mechanism kit	RD20	LV426931	RD20	S29339	RD20	S32599	—
		One early-break switch	—	—	RD22	S29339 + S29345	RD22	S32599 + S32605	—
		Two early-make switches	—	—	RD23	S29339 + S29346	RD23	S32599 + S29346	—
	MCC conversion accessory		—	—	—	S429341	—	S32606	—
	CNOMO conversion accessory		—	—	—	—	—	S32602	—
Door Mounted	Standard black handle	Operating mechanism kit	RE10	LV426932	RE10	S29338	RE10	S32598	RE10
	Standard black handle with:	Two early-break and two early make switches	—	—	—	—	—	—	RE16
		Two early make switches	—	—	RE13	S29338 + S29346	RE13	S32598 + S29346	—
	Red handle on yellow bezel	Operating mechanism kit	RE20	LV426933	RE20	S29340	RE20	S32600	—
Rotary Handle Replacement Kit			—	—	—	—	—	—	S33875
Telescoping			—	—	RT10	S29343	RT10	S32603	—
Accesso-ries	Key lock adapter		—	—	—	S429344	—	S32604	—
	Key locks	Ronis 1351.500	—	—	—	S41940	—	S41940	—
		Profalux KS5 B24 D4Z	—	—	—	S42888	—	S42888	—
		2 Ronis keylocks with 1 key	—	—	—	S41950	—	S41950	—
		2 Profalux keylocks with 1 key	—	—	—	S42878	—	S42878	—
	Indication Auxiliary Switch	One early-break switch	—	—	—	S29445	—	S32605	—
		Two early-make switches	—	—	—	S29346	—	S29346	—

[9] Not available in H-frame 2P modules.

PowerPact Accessories

Table 7.125: Electrical Accessories

Accessory	Description		Rated Voltage		B-, H-, J-, and L-Frame: Factory Installed Cat. Suffix	B-Frame: Field-Installable Cat. No.	B-Frame: Field-Installable Pre-Wired Cat. No.	H- and J-Frame: Field-Installable Cat. No.	L-Frame: Field-Installable Cat. No.	M-, P-, and R-Frame: Factory Installed Cat. Suffix	M-, P-, and R-Frame: Field-Installable Cat. No.
Auxiliary and Alarm Switches (OF, SD, SDE)  B-Frame  H-, J-, L-, M-, P, and R-Frame	Provides circuit breaker contact status. Note: The location of the accessory in the circuit breaker determines its function.	Standard Min Load = 10mA with 24V	1 auxiliary switch (OF) 1a1b		AA	LV426950	LV426951	S29450	S29450	AA	S29450 *[1]*
			2 auxiliary switch (OF) 2a2b		AB	—	—	2x S29450	2x S29450	AB	2x S29450 *[1]*
			3 auxiliary switch (OF) 3a3b		AC	—	—	—	3x S29450	AC	3x S29450 *[1]*
			Alarm Switch (SD) 1a1b		BC	LV426950	LV426952	S29450	S29450	BC	S29450 *[1]*
			Overcurrent trip switch (SDE) 1a1b		BD	—	—	—	S29450	BD	S29450 *[1]*
			Consisting of:	OF Switch	—	—	—	S29450	—	—	—
				SDE Adapter	—	—	—	S29451	—	—	—
			Alarm switch and Overcurrent trip switch		BE	—	—	—	2x S29450	BE	2x S29450
			Consisting of:	OF Switch	—	—	—	2x S29450	—	—	—
				SDE Adapter	—	—	—	S29451	—	—	—
			Auxiliary Switch/Alarm Switch/ Adapter (OF/SD/SDE) Kit		—	—	—	—	—	—	S33801 *[2]*
		Low Level Min Load = 1mA with 24V	One auxiliary switch (OF) 1a1b		AE	—	—	S29452	S29452	AE	S29452
			Two auxiliary switches (OF) 2a2b		AF	—	—	2x S29452	2x S29452	AF	2x S29452
			3 auxiliary switches (OF) 3a3b		AG	—	—	—	3x S29452	AG	3x S29452
			Alarm Switch (SD) 1a1b		BH	—	—	S29452	S29452	BH	S29452
			Overcurrent trip switch (SDE) 1a1b		BJ	—	—	—	S29452	BJ *[3]*	S29452
			Consisting of:	OF Switch	—	—	—	S29452	—	—	—
				SDE Adapter	—	—	—	S29451	—	—	—
			Alarm switch and Overcurrent trip switch		BK	—	—	—	2x S29452	BK *[3]*	2x S29452
			Consisting of:	OF Switch	—	—	—	2x S29452	—	—	—
				SDE Adapter *[4]*	—	—	—	S29451	—	—	—
Shunt Trip (MX)  B-Frame  H-, J-, and L-Frame	Trips the circuit breaker from a remote location by means of a trip coil energized from a separate supply voltage circuit.		AC	24	SK	LV426841	LV426861	S29384	S29384	SK	S33659
				48	SL	LV426842	LV426862	S29385	S29385	SL	S33660
				110–130	SA	LV426843	LV426863	S29386	S29386	SA	S33661
				220–240	—	—	—	—	—	SC	S33662
				208–277	SD	LV426844	LV426864	S29387	S29387	SD	S33663
				380–480	SH	LV426846	LV426866	S29388	S29388	SH	S33664
				525–600	SJ	—	—	S29389	S29389	—	—
			DC	12	SN	—	—	S29382	S29382	SN	S33658
				24	SO	LV426841	LV426861	S29390	S29390	SK	S33659
				30	SU	—	—	S29391	S29391	SK	S33659
				48	SP	LV426842	LV426862	S29392	S29392	SL	S33660
				60	SV	—	—	S29383	S29383	SL	S33660
				125	SR	LV426843	LV426863	S29393	S29393	SA	S33661
				250	SS	LV426844	LV426864	S29394	S29394	SC	S33662
 Undervoltage Trip (MN) H-, J-, and L-Frame	Instantaneously opens the circuit breaker when the under-voltage trip supply voltage drops to a value between 35% and 70% of its rated voltage. Closing is allowed when the supply voltage of the undervoltage trip reaches 85% of rated voltage.		AC	24	UK	LV426801	LV426821	S29404	S29404	UK	S33668
				48	UL	LV426802	LV426822	S29405	S29405	UL	S33669
				110–130	UA	LV426803	LV426823	S29406	S29406	UA	S33670
				220–240	UC	LV426804	LV426824	—	—	UC	S33671
				208–277	UD	LV426805	LV426825	S29407	S29407	—	—
				380–415	UF	LV426806	LV426826	—	—	—	—
				380–480	UH	LV426807	LV426827	S29408	S29408	UH	S33673
				525–600	UJ	—	—	S29409	S29409	—	—
			DC	12	UN	—	—	S29402	S29402	—	—
				24	UO	LV426801	LV426821	S29410	S29410	UK	S33668
				30	UU	—	—	S29411	S29411	UK	S33668
				48	UP	LV426802	LV426822	S29412	S29412	UL	S33669
				60	UV	—	—	S29403	S29403	UL	S33669
				125	UR	LV426803	LV426823	S29413	S29413	UA	S33670
				250	US	LV426815	LV426835	S29414	S29414	UC	S33671
Time Delay Unit 	Undervoltage trip with externally mounted adjustable time delay unit for UVR of 0.5, 0.9, 1.5, 3.0 seconds before circuit breaker trips		AC/DC	48	—	S33680 *[5]*	—	S33680 *[5]*	S33680 *[5]*	—	S33680 *[5]*
				100–130	—	S33681 *[5]*	—	S33681 *[5]*	S33681 *[5]*	—	S33681 *[5]*
				220–250	—	S33682 *[5]*	—	S33682 *[5]*	S33682 *[5]*	—	S33682 *[5]*
				380–480	—	—	—	—	—	—	S33683 *[5]*
	Undervoltage trip with externally mounted non-adjustable time delay unit of 0.25 sec before circuit breaker trips.		AC/DC	48	—	S29426 *[5]*	—	S29426 *[5]*	S29426 *[5]*	—	—
				100–130	—	—	—	—	—	—	S33684 *[5]*
				200–250	—	—	—	—	—	—	S33685 *[5]*
				220–240	—	S29427 *[5]*	—	S29427 *[5]*	S29427 *[5]*	—	—

[1] For electrically-operated P-frame circuit breakers S29450 is not field installable.
[2] P-frame drawout circuit breaker only.
[3] Not available on electrically operated P-frame.
[4] SDE Adapter used for H- and J-frame only.
[5] Field-installable kit includes time delay module only. Order undervoltage trip separately.

Product data sheet
Characteristics

S29354
H/J-FRAME MECHANICAL INTERLOCK FOR TOGGLE HANDLE

Product availability : Stock - Normally stocked in distribution facility

Main

Product or component type	Mechanical interlock
Range of product	Powerpact
Circuit breaker type	H-frame J-frame

Complementary

Rotary handle mounting style	Direct

Environment

Product certifications	UL

Ordering and shipping details

Category	01103 - H,J,COMPACT NS UL/IEC CIRCUIT BREAKER ACCESSORIES
Discount Schedule	DE2
GTIN	00785901560784
Nbr. of units in pkg.	1
Package weight(Lbs)	0.68000000000000005
Returnability	Y
Country of origin	US

Offer Sustainability

Sustainable offer status	Not Green Premium product
RoHS (date code: YYWW)	Will not be compliant Will not be compliant
REACh	Reference not containing SVHC above the threshold

	Reference not containing SVHC above the threshold

Contractual warranty

Warranty period	18 months

Resin Encapsulated Three and Single Phase Transformers

Table 14.14: Resin Encapsulated Three and Single Phase Transformers

kVA	Type 3R STD			Type 3R 304 Stainless			Type 4X 304 Stainless					
	Catalog No.	Weight (lbs)*[13]*	Enclosure *[14]*	Catalog No.	Weight (lbs)*[13]*	Enclosure *[15]*	Catalog No.	Weight (lbs)*[13]*	Enclosure *[15]*	Full Capacity Taps*[16]*	Deg C Temp. Rise	Insulation Class
Three Phase—480 Vac Delta Primary 208Y/120 Vac Secondary, 60 Hz; UL/cULus Listed												
3	3T2F	120	12C	3T2SS	120	12C	4X3T2FSS	165	54X	2–5%FCBN	115	180
6	6T2F	145	12C	6T2SS	145	12C	4X6T2FSS	195	54X	2–5%FCBN	115	180
9	9T2F	235	14C	9T2SS	235	14C	4X9T2FSS	290	54X	2–5%FCBN	115	180
15	15T2F	300	14C	15T2SS	300	14C	4X15T2FSS	350	54X	2–5%FCBN	115	180
30	30T2F	660	16C	30T2SS	660	16C	4X30T2FSS	850	55X	2–5%FCBN	115	180
Three Phase—480 Vac Delta Primary 240 Vac Delta Secondary, 60 Hz; UL/cULus Listed												
3	3T5F	120	12C	3T5SS	120	12C	4X3T5FSS	165	54X	2–5%FCBN	115	180
6	6T5F	145	12C	6T5SS	145	12C	4X6T5FSS	195	54X	2–5%FCBN	115	180
9	9T75F	235	14C	9T75SS	235	14C	4X9T75FSS	290	54X	2–5%FCBN	115	180
15	15T75F	300	14C	15T75SS	300	14C	4X15T75FSS	350	54X	2–5%FCBN	115	180
30	30T75F	660	16C	30T75SS	660	16C	4X30T75FSS	850	55X	2–5%FCBN	115	180
Single Phase—240 x 480 Vac Primary 120/240 Vac Secondary, 60 Hz; UL/cULus Listed												
1	1S1F	21.2	7A	1S1FSS	21.2	7A	4X1S1FSS	48	51X	None	115	180
1.5	1.5S1F	30.1	8A	1.5S1FSS	30.1	8A	4X1.5S1FSS	55	51X	None	115	180
2	2S1F	39.1	9A	2S1FSS	39.1	9A	4X2S1FSS	55	51X	None	115	180
3	3S1F	60	10A	3S1FSS	60	10A	4X3S1FSS	75	52X	None	115	180
5	5S1F	115	13B	5S1FSS	115	13B	4X5S1FSS	125	52X	None	115	180
7.5	7S1F	135	13B	7S1FSS	135	13B	4X7S1FSS	150	52X	None	115	180
10	10S1F	165	13B	10S1FSS	165	13B	4X10S1FSS	180	52X	None	115	180
15	15S1F	225	15B	15S1FSS	225	15B	4X15S1FSS	390	53X	None	115	180
25	25S1F	300	15B	25S1FSS	300	15B	4X25S1FSS	450	53X	None	115	180
Single Phase—480 Vac Primary 120/240 Vac Secondary, 60 Hz; UL/cULus Listed												
1	1S40F	21.2	7A	1S40FSS	21.2	7A	4X1S40FSS	48	51X	2–5%FCBN	115	180
1.5	1.5S40F	30.1	8A	1.5S40FSS	30.1	8A	4X1.5S40FSS	55	51X	2–5%FCBN	115	180
2	2S40F	39.1	9A	2S40FSS	39.1	9A	4X2S40FSS	55	51X	2–5%FCBN	115	180
3	3S40F	60	10A	3S40FSS	60	10A	4X3S40FSS	75	52X	2–5%FCBN	115	180
5	5S40F	115	13B	5S40FSS	115	13B	4X5S40FSS	125	52X	2–5%FCBN	115	180
7.5	7S40F	135	13B	7S40FSS	135	13B	4X7S40FSS	150	52X	2–5%FCBN	115	180
10	10S40F	165	13B	10S40FSS	165	13B	4X10S40FSS	180	52X	2–5%FCBN	115	180
15	15S40F	225	15B	15S40FSS	225	15B	4X15S40FSS	390	53X	2–5%FCBN	115	180
25	25S40F	300	15B	25S40FSS	300	15B	4X25S40FSS	450	53X	2–5%FCBN	115	180
Single Phase—600 Vac Primary 120/240 Vac Secondary, 60 Hz; UL/cULus Listed												
1	1S51F	21.2	7A	1S51FSS	21.2	7A	4X1S51FSS	48	51X	None	115	180
1.5	1.5S51F	30.1	8A	1.5S51FSS	30.1	8A	4X1.5S51FSS	55	51X	None	115	180
2	2S51F	39.1	9A	2S51FSS	39.1	9A	4X2S51FSS	55	51X	None	115	180
3	3S4F	60	10A	3S4FSS	60	10A	4X3S4FSS	75	52X	2–5%FCBN	115	180
5	5S4F	115	13B	5S4FSS	115	13B	4X5S4FSS	125	52X	2–5%FCBN	115	180
7.5	7S4F	135	13B	7S4FSS	135	13B	4X7S4FSS	150	52X	2–5%FCBN	115	180
10	10S4F	165	13B	10S4FSS	165	13B	4X10S4FSS	180	52X	2–5%FCBN	115	180
15	15S4F	225	15B	15S4FSS	225	15B	4X15S4FSS	390	53X	2–5%FCBN	115	180
25	25S4F	300	15B	25S4FSS	300	15B	4X25S4FSS	450	53X	2–5%FCBN	115	180
Single Phase—208 Vac Primary 120/240 Vac Secondary, 60 Hz; UL/cULus Listed												
1	1S7F	21.2	7A	1S7FSS	21.2	7A	4X1S7FSS	48	51X	None	115	180
1.5	1.5S7F	30.1	8A	1.5S7FSS	30.1	8A	4X1.5S7FSS	55	51X	None	115	180
2	2S7F	39.1	9A	2S7FSS	39.1	9A	4X2S7FSS	55	51X	None	115	180
3	3S60F	60	10A	3S60FSS	60	10A	4X3S60FSS	75	52X	2–5%FCBN	115	180
5	5S60F	115	13B	5S60FSS	115	13B	4X5S60FSS	125	52X	2–5%FCBN	115	180
7.5	7S60F	135	13B	7S60FSS	135	13B	4X7S60FSS	150	52X	2–5%FCBN	115	180
10	10S60F	165	13B	10S60FSS	165	13B	4X10S60FSS	180	52X	2–5%FCBN	115	180
15	15S60F	225	15B	15S60FSS	225	15B	4X15S60FSS	390	53X	2–5%FCBN	115	180
25	25S60F	300	15B	25S60FSS	300	15B	4X25S60FSS	450	53X	2–5%FCBN	115	180
Single Phase—277 Vac Primary 120/240 Vac Secondary, 60 Hz; UL/cULus Listed												
1	1S8F	21.2	7A	1S8FSS	21.2	7A	4X1S8FSS	48	51X	None	115	180
1.5	1.5S8F	30.1	8A	1.5S8FSS	30.1	8A	4X1.5S8FSS	55	51X	None	115	180
2	2S8F	39.1	9A	2S8FSS	39.1	9A	4X2S8FSS	55	51X	None	115	180
3	3S61F	60	10A	3S61FSS	60	10A	4X3S61FSS	75	52X	2–5%FCBN	115	180
5	5S61F	115	13B	5S61FSS	115	13B	4X5S61FSS	125	52X	2–5%FCBN	115	180
7.5	7S61F	135	13B	7S61FSS	135	13B	4X7S61FSS	150	52X	2–5%FCBN	115	180
10	10S61F	165	13B	10S61FSS	165	13B	4X10S61FSS	180	52X	2–5%FCBN	115	180
15	15S61F	225	15B	15S61FSS	225	15B	4X15S61FSS	390	53X	2–5%FCBN	115	180
25	25S61F	300	15B	25S61FSS	300	15B	4X25S61FSS	450	53X	2–5%FCBN	115	180

Table 14.15: Single-Phase—120/240 Vac Secondary; 60 Hz; cULus Listed

kVA	240 x 480 Primary Catalog No.	Weight (lbs) *[13]*	Enclosure*[15]*	600 Primary Catalog No.	Weight (lbs) *[13]*	Enclosure*[15]*	Full Capacity Taps	Degree C Temperature Rise	Insulation Class
0.05	50SV1A	4.2	1A	50SV51A	4.2	1A	None	55	105
0.1	100SV1A	4.5	2A	100SV51A	4.5	2A	None	55	105
0.15	150SV1A	6.2	3A	150SV51A	6.2	3A	None	55	105
0.25	250SV1B	10.5	4A	250SV51B	10.5	4A	None	80	130
0.5	500SV1B	13.8	5A	500SV51B	13.8	5A	None	80	130
0.75	750SV1F	15.5	6A	750SV51F	15.5	6A	None	115	180

[13] Not for construction, Contact your local Schneider Electric representative for certified prints.
[14] For enclosure styles, see Table 14.8 Enclosure Dimensions and Accessories, page 14-6
[15] For enclosure styles, see Table 14.17 Enclosure Dimensions, page 14-9
[16] FCBN = Full Capacity Below Normal.

Family	XB4	XB5	9001K	9001SK	9001KX
					

Type of Product	22 mm Push Button (metal)	22 mm Push Button (plastic)	30 mm Push Button (metal)	30 mm Push Button (plastic)	30 mm Push Button (metal, square)
Mounting Hole Diameter	22.5 mm	22.5 mm	31 mm (1.22 in)	31 mm (1.22 in)	31 mm (1.22 in)
Approvals	UL Listed File E164353, CCN NKCR UL Recognized File E164353. CCN NKCR2 CSA File LR44087. Class 3211-03	UL Listed File E164353, CCN NKCR UL Recognized File E164353., CCN NKCR2 CSA File LR44087. Class 3211-03	UL File E78403. CCN NKCR CSA File LR25490. Class 3211-03	UL File E78403. CCN NKCR CSA File LR25490. Class 3211-03	UL File E78403. CCN NKCR CSA File LR25490. Class 3211-03
Conforming to Standards	CE Marked EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-4, EN/IEC 60947-5-5 EN/IEC 60204-1 and EN/ISO 13850: 2006 (trigger action and mechanical latching emergency stop push buttons) EN/IEC 60364-5-53 (emergency switching of mechanical latching push buttons) — JIS C 4520 UL 508 CSA C22.2 No.14	CE Marked EN/IEC 60947-1, EN/IEC 60947-5-1, EN/IEC 60947-5-4, EN/IEC 60947-5-5 EN/IEC 60204-1 and EN/ISO 13850: 2006 (trigger action and mechanical latching emergency stop push button). EN/IEC 60364-5-53 (emergency switching of mechanical latching push buttons) EN81-1 (emergency stop trigger action and mechanical latching push buttons with mechanical state indicator) JIS C 4520 UL 508 CSA C22.-2 No.14	CE Marked EN/IEC 60947-1 EN/IEC60947-5-1 EN/IEC60947-5-4 JIS C 4520 and 852 UL 508 CSA C22.2 No.14	CE Marked EN/IEC 60947-1 EN/IEC60947-5-1 EN/IEC60947-5-4 JIS C 4520 and 852 UL 508 CSA C22.2 No.14	CE Marked
Degree of Protection	IP65 IP66 for booted NEMA 1, 2, 3, 4, 12, 13	IP65 IP66 for Booted NEMA 1, 2, 3, 4, 4X, 12, 13	IP66 NEMA 1, 2, 3, 3R, 4, 12, 13	IP66 NEMA 1, 2, 3, 3R, 4, 4X, 12, 13	IP66 NEMA 1, 2, 3, 3R, 4, 4X, 12, 13
Electric Shock Protection	Class I	Class I	Class II	Class II	Class II
Electrical Consumption					
LED	24 Vac/Vdc: 18 mA 120 Vac: 14 mA 240 Vac: 14 mA	24 Vac/Vdc: 18 mA 120 Vac: 14 mA 240 Vac: 14 mA			
Rated Operational Characteristics	AC-15; B600 Ue = 600 Vac and Ie = 1.2 A Ue = 240 Vac and Ie = 3A Ue = 120 Vac and Ie = 6A Continuous 10 A	AC-15; B600 Ue = 600 Vac and Ie = 1.2 A Ue = 240 Vac and Ie = 3 A Ue = 120 Vac and Ie = 6 A Continuous 10 A	AC-15; A600 Continuous 10 A	AC-15; A600 Continuous 10 A	AC-15; A600 Continuous 10 A
	DC-13; Q600 Ue = 600 Vdc and Ie = 0.1 A Ue = 250 Vdc and Ie = 0.27 A Ue = 125 Vdc and Ie = 0.55 A	DC-13; Q600 Ue = 600 Vdc and Ie = 0.1 A Ue = 250Vdc and Ie = 0.27 A Ue = 125 Vdc and Ie = 0.55 A	DC-13; Q600 Ue = 600 Vdc and Ie = 0.1 A Ue = 250 Vdc and Ie = 0.27 A Ue = 125 Vdc and Ie = 0.55 A	DC-13; Q600 Ue = 600 Vdc and Ie = 0.1 A Ue = 250 Vdc and Ie = 0.27 A Ue = 125 Vdc and Ie = 0.55 A	DC-13; Q600 Ue = 600 Vdc and Ie = 0.1 A Ue = 250 Vdc and Ie = 0.27 A Ue = 125 Vdc and Ie = 0.55 A
Connection Type	Screw or Spring Terminal		Screw Terminal		
	Screw Terminal:	Spring Terminal:			
Cable Size	1 x 24 AWG (0.22 mm²) min. 2 x 14 AWG (2.5 mm²) max. 2 x 16 AWG (1.5 mm²) max.	1 x 24 AWG (0.22 mm²) min. 2 x 14 AWG (2.5 mm²) max. 2 x 16 AWG (1.5 mm²) max.	1 x 24 AWG (0.22 mm²) min. 2 x 16 AWG (1.5 mm²) max	1 x 24 AWG (0.22 mm²) min. 2 x 16 AWG (1.5 mm²) max	1 x 24 AWG (0.2 2mm²) min. 2 x 16 AWG (1.5 mm²) max
Digest Page	19-23	19-42	19-63	19-73	19-90

Table 19.205: Non-Illuminated Momentary Push Button Operators—UL Types 4, 4X, 13/NEMA 4, 4X, 13
For use in hazardous locations—See page 19-83.
Contact blocks and legend plate not included unless otherwise noted.

Description	Color	Operator with 1 N.O. and 1 N.C. Contact (KA1)		Operator with 1 N.O. Contact (KA2)	Operator with 1 N.C. Contact (KA3)		Operator Only No Contacts ▼	
 9001SKR1B Full Guard	Black	SKR1BH13		SKR1BH5	SKR1BH6		SKR1B	
	Red	SKR1RH13		SKR1RH5	SKR1RH6		SKR1R	
	Green	SKR1GH13		SKR1GH5	SKR1GH6		SKR1G	
	Universal ▲	SKR1UH13		SKR1UH5	SKR1UH6		SKR1U	
	Other ■	SKR1■H13		SKR1■H5	SKR1■H6		SKR1■	
 9001SKR3B No Guard	Black	SKR3BH13		SKR3BH5	SKR3BH6		SKR3B	
	Red	SKR3RH13		SKR3RH5	SKR3RH6		SKR3R	
	Green	SKR3GH13		SKR3GH5	SKR3GH6		SKR3G	
	Universal ▲	SKR3UH13		SKR3UH5	SKR3UH6		SKR3U	
	Other ■	SKR3■H13		SKR3■H5	SKR3■H6		SKR3■	
 9001SKR2B Extended Guard	Black	SKR2BH13		SKR2BH5	SKR2BH6		SKR2B	
	Red	SKR2RH13		SKR2RH5	SKR2RH6		SKR2R	
	Green	SKR2GH13		SKR2GH5	SKR2GH6		SKR2G	
	Universal ▲	SKR2UH13		SKR2UH5	SKR2UH6		SKR2U	
	Other ■	SKR2■		SKR2■H5	SKR2■H6		SKR2■	
 9001SKR4B 1-3/8 in. (35 mm) Mushroom Button	**Snap-In Mushroom Button**							
	Black	SKR4BH13		SKR4BH5	SKR4BH6		SKR4B	
	Red	SKR4RH13		SKR4RH5	SKR4RH6		SKR4R	
	Red ♦	SKR4R05H13		SKR4R05H5	SKR4R05H6		SKR4R05	
	Green	SKR4GH13		SKR4GH5	SKR4GH6		SKR4G	
	Other ★	SKR4★H13		SKR4★H5	SKR4★H6		SKR4★	
	Screw-On Mushroom Button with Set Screw Security							
	Black	SKR24BH13		SKR24BH5	SKR24BH6		SKR24B	
	Red	SKR24RH13		SKR24RH5	SKR24RH6		SKR24R	
	Green	SKR24GH13		SKR24GH5	SKR24GH6		SKR24G	
	Other ★	SKR24★H13		SKR24★H5	SKR24★H6		SKR24★	
 9001SKR5 2-1/4 in. (57 mm) Mushroom Button	**Snap-In Mushroom Button**							
	Black	SKR5BH13		SKR5BH5	SKR5BH6		SKR5B	
	Red	SKR5RH13		SKR5RH5	SKR5RH6		SKR5R	
	Red ♦	SKR5R05H13		SKR5R05H5	SKR5R05H6		SKR5R05	
	Green	SKR5GH13		SKR5GH5	SKR5GH6		SKR5G	
	Other ★	SKR5★H13		SKR5★H5	SKR5★H6		SKR5★	
	Screw-On Mushroom Button with Set Screw Security							
	Black	SKR25BH13		SKR25BH5	SKR25BH6		SKR25B	
	Red	SKR25RH13		SKR25RH5	SKR25RH6		SKR25R	
	Green	SKR25GH13		SKR25GH5	SKR25GH6		SKR25G	
	Other ★	SKR25★H13		SKR25★H5	SKR25★H6		SKR25★	

Table 19.206: Color Codes

Color	■ SKR1, 2, 3 Place Color Code in Type Number	★ SKR4, 5, 24, 25 Place Color Code in Type Number
Blue	L	L
Yellow	Y	Y
White	W	—
Orange	S	S
Gray	E	—

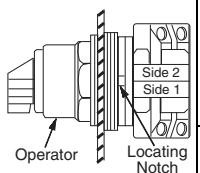
▲ The universal push button operators include one each of the following color inserts: black, red, green, yellow, orange, blue and white.
■ See Table 19.206.
♦ Knob has the words “Emergency Stop” in raised letters highlighted in white for readability.
★ See Table 19.206.
▼ These operators can be ordered complete with contact blocks. For maximum block usage, see page 19-84. Add the “H” number chosen from page 19-84 to the end of the operator type number and add the cost of the “H” number to the operator cost.

NOTE: *When ordering, add prefix **9001** to the catalog number.*
To select and order contact blocks, light modules, and accessories, see pages 19-81 through 19-88.

NOTE: *To order, add prefix 9001 to the beginning of the catalog number.*

Table 19.215: 3-Position Selector Switches

CONTACT BLOCK REQUIRED — **1 — Contact Closed 0 — Contact Open**

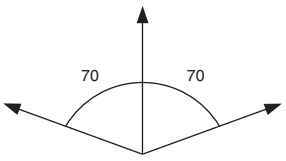
Contact Block Position	Quantity and Type	Mount on Side	Center	Center	Center	Center	Center	Center	Center	Center	Center
 Top View	KA1 or KA3 / KA2	KA1 #2 or KA3 #2	1 0 0	1 0 0	0 0 1	1 0 0	1 0 0	1 0 0	1 0 0	0 1 0	1 1 0
			KA2 #2	0 1 1	0 0 1	0 1 0	0 1 0	0 0 1	0 1 1	1 0 0	0 0 1
	KA1 or KA3 / KA2	KA1 #1 or KA3 #1	0 0 1	1 0 0	0 0 1	1 0 0	0 1 0	0 0 1	1 0 1	0 0 1	0 1 1
			KA2 #1	1 1 0	0 0 1	0 1 0	0 1 0	0 0 1	1 0 0	0 1 0	0 1 0	1 0 0

Cam (see page 19-69)	B	C	D	E	F	G	J	L	M
Non-Illuminated Operators	**Type**	**Type**	**Type**	**Type**	**Type**	**Type**	**Type**	**Type**	**Type**
Manual Return, Operator Only (without contact blocks) ▲									
Without Knob	SKS42	SKS43	SKS44	SKS45	SKS46	SKS47	SKS49	SKS401	SKS402
With Knob (select style and color from table 19.168 below)	SKS42♦	SKS43♦	SKS44♦	SKS45♦	SKS46♦	SKS47♦	SKS49♦	SKS401♦	SKS402♦
Operator with Contact Blocks and Standard black knob ★									
With 1 KA1 on Side #2 (H13)	SKS42BH13	SKS43BH13	SKS44BH13	SKS45BH13	SKS46BH13	SKS47BH13	SKS49BH13	SKS401BH13	SKS402BH13
With 1 KA1 on Side #1 (H1)	SKS42BH1	SKS43BH1	SKS44BH1	SKS45BH1	SKS46BH1	SKS47BH1	SKS49BH1	SKS401BH1	SKS402BH1
With 1 KA1 on Side #1 and 1 KA1 on side #2 (H2)	SKS42BH2	SKS43BH2	SKS44BH2	SKS45BH2	SSKS46BH2	SKS47BH2	SKS49BH2	SKS401BH2	SKS402BH2
Spring Return from Left to Center, Operator Only (without contact blocks) ▲									
Without Knob	SKS62	SKS63	SKS64	SKS65	SKS66	SKS67	SKS69	SKS601	SKS602
With Knob (select style and color from table 19.168 below)	SKS62♦	SKS63♦	SKS64♦	SKS65♦	SKS66♦	SKS67♦	SKS69♦	SKS601♦	SKS602♦
Spring Return from Right to Center, Operator Only (without contact blocks) ▲									
Without Knob	SKS72	SKS73	SKS74	SKS75	SKS76	SKS77	SKS79	SKS701	SKS702
With Knob (select style and color from table 19.168 below)	SKS72♦	SKS73♦	SKS74♦	SKS75♦	SKS76♦	SKS77♦	SKS79♦	SKS701♦	SKS702♦
Spring Return from Both Sides to Center, Operator Only (without contact blocks) ▲									
Without Knob	SKS52	SKS53	SKS54	SKS55	SKS56	SKS57	SKS59	SKS501	SKS502
With Knob (select style and color from table 19.168 below)	SKS52♦	SKS53♦	SKS54♦	SKS55♦	SKS56♦	SKS57♦	SKS59♦	SKS501♦	SKS502♦
Illuminated Operators	**Type**	**Type**	**Type**	**Type**	**Type**	**Type**	**Type**	**Type**	**Type**
Manual Return, Operator Only (without contact blocks) ▲									
Without Knob, 110-120V 50-60 Hz Transformer	SK42J1	SK43J1	SK44J1	SK45J1	SK46J1	SK47J1	SK49J1	SK401J1	SK402J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer	SK42J1R	SK43J1R	SK44J1R	SK45J1R	SK46J1R	SK47J1R	SK49J1R	SK401J1R	SK402J1R
With Other Color Knob and other voltage Light Module ■ ♦	SK42J■♦	SK43J■♦	SK44J■♦	SK45J■♦	SK46J■♦	SK47J■♦	SK49J■♦	SK401J■♦	SK402J■♦
Spring Return from Left to Center, Operator Only (without contact blocks) ▲									
Without Knob, 110-120V 50-60 Hz Transformer	SK62J1	SK63J1	SK64J1	SK65J1	SK66J1	SK67J1	SK69J1	SK601J1	SK602J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer	SK62J1R	SK63J1R	SK64J1R	SK65J1R	SK66J1R	SK67J1R	SK69J1R	SK601J1R	SK602J1R
With Other Color Knob and other voltage Light Module ■ ♦	SK62J■♦	SK63J■♦	SK64J■♦	SK65J■♦	SK66J■♦	SK67J■♦	SK69J■♦	SK601J■♦	SK602J■♦
Spring Return from Right to Center, Operator Only (without contact blocks) ▲									
Without Knob, 110-120V 50-60 Hz Transformer	SK72J1	SK73J1	SK74J1	SK75J1	SK76J1	SK77J1	SK79J1	SK701J1	SK702J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer	SK72J1R	SK73J1R	SK74J1R	SK75J1R	SK76J1R	SK77J1R	SK79J1R	SK701J1R	SK702J1R
With Other Color Knob and other voltage Light Module ■ ♦	SK72J■♦	SK73J■♦	SK74J■♦	SK75J■♦	SK76J■♦	SK77J■♦	SK79J■♦	SK701J■♦	SK702J■♦
Spring Return from Both Sides to Center, Operator Only (without contact blocks) ▲									
Without Knob, 110-120V 50-60 Hz Transformer	SK52J1	SK53J1	SK54J1	SK55J1	SK56J1	SK57J1	SK59J1	SK501J1	SK502J1
With Standard Red Knob, 110-120V 50-60 Hz Transformer	SK52J1R	SK53J1R	SK54J1R	SK55J1R	SK56J1R	SK57J1R	SK59J1R	SK501J1R	SK502J1R
With Other Color Knob and other voltage Light Module ■ ♦	SK52J■♦	SK53J■♦	SK54J■♦	SK55J■♦	SK56J■♦	SK57J■♦	SK59J■♦	SK501J■♦	SK502J■♦

▲ These operators can be ordered complete with contact blocks. Add the "H code" from page 19-84 as needed for your application.
■ Add the voltage assembly code as chosen from page 19-82. Example: K25J■ with 208Vac = K25J3.
♦ Add the knob color code from Table 19.216. For LED, knob color must match LED.
★ For other color knobs replace the B with knob color code from Table 19.216.

Table 19.216: Selector Switch Assembly Code and Knob Cat. No.

Color	Standard Knob ♦ Knob Code	Standard Knob Cat. No.	Gloved Hand Knob ♦ Knob Code	Gloved Hand Knob Cat. No.
Black	B	B11	FB	B25
Red	R	R8	FR	R24
Green	G	G8	FG	G24
Yellow	Y	Y8	FY	Y24
Blue	L	L8	FL	L24
White	W	W8	FW	W24
Amber	A	A8	FA	A24
Clear	C	C8	FC	C24



3 Position

NOTE: *To select and order Contact Blocks, Light Modules, Knobs, and Accessories. See pages 19-81 through 19-88.*

Harmony™ 9001K/SK/KX 30 mm push buttons

9001SK – Pilot lights

Note: When ordering, add prefix "9001" to the reference.

Pilot Lights—UL Types 4, 4X, 13/NEMA 4, 4X, 13
For use in hazardous locations, see page 53. Legend plate not included.

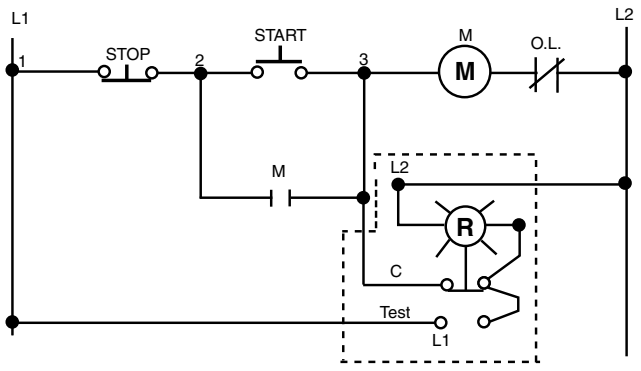
Description		Voltage	Style	With Red Fresnel Color Cap	With Green Fresnel Color Cap	With Other Color Cap (2)	Without Color Cap
 9001SKP1	Standard Pilot Light (Fresnel color cap shown)	110–120 V, 50–60 Hz	Transformer	SKP1R31	SKP1G31	SKP1■	SKP1
		220–240 V, 50–60 Hz	Transformer	SKP7R31	SKP7G31	SKP7■	SKP7
		24–28 Vac/Vdc	Full Voltage	SKP35R31	SKP35G31	SKP35■	SKP35
		For other voltages (1)	Transformer, Flashing or LED (3)	SKP▲R31	SKP▲G31	SKP▲■	SKP▲
			Full Voltage, Neon or Resistor (4)	SKP▲R31	SKP▲G31	SKP▲■	SKP▲
 9001SKT1	Push-To-Test Pilot Light (Fresnel color cap shown)	110–120 V, 50–60 Hz	Transformer	SKT1R31	SKT1G31	SKT1■	SKT1
		220–240 V, 50–60 Hz	Transformer	SKT7R31	SKT7G31	SKT7■	SKT7
		24–28 Vac/Vdc	Full Voltage	SKT35R31	SKT35G31	SKT35■	SKT35
		For other voltages (1)	92%	SKT▲R31	SKT▲G31	SKT▲■	SKT▲
			Full Voltage, Neon or Resistor (4)	SKT▲R31	SKT▲G31	SKT▲■	SKT▲
 9001SKTR38	Remote Test Pilot Light (Fresnel color cap shown)	120 Vac Only	Resistor	SKTR38R31	SKTR38G31	SKTR38■	SKTR38
		24–28 Vac Only	Full Voltage	SKTR35R31	SKTR35G31	SKTR35■	SKTR35
		For other voltages (1)	Full Voltage or Resistor (5)	SKTR▲R31	SKTR▲G31	SKTR▲■	SKTR▲

(1) Replace ▲ with the voltage assembly code as chosen from the tables on page 54.
Example: SKT▲R31 with 208 Vac red LED voltage = SKT37LRR31.
(2) Replace ■ with the color code as chosen from the color code table below.
Example: SKP1■ with a blue fresnel cap = SKP1L31.
(3) The cap must be the same color as the LED light module chosen, e.g., for a green LED, use a green color cap.
(4) On neon light modules, use clear color caps only.
(5) Use only full voltage or resistor voltage assembly codes on remote test pilot lights. Do not choose LED, neon or transformer codes. For AC use only.

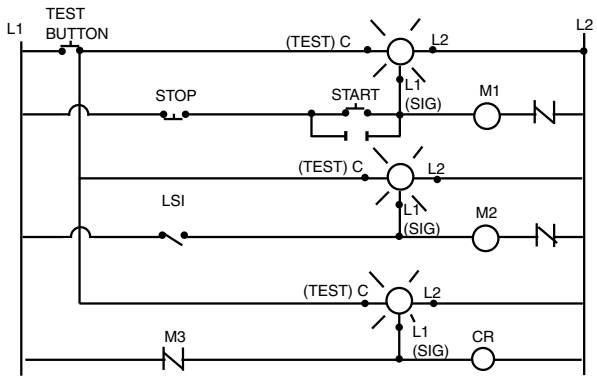
Color Caps

Color	■ Plastic Fresnel 	■ Plastic Domed 
Amber	A31	A9
Blue	L31	L9
Clear	C31	C9
Green	G31	G9
Red	R31	R9
White	W31	W9
Yellow	Y31	Y9

Typical Wiring Diagrams



Push-to-test Pilot Light



Remote Test Pilot Light

To select and order Contact Blocks, Light Modules, Knobs, and Accessories, see pages 50 to 59.

For use in hazardous locations—See page 19-83.

- With neon type light modules, use a **clear** color cap only.
- With LED light modules, use either a clear color cap or a cap the same color as the LED.

Table 19.228: Standard Light Modules for Types K, SK, and KX Control Units ■

Voltage	Description	Light Module Type		Voltage Assembly Code	Rating	Replacement Lamp Part Number ■	
All	Full Voltage (without Bayonet Base Lamp)	KM40		40	—	None	
6 Vac/Vdc	Full Voltage	KM31		31	.9 VA	2550101020	
6 Vac/Vdc	LED Red	KM31LR		31LR		6508805201	
6 Vac/Vdc	LED Green	KM31LG		31LG		6508805203	
6 Vac/Vdc	LED Yellow	KM31LY		31LY		6508805202	
12–14 Vac/Vdc	Full Voltage	KM32		32	1.2 VA	2550101037	
12–14 Vac/Vdc	LED Red	KM32LR		32LR		6508805201	
12–14 Vac/Vdc	LED Green	KM32LG		32LG		6508805203	
12–14 Vac/Vdc	LED Yellow	KM32LY		32LY		6508805202	
18 Vac/Vdc	Resistor	KM33		33	1.4 VA	2550101037	
24–28 Vac/Vdc	Full Voltage	KM35		35	1.2 VA	2550101002	
24–28 Vac/Vdc	LED Red	KM35LR		35LR	.28 VA	6508805210	
24–28 Vac/Vdc	LED Green	KM35LG		35LG	.28 VA	6508805212	
24–28 Vac/Vdc	LED Yellow	KM35LY		35LY	.28 VA	6508805211	
24–28 Vac/Vdc	LED White	KM35LW		35LW	.28 VA	6508805214	
24–28 Vac/Vdc	LED Blue	KM35LL		35LL	.28 VA	6508805213	
48 Vac/Vdc	Full Voltage	KM36		36	2.6 VA	2550101025	
110–120 V, 50–60 Hz	LED Red	KM1LR		1LR		6508805201	
110–120 V, 50–60 Hz	LED Green	KM1LG		1LG		6508805203	
110–120 V, 50–60 Hz	LED Yellow	KM1LY		1LY		6508805202	
110–120 V, 50–60 Hz	Transformer	KM1		1	2.4 VA	2550101020	
110–120 V, 50–60 Hz	Flashing	KMF1		F1	.85 VA	2550101036	
120 Vac/Vdc	Resistor	KM38		38	3.0 VA	2550101027	
120 Vac/Vdc	Full Voltage	KM38		38	3.0 VA	2550101027	
120 Vac/Vdc	Neon ▲	KM11		11	0.2 VA	2550101013	
120 Vac/Vdc	LED Red	KM38LR		38LR	1.4 VA	6508805210	
120 Vac/Vdc	LED Green	KM38LG		38LG	1.4 VA	6508805212	
120 Vac/Vdc	LED Yellow	KM38LY		38LY	1.4 VA	6508805211	
120 Vac/Vdc	LED White	KM38LW		38LW	1.4 VA	6508805214	
120 Vac/Vdc	LED Blue	KM38LL		38LL	1.4 VA	6508805213	
208–220 V, 50–60 Hz	Transformer	KM3		3	2.5 VA	2550101020	
208–220 V, 50–60 Hz	LED Red	KM3LR		3LR		6508805201	
208–220 V, 50–60 Hz	LED Green	KM3LG		3LG		6508805203	
208–220 V, 50–60 Hz	LED Yellow	KM3LY		3LY		6508805202	
220–240 V, 50–60 Hz	Transformer	KM7		7	2.0 VA	2550101020	
220–240 V, 50–60 Hz	LED Red	KM7LR		7LR		6508805201	
220–240 V, 50–60 Hz	LED Green	KM7LG		7LG		6508805203	
220–240 V, 50–60 Hz	LED Yellow	KM7LY		7LY		6508805202	
240 Vac/Vdc	Resistor	KM25		25	6.0 VA	2550101027	
240 Vac/Vdc	Neon ▲	KM12		12	0.3 VA	2550101013	
277 V, 50–60 Hz	Transformer	KM8		8	2.4 VA	2550101020	
380–480 V, 50–60 Hz	Transformer	KM5		5	2.8 VA	2550101020	
480 Vac/Vdc	Neon ▲	KM14		14	0.5 VA	2550101013	
550–600 V, 50–60 Hz	Transformer	KM6		6	2.5 VA	2550101020	

▲ Not for use on KX operators.
■ For use with all operators except KX and remote test pilot.

NOTE: *Light modules are available in other voltages. For additional information, refer to Catalog* **9001CT0001**.

For use in hazardous locations—See page 19-83.

- Reduces the depth of illuminated push buttons with contact blocks by over 33%.
- With LED light modules, use a cap that is the same color as the LED.

Table 19.229: Shallow Depth Light Modules For Types K and SK Control Units ♦

Voltage	Description	Light Module Type		Voltage Assembly Code	Rating	Replacement Lamp Part Number	
24–28 Vac/Vdc	Full Voltage	KM55		55	1.2 VA	2550101002	
	LED Red	KM55LR		55LR	0.5 VA	6508805204	
	LED Green	KM55LG		55LG		6508805206	
	LED Yellow	KM55LY		55LY		6508805205	
110–120 Vac/Vdc	Full Voltage	KM58		58	3.0 VA	2550101027	
	LED Red	KM58LR		58LR	0.5 VA	6508805204	
	LED Green	KM58LG		58LG		6508805206	
	LED Yellow	KM58LY		58LY		6508805205	

♦ For use with all operators except KX and remote test pilot.

NOTE: *When ordering, add prefix 9001 to the catalog number.*

File CCN E42259 NKCR — File Class LR25490 3211 03 — CE marked

The Class 9001 Type KA contact blocks are Fingersafe® contact blocks (meeting VDE 0106 Part 100). They have one screw mounting and captive (backed out) plus/minus terminal screws. These contact blocks are double-break, direct-acting contacts. Because of the wiping action of these contacts, they are suitable for use with programmable controllers. All contact blocks listed below accept up to 2 #12–#24 AWG solid or stranded wires. Recommended tightening torque for screw terminals is 7 lb-in.

Table 19.223: Standard Contact Blocks

Description	Symbol	Type	
 (Clear Cover)	Direct-Acting	KA1	
 (Green Cover)		KA2	
 (Red Cover)	Direct-Acting	KA3	
 (Clear Cover)	N.O. Contact Early Closing	KA4	
 (Red Cover)	N.C. Contact Late Opening	KA5	
 (Green Cover)	N.O. Contact Early Closing	KA6	

Table 19.224: Additional Circuit Arrangements

Sequencing ▲ N.O. Contact of KA4 closes before N.O. Contact on KA1	KA4 KA1	Order One Type KA4 and One Type KA1	
Overlapping ▲ N.O. Contact of KA4 closes before N.C. Contact of KA5 Opens	KA4 KA5	Order One Type KA4 and One Type KA5	

▲ For push buttons or two-position selector switches only. For sequencing or overlapping contacts on other operators, refer to catalog **9001CT0001**.

Symbol	Contact Blocks with Binder Head Screws (not Fingersafe)			Gold Flashed Contacts with Standard Pressure Wire Terminals	
	Type	Quantity■		Type	
	KA21	25–Up		KA31	
	KA22	25–Up		KA32	
	KA23	25–Up		KA33	
N.O. Early Closing	KA24	25–Up		KA34	
N.C. Contact Late Opening	KA25	25–Up		KA35	

■ Minimum order quantity is 25. The price represents one individual contact block.

Contact blocks listed below are not Fingersafe, but provide:

- Terminals that accept ring tongue/fork tongue connectors
- Short single circuit contact blocks (0.75" deep vs. 0.97" deep on the Fingersafe)
- Same as old style Series G product available prior to March, 1989.
- For assembled operators, use form Y238 (add to catalog number as suffix, for example: 9001KRU1H13Y238)

Table 19.225: Contact blocks (not Fingersafe)

Symbol	Type		Symbol	Type	
	KA1G		N.O. Contact Early Closing	KA4G	
	KA2G		N.C. Contact Late Opening	KA5G	
	KA3G		N.O. Contact Early Closing	KA6G	

Table 19.226: Contact blocks with Quick-Connect terminals (not Fingersafe)

Symbol	Type	
	KA12	
	KA13	

Dimensions. . . . . Catalog 9001CT0001

Table 19.227: Maximum Current Ratings for Control Circuit Contacts—Types KA1–KA6, KA21–KA25, KA31–KA35, KA1G–KA6G

V	AC						Volts	DC				
	Inductive (NEMA / UL Type A600) 35% Power Factor					Resistive 75% Power Factor Make, Break and Continuous Amperes		Inductive and Resistive (NEMA Q600)				
	Make		Break		Continuous Carrying Amperes			Make and Break				Continuous Carrying Amperes
	Amperes	VA	Amperes	VA				KA1	KA2 KA3	KA4	KA5 KA6	
120	60	7200	6.0	720	10	10	125	0.55	0.55	—	—	2.5
240	30		3.0				250	0.27	0.27	—	—	
480	15		1.5				600	0.10	0.10	—	—	
600	12		1.2									

NOTE: *When ordering, add prefix **9001** to the catalog number.*

Type SK Corrosion Resistant Illuminated Operators

Table 19.256: Illuminated Push Button Operators

Description		Voltage and Frequency	Style	With Red Color Cap and 1 N.O. and 1 N.C. Contact (KA1) *[82]*	With Green Color Cap and 1 N.O.and 1 N.C. Contact (KA1) *[82]*	With Other Color Cap Without Contact Blocks *[83] [82]*
 9001SK1L1	Full Guard Illuminated Push Button	110–120 V, 50–60 Hz	Transformer	SK1L1RH13	SK1L1GH13	SK1L1
		220–240 V, 50–60 Hz	Transformer	SK1L7RH13	SK1L7GH13	SK1L7
		24–28 Vac/Vdc	Full Voltage	SK1L35RH13	SK1L35GH13	SK1L35
		For other voltages See Table *[84]*	Transformer, Flashing	SK1L■RH13	SK1L■GH13	SK1L ■
			Full Voltage	SK1L■RH13	SK1L■GH13	SK1L ■
			Resistor, Neon *[85]*	SK1L■RH13	SK1L■GH13	SK1L ■
			LED *[86]*	SK1L■RH13	SK1L■GH13	SK1L ■ *[87]*
 9001SK2L1	No Guard Illuminated Push Button	110–120 V, 50–60 Hz	Transformer	SK2L1RH13	SK2L1GH13	SK2L1
		220–240 V, 50–60 Hz	Transformer	SK2L7RH13	SK2L7GH13	SK2L7
		24–28 Vac/Vdc	Full Voltage	SK2L35RH13	SK2L35GH13	SK2L35
		For other voltages See Table *[84]*	Transformer, Flashing	SK2L■RH13	SK2L■GH13	SK2L ■
			Full Voltage	SK2L■RH13	SK2L■GH13	SK2L ■
			Resistor, Neon *[85]*	SK2L■RH13	SK2L■GH13	SK2L ■
			LED*[86]*	SK2L■RH13	SK2L■GH13	SK2L ■ *[87]*
 9001SK2L1R20	1-3/8 in. (35 mm) Illuminated Mushroom, Screw-On Plastic Head	110–120 V, 50–60 Hz	Transformer	SK2L1R20H13	SK2L1G20H13	Order SK2L■ *[87][88]*
		220–240 V, 50–60 Hz	Transformer	SK2L7R20H13	SK2L7G20H13	
		24–28 Vac/Vdc	Full Voltage	SK2L35R20H13	SK2L35G20H13	
		For other voltages See Table *[84]*	Transformer, Flashing	SK2L■R20H13	SK2L■G20H13	
			Full Voltage	SK2L■R20H13	SK2L■G20H13	
			Resistor, Neon *[85]*	SK2L■R20H13	SK2L■G20H13	
			LED *[86]*	SK2L■R20H13	SK2L■G20H13	
 9001SK2L1R21	2-1/4 in. (57 mm) Illuminated Mushroom, Screw-On Plastic Head	110–120 V, 50–60 Hz	Transformer	SK2L1R21H13	SK2L1G21H13	Order SK2L■ *[87][88]*
		220–240 V, 50–60 Hz	Transformer	SK2L7R21H13	SK2L7G21H13	
		24–28 Vac/Vdc	Full Voltage	SK2L35R21H13	SK2L35G21H13	
		For other voltages See Table *[84]*	Transformer, Flashing	SK2L■R21H13	SK2L■G21H13	
			Full Voltage	SK2L■R21H13	SK2L■G21H13	
			Resistor, Neon *[85]*	SK2L■R21H13	SK2L■G21H13	
			LED *[86]*	SK2L■R21H13	SK2L■G21H13	

Table 19.257: Color Caps

Color	Color Codes		
	SK1L/SK2L	1-3/8 in. (35 mm) Mushroom	2-1/4 in. (57 mm) Mushroom
Red	R	R20	R21
Green	G	G20	G21
Blue	L	L20	L21
Yellow	Y	Y20	Y21
White	W	W20	W21
Clear	C	C20	C21
Amber	A	A20	A21

NOTE: To select and order Contact Blocks, Light Modules, Knobs, and Accessories, see Type KA Contact Blocks, page 19-90 through Hermetically Sealed Power Reed Contact Blocks, page 19-92.

NOTE: For use in hazardous locations—See Square D Offering According to Class, Division, and Group, page 19-92. Contact blocks and legend plate not included unless otherwise noted.

[82] When ordering, add prefix 9001 to the catalog number.
[83] These operators can be ordered complete with contact blocks. For maximum block usage, see Table 19.280 “H” Codes, page 19-93. Add the “H” number to the end of the operator type number.
[84] ■ Add the voltage assembly code as chosen from Standard and Shallow Depth Light Modules, page 19-91. **EXAMPLE: SK2L_ with 240 Vac/Vdc = SK2L25.**
[85] On neon light modules, use clear color caps only.
[86] Add the color code as chosen from the color cap table below. **EXAMPLE: SK2L25 with a blue 1-3/8 in. mushroom button = SK2L25L20**.
[87] The cap must be the same color as the LED light module chosen, e.g., for green LED, use green color cap.
[88] The only difference between a no guard (SK2L) operator and mushroom button operator is the color cap.

Type SK Corrosion Resistant Pilot Lights

Table 19.266: Pilot Lights—UL Types 4, 4X, *[105]*

Description			Voltage	Style	With Red Fresnel Color Cap *[106]*	With Green Fresnel Color Cap *[106]*	With Other Color Cap *[106] [107]*	Without Color Cap *[106]*
	9001SKP1	Standard Pilot Light (Fresnel color cap shown)	110–120 V, 50–60 Hz	Transformer	SKP1R31	SKP1G31	SKP1■	SKP1
			220–240 V, 50–60 Hz	Transformer	SKP7R31	SKP7G31	SKP7■	SKP7
			24–28 Vac/Vdc	Full Voltage	SKP35R31	SKP35G31	SKP35■	SKP35
			For other voltages *[106]*	Transformer, Flashing or LED *[108]*	SKP▲R31	SKP▲G31	SKP■	SKP▲
				Full Voltage, Neon or Resistor *[109]*	SKP▲R31	SKP▲G31	SKP▲■	SKP▲
	9001SKT1	Push-To-Test Pilot Light (Fresnel color cap shown)	110–120 V, 50–60 Hz	Transformer	SKT1R31	SKT1G31	SKT1■	SKT1
			220–240 V, 50–60 Hz	Transformer	SKT7R31	SKT7G31	SKT7■	SKT7
			24–28 Vac/Vdc	Full Voltage	SKT35R31	SKT35G31	SKT35■	SKT35
			For other voltages *[106]*	Transformer, Flashing or LED *[108]*	SKT▲R31	SKT▲G31	SKT▲■	SKT▲
				Full Voltage, Neon or Resistor *[109]*	SKT▲R31	SKT▲G31	SKT▲■	SKT▲
	9001SKTR38	Remote Test Pilot Light (Fresnel color cap shown)	120 Vac Only	Resistor	SKTR38R31	SKTR38G31	SKTR38■	SKTR38
			24–28 Vac Only	Full Voltage	SKTR35R31	SKTR35G31	SKTR35■	SKTR35
			For other voltages *[106] [107] [110]*	Full Voltage or Resistor *[111]*	SKTR▲R31	SKTR▲G31	SKTR▲■	SKTR▲

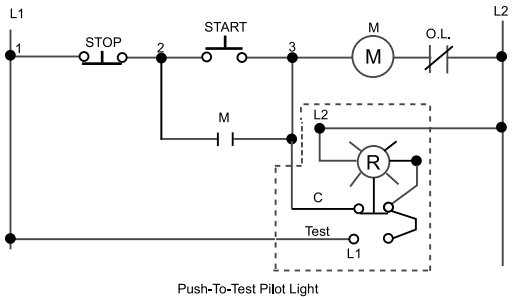

Plastic Fresnel


Plastic Domed

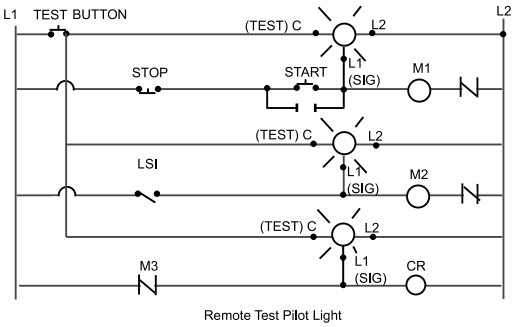
Table 19.267: Color Caps

Color	Plastic Fresnel *[112]*	Plastic Domed *[112]*
Amber	A31	A9
Blue	L31	L9
Clear	C31	C9
Green	G31	G9
Red	R31	R9
White	W31	W9
Yellow	Y31	Y9

Typical Wiring Diagram



Push-To-Test Pilot Light



Remote Test Pilot Light

NOTE: To select and order Contact Blocks, Light Modules, Knobs, and Accessories, see Type KA Contact Blocks, page 19-90 through Hermetically Sealed Power Reed Contact Blocks, page 19-92.

NOTE: For use in hazardous locations—See Square D Offering According to Class, Division, and Group, page 19-92. Contact blocks and legend plate not included unless otherwise noted.

[105] When ordering, add prefix 9001 to the catalog number.
[106] ▲ Add the voltage assembly code as chosen from Standard and Shallow Depth Light Modules, page 19-91.**EXAMPLE: SKT•••R31 with 208 Vac red LED voltage = SKT37LRR31.**
[107] ■ Add the color code as chosen from the color cap table below.**EXAMPLE: SKP1 with a blue fresnel cap = SKP1L31.**
[108] The cap must be the same color as the LED light module chosen, e.g., for a green LED, use a green color cap.
[109] On neon light modules, use clear color caps only.
[110] Use only full voltage or resistor voltage assembly codes on remote test pilot lights. Do not choose LED, neon or transformer codes. For AC use only.
[111] Use only full voltage or resistor voltage assembly codes on remote test pilot lights. Do not choose LED (exception — these LED codes are allowed: 38LG, 38LL, 38LR, 38LW, 38LY), neon or transformer codes. For AC use only.
[112] Add the color code as chosen from the color cap table below.**EXAMPLE: SKP1 with a blue fresnel cap = SKP1L31.**

Powertite® 100 and 150 Amp Pin and Sleeve Plugs and Receptacles

600 Vac, 250 Vdc, 50-400 Hz

Pressure Wire Terminals – 100 Amp: Wire Recess Diameter: .391". Wire Size Range: #4—#1 Building; #4—#2 Extra Flex.
150 Amp: Wire Recess Diameter: .525". Wire Size Range: #2—2/0 Building; #2—#2/0 Extra Flex.

NEMA 3, 3R, 4, 4X

Grounding Style	Wire/Pole	Receptacle with AJA Mounting Box *	Hub Size (Inches)	Receptacle Only †	Clamping Ring Plug ‡	Plug Cable Dia. (Inches)
100 Amp Style 1 (Shell Only)	2W, 2P	**ADJA1022-125**	1-1/4	**ADR1022**	**ACP1022CD**	.875 to 1.906
		ADJA1022-150	1-1/2			
	3W, 3P	**ADJA1033-125**	1-1/4	**ADR1033**	**ACP1033CD**	.875 to 1.906
		ADJA1033-150	1-1/2			
	4W, 4P	**ADJA1044-150**	1-1/2	**ADR1044**	**ACP1044CD**	.875 to 1.906
		ADJA1044-200	2			
100 Amp Style 2 (Shell and Extra Pole)	2W, 3P	**ADJA1023-125**	1-1/4	**ADR1023**	**ACP1023CD**	.875 to 1.906
		ADJA1023-150	1-1/2			
	3W, 4P	**ADJA1034-150**	1-1/2	**ADR1034**	**ACP1034CD**	.875 to 1.906
		ADJA1034-200	2			
150 Amp Style 2 (Shell and Extra Pole)	3W, 4P	**ADJA15034-150**	1-1/2	**ADR15034**	**ACP15034CD**	.875 to 1.906
		ADJA15034-200	2		**ACP15034DE**	1.250 to 2.187

Receptacles are provided with spring door and screw cap.
*For Reverse Service, add suffix -**RS** to Catalog Number.*
*For Special Polarization, add suffix -**P4** to Catalog Number.*

Horsepower Ratings for Emergency Disconnect Under Load

Not for normal starting and stopping, but plug may be withdrawn in an emergency if within these maximum HP ratings.

Amp	Motor Phase	Wire/Pole	Motor Horsepower 120 Vac	240 Vac	480 Vac	600 Vac
100	1-Phase	2W, 2P or 2W, 3P	7-1/2HP	15HP	30HP	30HP
	3-Phase	3W, 3P; 3W, 4P; or 4W, 4P	10HP	20HP	40HP	40HP
150	3-Phase	3W, 4P	Do Not Disconnect Under Load			

** For additional mounting boxes, see Aluminum Mounting Boxes.*
‡ Plug and receptacle combination is NEMA 4X rated when clamping ring is fully tightened on receptacle.
† Receptacle is NEMA 4X rated when screw cap is closed when the receptacle is not in use.

Aluminum Mounting Boxes

For Powertite® 30, 60, 100, and 150 Amp Receptacles

30 Amp




Hub Size (Inches)	AEE	AERH	AERC	AERA
1/2	**AEE13**	**AERH13**	**AERC13**	**AERA13**
3/4	**AEE23**	**AERH23**	**AERC23**	**AERA23**
1	**AEE33**	**AERH33**	**AERC33**	**AERA33**

60 and 100 Amp




Hub Size (Inches)	AEE	AERH	AERC	AERA
1	**AEE36**	**AERH36**	**AERC36**	**AERA36**
1-1/4	**AEE46**	**AERH46**	**AERC46**	**AERA46**
1-1/2	**AEE56**	**AERH56**	**AERC56**	**AERA56**

60, 100, and 150 Amp


Hub Size (Inches)	AJA Back Box and Adapter *	Angle Adapter Only
1	**AJA310**	
1-1/4	**AJA410**	**AJA100**
1-1/2	**AJA510**	
2	**AJA610**	

Replacement Receptacle Mounting Gasket

Amp	Back Box Type	Part Number
30	AEE, AERH, AERC, AERA	**69060871000**
60, 100	AEE, AERH, AERC, AERA	**69060567000**
60, 100, 150	AJA	**69009497000**

** Feed-Thru box furnished with one close-up plug in bottom recessed hub.*

COOPER Bussmann

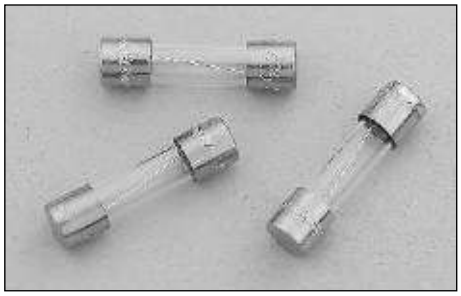
5mm x 20mm Fuses

GMA Series, Fast Acting, Glass Tube

Description

- Fast acting, low breaking capacity
- Optional axial leads available
- 5mm x 20mm physical size
- Glass tube, nickel-plated brass endcap construction
- Designed to UL/CSA 248-14

RoHS 2002/95/EC



ELECTRICAL CHARACTERISTICS		
Rated Current	**% of Amp Rating**	**Opening Time**
63mA - 10A	100%	None
	135%	60 minutes maximum
	200%	2 minutes maximum

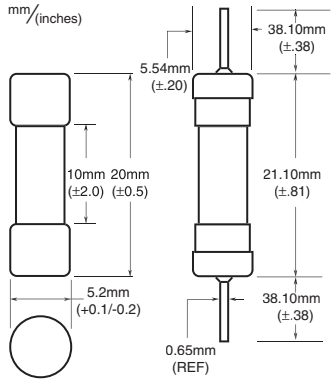
Agency Information

- UL Listed, Guide JDYX, File E19180, 63mA-6A
- UL Recognized Card: (7A-15A) Guide JDYX2, File E19180
- CSA Certified, Class 1422-01, File E65063, 63mA-6A
- MITI Approval, 1A-15A
- CCC Approval, 63mA-6A

Ordering

- Specify packaging, product, and option code
- For -R option, drop mA or A from product code (i.e. GMA-2-R)

Dimensions mm/(inches)



- Ratings above 6.3A have a 0.8mm diameter lead
- With TR2 packaging code, lead wire length is 19.05mm

SPECIFICATIONS

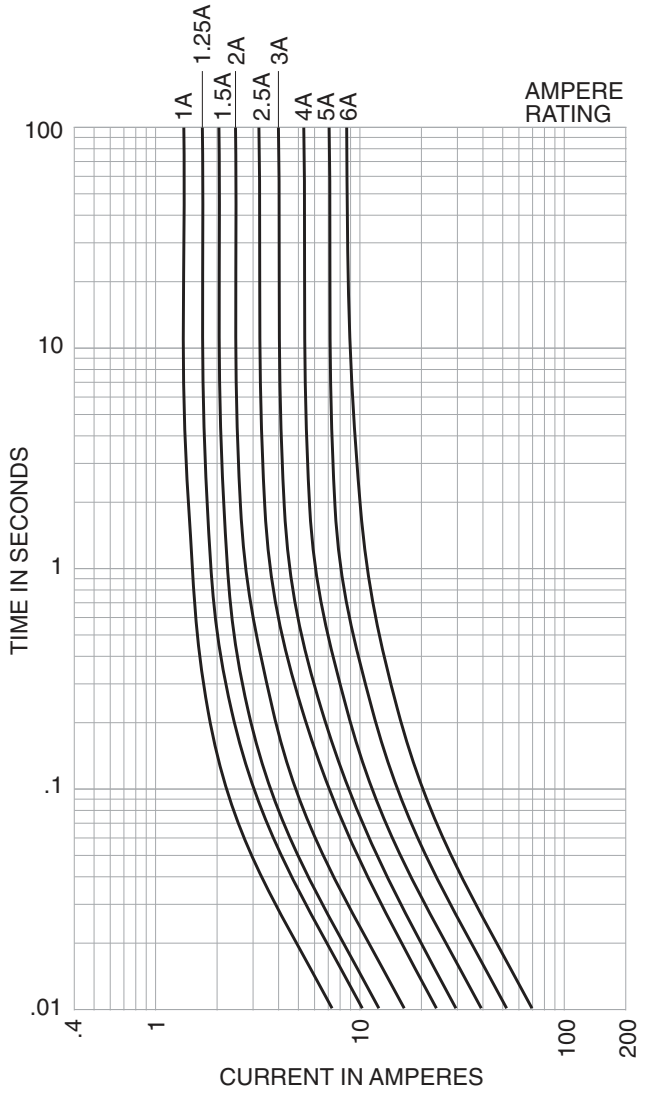
Product Code	Voltage Rating AC	AC Interrupting Rating* 250V	AC Interrupting Rating* 125V	Typical DC Cold Resistance (ohms)**	Typical Pre-Arc I^2t AC†	Maximum Voltage Drop (mV)‡
GMA-63mA	250V	35A	10,000A	-	0.00024	4700
GMA-100mA	250V	35A	10,000A	-	0.0001	4300
GMA-125mA	250V	35A	10,000A	-	0.0024	2600
GMA-200mA	250V	35A	10,000A	-	0.001	3400
GMA-250mA	250V	35A	10,000A	-	0.018	2200
GMA-300mA	250V	35A	10,000A	-	0.019	470
GMA-315mA	250V	35A	10,000A	-	0.019	450
GMA-500mA	250V	35A	10,000A	0.454	0.15	230
GMA-600mA	250V	35A	10,000A	0.256	0.32	200
GMA-750mA	250V	35A	10,000A	0.186	0.47	200
GMA-800mA	250V	35A	10,000A	0.170	0.70	180
GMA-1A	250V	35A	10,000A	0.163	0.48	300
GMA-1.25A	250V	100A	10,000A	0.122	0.84	290
GMA-1.5A	250V	100A	10,000A	0.090	1.6	270
GMA-1.6A	250V	100A	10,000A	0.080	2.0	260
GMA-2A	250V	100A	10,000A	0.066	3.1	250
GMA-2.5A	250V	100A	10,000A	0.046	4.9	240
GMA-3A	250V	100A	10,000A	0.039	8.8	215
GMA-3.15A	125V	-	10,000A	0.036	9.7	210
GMA-3.5A	125V	-	10,000A	0.030	13	210
GMA-4A	125V	-	10,000A	0.026	19	205
GMA-5A	125V	-	10,000A	0.021	29	200
GMA-6A	125V	-	10,000A	0.017	45	180
GMA-7A	125V	-	200A	0.012	150	110
GMA-8A	125V	-	200A	0.009	280	110
GMA-10A	125V	-	200A	0.006	280	110
GMA-15A	125V	-	150A	0.004	950	100

* Interrupting ratings: Interrupting ratings for 63mA - 6A were measured at 70% - 80% power factor on AC. The interrupting ratings for 7A - 15A were measured at 100% power factor on AC.
** DC Cold Resistance (Measured at <10% of rated current)
† Typical Pre-Arching I^2t (I^2t was measured at listed interrupting rating and rated voltage)
‡ Maximum Voltage drop (Voltage drop was measured at 20°C ambient temperature at rated current)

5mm x 20mm Fuses

GMA Series, Fast Acting, Glass Tube

TIME CURRENT CURVE



PACKAGING CODE	
Packaging Code	**Description**
BK	100 pieces of fuses packed into a cardboard carton
BK1	1,000 pieces of fuses packed into a poly bag
TR2	1,500 pieces of fuses packed into tape on a reel (19.05mm lead wire length)

OPTION CODE	
Option Code	**Description**
V	Axial leads - copper tinned wire with nickel plated brass overcaps
-R	RoHS compliant version

Visit us on the web at:
www.cooperbussmann.com

OC-2595 3/07

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Fusetron® dual-element, time-delay fuses

FRS-R (600V) Class RK5

Specifications

Description: Dual-element, time-delay fuse – 10 seconds (minimum) at 500% rated amps.

Dimensions: See page 11 for Class RK5 dimensions.

Construction: Fiberglass tube.

Ratings:

Volts — 600Vac (or less)
— 300Vdc

Amps — 1/10-600A

IR — 200,000A RMS Sym.
— 20,000A @ 300Vdc

Agency Information: CE, Std. 248-12, Class RK5, UL Listed, Guide JDDZ, File E4273, CSA Certified, Class 1422-02, File 53787.

Features and Benefits

- 2:1 selective coordination ratio (within RK5 fuse family) prevents electrical shutdowns from extending beyond the failed circuit.
- Insulated end caps for 70-600A fuses reduces exposure to live parts and extends air gap to distance between blades of adjacent mounted fuses or to housing.

Typical Applications

- Power Panelboards
- Motor Control Centers
- Combination Starters
- Machinery Disconnects

Catalog Numbers (Amps)

FRS-R-1/10	FRS-R-2	FRS-R-10	FRS-R-110
FRS-R-1/8	FRS-R-2 1/4	FRS-R-12	FRS-R-125
FRS-R-15/100	FRS-R-2 1/2	FRS-R-15	FRS-R-150
FRS-R-2/10	FRS-R-2 8/10	FRS-R-17 1/2	FRS-R-175
FRS-R-1/4	FRS-R-3	FRS-R-20	FRS-R-200
FRS-R-3/10	FRS-R-3 2/10	FRS-R-25	FRS-R-225
FRS-R-4/10	FRS-R-3 1/2	FRS-R-30	FRS-R-250
FRS-R-1/2	FRS-R-4	FRS-R-35	FRS-R-275
FRS-R-6/10	FRS-R-4 1/2	FRS-R-40	FRS-R-300
FRS-R-8/10	FRS-R-5	FRS-R-45	FRS-R-325
FRS-R-1	FRS-R-5 6/10	FRS-R-50	FRS-R-350
FRS-R-1 1/8	FRS-R-6	FRS-R-60	FRS-R-400
FRS-R-1 1/4	FRS-R-6 1/4	FRS-R-70	FRS-R-450
FRS-R-1 4/10	FRS-R-7	FRS-R-75	FRS-R-500
FRS-R-1 1/2	FRS-R-7 1/2	FRS-R-80	FRS-R-600
FRS-R-1 6/10	FRS-R-8	FRS-R-90	
FRS-R-1 8/10	FRS-R-9	FRS-R-100	

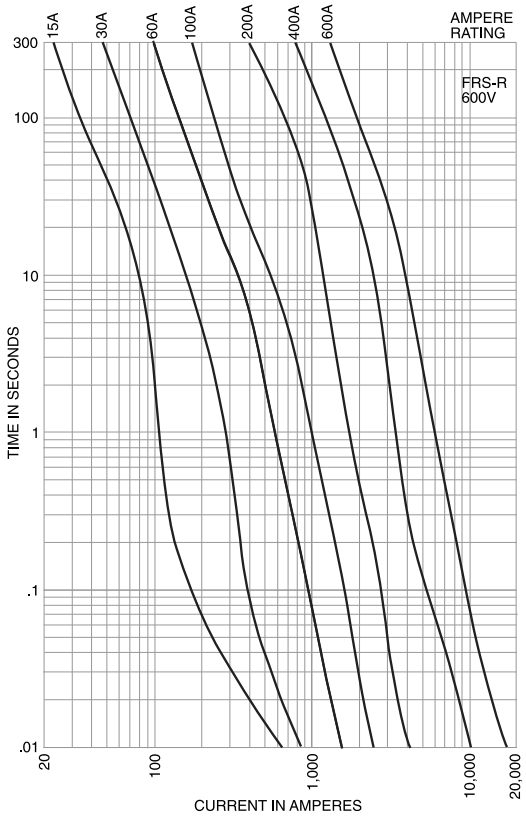
For superior electrical protection, Cooper Bussmann recommends upgrading FRS-R fuse applications to Low-Peak LPS-RK fuses See page 16.

Recommended Fuse Holders & Blocks For Class RK5 600V Fuses

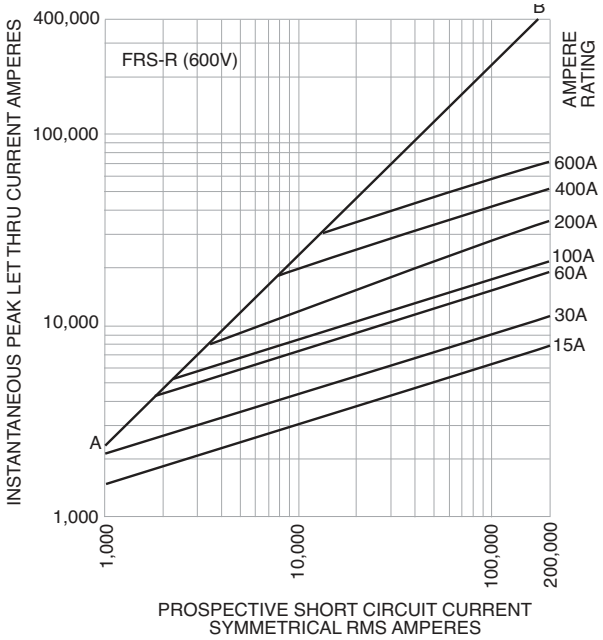
• See page 9

Data Sheet: 1017 (0-60), 1018 (70-600)

Time-Current Characteristic Curves—Average Melt



Current Limitation Curves



Recommended Fuse Reducers For Class R Fuses

• See page 10

DURACELL® ULTRA Emergency Light Batteries

Duracell® Ultra SLA technology from Batteries Plus offers high-density power that out-performs traditional lead acid batteries. The Absorbed Glass Mat (AGM) construction is designed for efficient gas recombination and allows for maintenance-free operation. Duracell® Ultra SLA batteries maintain their high capacity with a design that is resistant to damage caused by deep discharge. Every Duracell® Ultra SLA battery is inspected to ensure the highest standards in materials and fabrication.

High Cycle Life

SPILL PROOF GUARANTEE

Features:

- Duracell® Ultra batteries contain a proprietary grid alloy formula. This formula combined with the advanced plate curing techniques offer improved performance.
- A computer manages the advanced tank formation technique. Formation temperature is strictly controlled to improve service life of Duracell® Ultra batteries.
- The unique construction and sealing techniques of the Duracell® Ultra battery guarantee leak-proof operation regardless of the battery's position with no adverse effect to capacity or service life.
- Quality Assurance Engineers monitor and control the entire production process. Final quality inspection occurs on every Duracell® Ultra battery.
- Heavy-duty lead calcium tin alloy grids provide an extra margin of performance and service life in float applications, even after repeated over-discharges.
- More than 1,000 discharge/recharge cycles can be realized from Duracell® Ultra batteries, given average depth of discharge.

Sealed **Lead** Acid

Maintenance Free

Spill Proof Design

1 YEAR

1 Year Warranty

Stringent Quality Control

DURACELL® ULTRA Emergency Light Batteries

PROJECT NAME:
CATALOG #
FIXTURE TYPE
NOTES

Battery	Volts	Capacity Ah (20Hrs)	Dimensions (LxWxH Inches)			Terminal Type	Group Size	Weight (Lbs.)	Battery Type
DURA12-2.9F	12V	2.9	3.11	2.2	3.9	F1, T1	NULL	2.36	General Purpose
DURA12-5F	12V	5	3.54	2.76	4.21	F1, T1	NULL	NULL	General Purpose
DURA12-7F	12V	7	5.94	2.56	3.94	F1, T1	NULL	NULL	General Purpose
DURA12-8F	12V	8	5.94	2.56	3.94	F1, T1	NULL	NULL	General Purpose
DURA12-9F2	12V	9	5.95	2.56	3.94	F2, T2	NULL	NULL	General Purpose
DURA12-10F2	12V	10	5.95	2.54	4.38	F2, T2	NULL	7.5	General Purpose
DURA12-12F2	12V	12	5.94	3.9	3.98	F2, T2	NULL	NULL	General Purpose
DURA12-18F2	12V	18	7.13	3.03	6.57	F2, T2	NULL	NULL	General Purpose
DURA6-10F	6V	10	5.94	1.97	3.98	F1, T1	NULL	4.851	General Purpose
DURA6-12F	6V	12	5.94	1.97	3.98	F1, T1	NULL	NULL	General Purpose
DURA6-5F	6V	5	2.76	1.85	4.21	F1, T1	NULL	NULL	General Purpose
DURA6-7.2F	6V	7.2	5.94	1.34	3.68	F1, T1	NULL	2.43	General Purpose

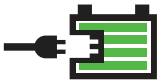
Charging, Maintenance, and Storage Tips

Recharge after each use and store battery fully charged

Do not store in a discharged state. Charge batteries every couple months

Overcharging kills batteries

Undercharging shortens battery life



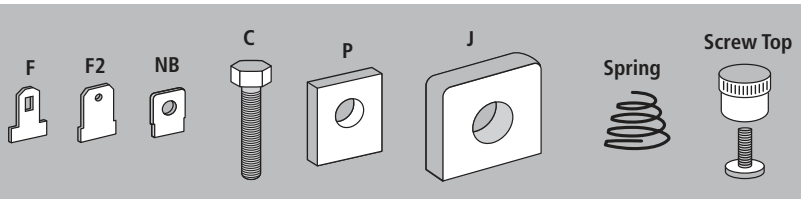
Disconnect charger once fully charged

Use charger that provides proper voltage for the battery
GEL batteries are charged at **13.8 -14.1V**

Check battery for corrosion or deformation

Store in cool, dry place (68°F is best)

SLA Terminal Types



Visit batteriesplus.com for warranty information

Batteries + Bulbs

General specifications

- Mounting without screws in square openings as indicated in the cut-out diagram
- Plate thickness from 1.3 to 3.7mm (up to 4mm with cut-out max tolerance)
- Plastic parts in PC/ABS alloy, except elastic clips, made in PA66 GF13HSL
- Standard color RAL 7035, other colors available on request, subject to quantity
- Permanent sealing gasket in polyurethane foam
- Filter media in thermo-linked progressive structure synthetic fibre
  - filter class G3 (optionally filter class G4), according to EN 779
- Filter media can be cleaned, up to 10 times by washing, blowing dry and lightly beating
- IP55, Type1, 3R and EMC versions on request
- UL approval according to UL 508 and CSA approval according to CSA/CAN 22.2 No. 14

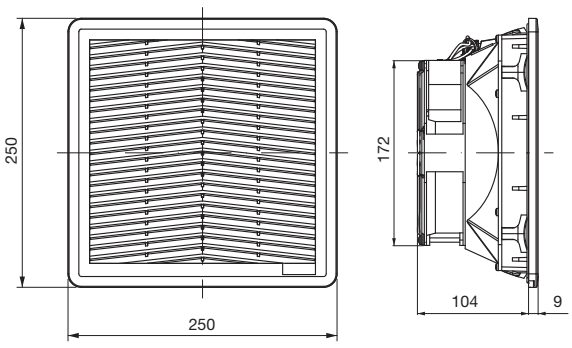
- ▶ Clip mounting system
- ▶ Easy media replacement
- ▶ Low profile
- ▶ Quick electrical connection with cage clamp terminal

Technical data

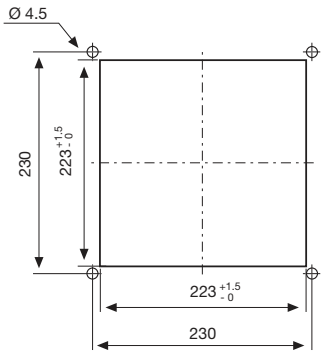
Model	Rated Voltage	Freq.	Rated Current	Rated power	Max air flow	Static Pressure	Noise	Weight	Working Temp. Range	Approvals
	V	Hz	A	W	m³/h	Pa	dB(A)	Kg	°C	
FF15A115ZN2	115 V a.c.	50/60	0.360/0.361	39/41	230/272	150/195	52.0/56.0	1.71	-10 ÷ +55	CE; cURus; cCSAus;
FF15A115ZNR2	115 V a.c.	50/60	0.358/0.359	39/41	238/283	195/252	52.0/56.0	1.71	-10 ÷ +55	CE; cURus; cCSAus;
FF15A230ZN2	230 V a.c.	50/60	0.185/0.194	42/45	230/272	150/195	52.0/56.0	1.71	-10 ÷ +55	CE; cURus; cCSAus;
FF15A230ZNR2	230 V a.c.	50/60	0.185/0.192	42/45	238/283	195/252	52.0/56.0	1.71	-10 ÷ +55	CE; cURus; cCSAus;

Technical specifications

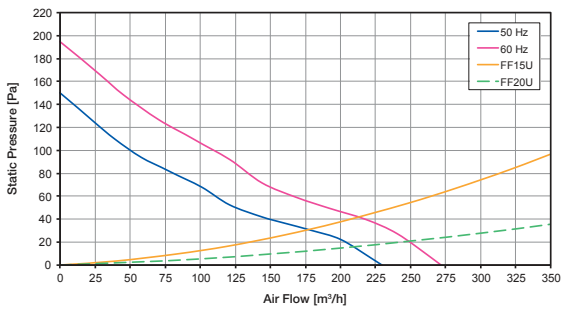
Technical drawing



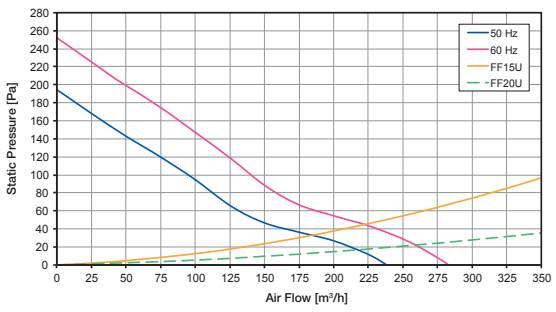
Mounting cut-out



Standard flow



Reverse flow



FF series exhaust filters

- Free-tool clip mounting system
- Plate thickness: FF08 from 0.039 to 0.079in; FF12, FF13 from 0.051 to 0.126in; FF15, FF20 from 0.051 to 0.146in (up to 0.157in with cut-out max tolerance)
- Standard color RAL 7035, other colors available on request, subject to quantity
- Standard protection ratings: IP54 and Type 12. Optional versions: IP55, Type 1, 3R and EMC

Model	Dimensions	Cut-Out	Weight
	in	in	lb
FF08Z	4.19x4.19x0.91	3.6x3.6	0.22
FF12Z	5.91x5.91x1.15	4.88x4.88	0.44
FF13Z	8.03x8.03x1.16	6.97x6.97	0.79
FF15Z	9.84x9.84x1.33	8.78x8.78	1.26
FF20Z	12.8x12.8x1.34	11.45x11.45	2.16

FF series IP55 exhaust filters

- IP55 protection degree

Model	Dimensions	Cut-Out	Weight
	in	in	lb
FF12U5	5.91x5.91x1.15	4.88x4.88	0.44
FF13U5	8.03x8.03x1.16	6.97x6.97	0.79
FF15U5	9.84x9.84x1.33	8.78x8.78	1.28
FF20U5	12.8x12.8x1.34	11.45x11.45	2.18

FF series EMC exhaust filters

- Electromagnetic shielding

Model	Dimensions	Cut-Out	Weight
	in	in	lb
FF08UC	4.19x4.19x0.91	3.6x3.6	0.22
FF12UC	5.91x5.91x1.15	4.88x4.88	0.46
FF13UC	8.03x8.03x1.16	6.97x6.97	0.82
FF15UC	9.84x9.84x1.33	8.78x8.78	1.32
FF20UC	12.8x12.8x1.34	11.45x11.45	2.27

FF series Type 3R exhaust filters

- Ideal for outdoor applications
- Plastics construction against atmospheric deterioration
- UV resistant
- IP55 protection degree; IP54 for FF08 series

Model	Dimensions	Cut-Out	Weight
	in	in	lb
FF08N3	4.19x4.19x 0.91	3.60x 3.60	0.30
FF12N53	5.91x5.91x1.15	4.88x4.88	0.64
FF13N53	8.03x8.03x1.16	6.97x6.97	1.04
FF15N53	9.84x9.84x1.33	8.78x8.78	1.96
FF20N53	12.8x12.8x1.34	11.45x11.45	2.56

orangis ambient control

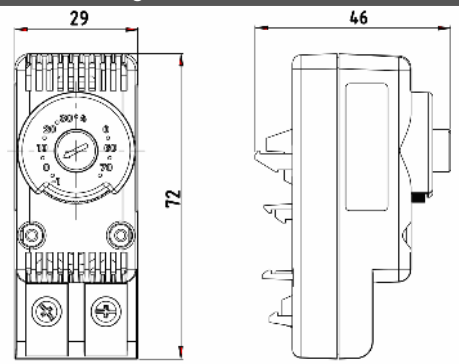
Fandis colors of engineering

MECHANICAL THERMOSTAT

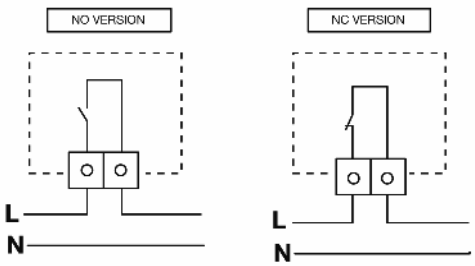
Description: **NO/NC Thermostat for rail**

Enclosure material	PA66 UL 94V-0
Color	grey RAL 7035
Protection degree:	IP20
Appliance class:	class II
Mounting on:	DIN rail 35 mm (EN 50 022); DIN rail 15 mm (EN 50 045); DIN rail 32 mm (EN 50 035)
Fixing method:	snap on
Electrical connection:	screw terminals
Electrical section wires:	from 0.75 mm² to 2.5 mm²
Sensing element type:	bi-metallic
Setting/indexing:	external Knob / 5°C
Storage temperature:	from -40°C to +90°C
Max air humidity	95% RH at 25°C (not condensing)
Temperature scale:	available with Fahrenheit degree scale (°F)
External dimensions:	72x29x46 mm
Endurance:	100.000 cycles
Applicable standards:	EN 60730-1
Approvals:	CE, cURus

technical drawing



wiring diagram



Model	Rated Voltage Range	Rated Current	Contact Current	Setting Range	Differential (referred to set point)	Accuracy	Net Weight
		(A) *	(A)	(°C)	(°C)	(°C)	(kg)
TRT-10A230V-NC	60 V d.c.;110-250 V a.c.	10	15	-10 ~ 80	-3	±3	0.054
TRT-10A230V-NO	60 V d.c.;110-250 V a.c.	10	15	-10 ~ 80	+4 if A < 5 ; +7 if A > 5	±3	0.054

(*) resistive load (or 1/6 hp motor load)

Streamline® Low Profile Strobe Light

Models LP3S, LP3E, LP3M

PERFECT SIZE MEETS SUPERIOR PERFORMANCE

- LP3S and LP3M are available in 12-48VDC, 120VAC and 240VAC; LP3E in 120VAC
- Surface mount, Edison mount, or integrated ½ - inch pipe mount
- Five dome colors
- Screw-on lens provides easy access
- Low profile — Model LP3S is only 5" high
- Type 4X, IP66 enclosure
- PLC and triac compatible
- UL and cUL Listed, CSA Certified and CE Approved*

* CE Approval for S, M models only.

Federal Signal introduces the Model LP3 low profile strobe light. This Type 4X strobe is available in five colors: amber, blue, clear, green and red.

The LP3 is offered in three mounting configurations: the LP3S features a three-hole surface mount — ideal for control panels and other flat or flush surfaces; the LP3E features a standard A-19 medium Edison screw base; the LP3M features a ½" male pipe mount and 18' wire leads.

Both the LP3S and LP3M include a surface gasket to complete the Type 4X installation. An optional dome guard is available for use with the LP3M when installed flush with a panel. All LP3 units feature a unique threaded screw-on lens to provide for tool free wiring and strobe tube replacement. The strobe tube is rated for 7,000 hours.

LP3 comes in three voltage variations: 12-48VDC, 120VAC and 240VAC. The state-of-the-art strobe mechanism produces 2.2 joules of energy, while drawing relatively low amperage.

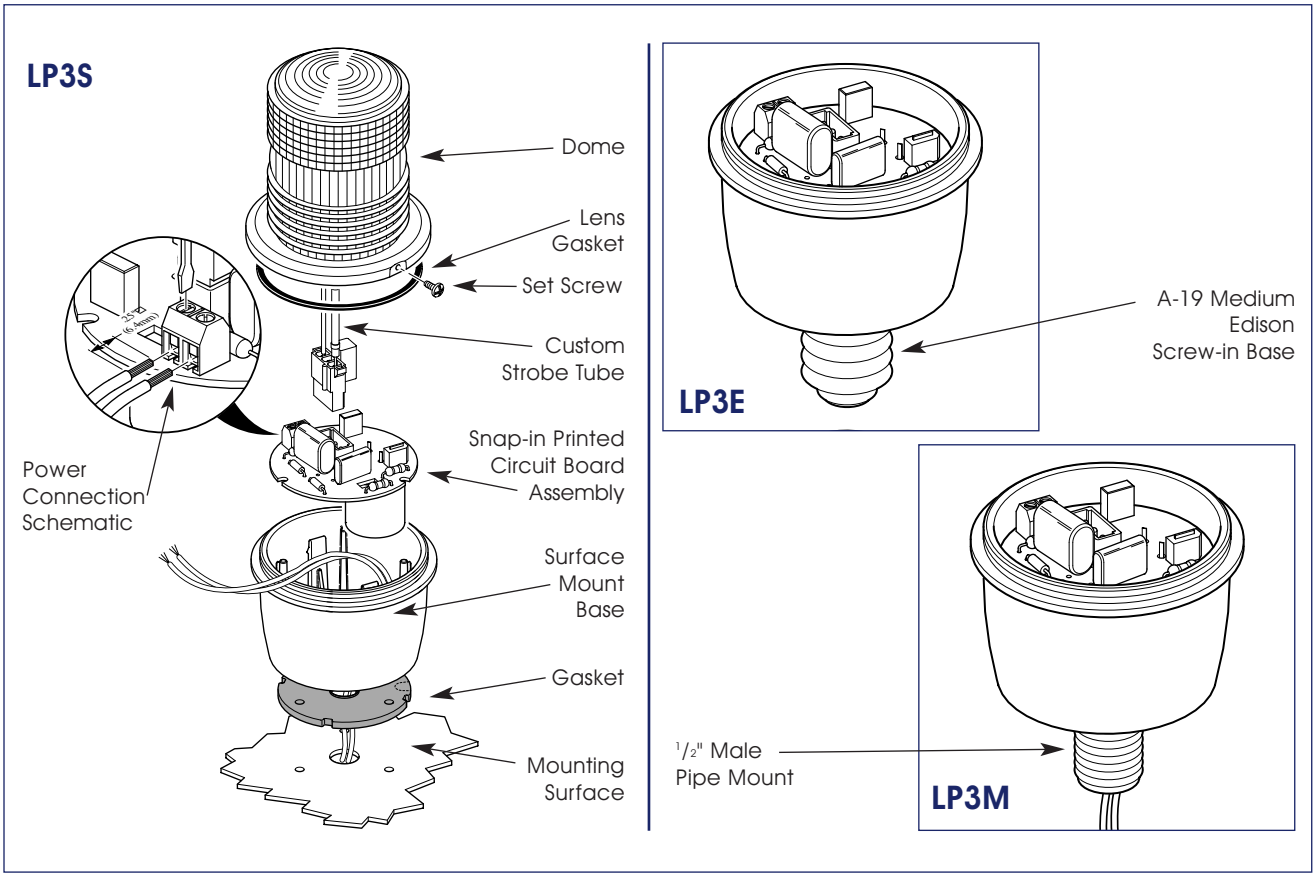
StreamLine® strobes feature high-quality, long-life strobe tubes which are designed to reduce tungsten build-up for longer lamp maintenance cycles. Careful consideration is given to the relationship between tube shape and lens design for maximum light output. StreamLine products make use of surface mount technology, which provides a more powerful light in a much smaller package. The high-quality dry-electrolyte capacitor used in StreamLine products runs cooler than those used in many competitive strobes, resulting in a more reliable product that won't fail due to overheating.

Model	Voltage	Operating Current	Flash Rate/ Minute	Joule Output	Candela Peak[1]	Candela ECP[2]
LP3	12-48VDC	0.44-0.10 amps	65-95	2.2	175,000	51.5
LP3	120VAC	0.10 amps	65-95	2.2	175,000	51.5
LP3	240VAC	0.07 amps	65-95	2.2	175,000	51.5

[1] Peak candela is the maximum light intensity generated by a flashing light during its light pulse
[2] ECP (Effective Candela) is the intensity that would appear to an observer if the light were burning steadily

5 yr FEDERAL SIGNAL WARRANTY

STREAMLINE® LOW PROFILE STROBE LIGHT (LP3S/LP3E/LP3M)



SPECIFICATIONS

Lamp Life:*	7,000 hours	7,000 hours
Lamp Style:	Strobe	Strobe
Operating Temperature:	-31°F to 150°F	-35°C to 66°C
Net Weight:	7.3 oz.	206.96 g
Shipping Weight:	8.5 oz.	240.98 g
Diameter:	3.125"	7.94 cm
Height (from bottom):		
LP3S	5.0"	12.7 cm
LP3E	6.1"	15.5 cm
LP3M	5.8"	14.7 cm

* Optimal hours under ideal conditions.

HOW TO ORDER

- Specify model, voltage and color
- Specify options
  Wire/Dome guard for LP3S and LP3M (LP3G)
- Please refer to Model Number Index LP3 (E.M) beginning on page 375

REPLACEMENT PARTS

Description	***Part Number***	***Description***	***Part Number***
Dome, Amber	K8589063A	PC Assembly, 12-48VDC	K2001316B
Dome, Blue	K8589063A-01	PC Assembly, 120VAC	K2001317A
Dome, Clear	K8589063A-02	PC Assembly, 240VAC	K2001317A-01
Dome, Green	K8589063A-03	Gasket, Lens	K8589013A
Dome, Red	K8589063A-04	Gasket, Base LP3S	K8589011A
Strobe Tube	K149130A		

MIDGET & CLASS CC
600 Volt Fuse Blocks

600 Volt midget and Class CC fuse blocks

Mersen midget fuse blocks accommodate all 30 ampere 1-1/2" x 13/32" midget fuses. Class CC fuse blocks accommodate all 30 ampere Class CC fuses. A choice of box, screw, or pressure-plate connectors fit a wide range of stranded or solid copper wire. Insulators are glass-filled polycarbonate (GFPC) with verified dielectric strength in excess of 2500V. Fuse blocks feature a unique adder block which can be snapped onto 1-, 2- or 3-pole blocks to form multi-pole segmented blocks of as many poles as desired. All fuse clips are made of high conductivity tin-plated copper alloy.

Recommended Fuse Usage:

Midget Fuse Block use with ATQ, ATM, A6Y-2B, A25Z-2, TRM, OTM, A15QS-2, GFN, GGU, A60Q-2, DCT

Class CC Fuse Block use with ATDR, ATMR, ATQR

Clip & Connector Types

30A MIDGET/CC			
COPPER BOX CONNECTOR	SCREW WITH DOUBLE QUICK-CONNECTS	PRESSURE PLATE WITH DOUBLE QUICK-CONNECTS	PRESSURE PLATE WITH DOUBLE QUICK- CONNECTS (CLASS CC REJECTION END)
			

Ratings:

Midget Block

Volts : 600VAC / DC
Amps : 30A Maximum
SCCR : 100kA (depending on fuse I.R.)
: 10kA (when using quick connect terminal)

Class CC Block

Volts : 600VAC / DC
Amps : 30A Maximum
SCCR : 200kA
: 10kA (when using quick connect terminal)

Temperature/flammability GFPC insulators rated 125^{0}C, 94V-0 flammability.

Approvals:

All fuse blocks meet the requirements of UL 4248

Midget Block

- UL recognized component guide IZLT2, File E52283
- CSA certified class 6225, File 32169

Class CC Block

- UL listed, guide IZLT, File E52283
- CSA certified class 6225, File 32169

MIDGET & CLASS CC
600 Volt Fuse Blocks

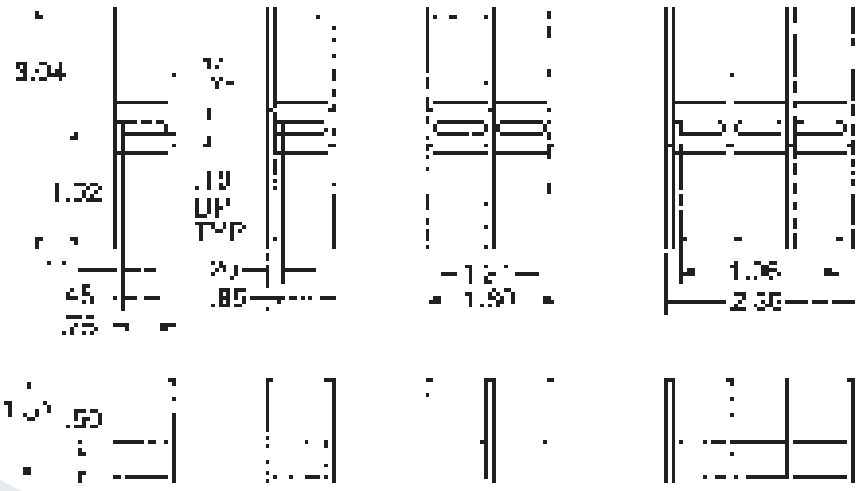
600 Volt, 30A Midget and Class CC Fuse Blocks

Connector			Catalog No.				Torque
Type	Wire Range	Poles*	Midget	Listing	Class CC	Listing	In - lb
Screw w/ double quick connects at both ends	Cu #10-14	ADDER 1 2 3 4	30310 30311 30312 30313 30314	UL Rec. & CSA	30310R 30311R 30312R 30313R 30314R	UL & CSA	20
Pressure plate (sems) w/ double quick connects at both ends	Cu #10-14	ADDER 1 2 3 4	30320 30321 30322 30323 30324	UL Rec. & CSA	30320R 30321R 30322R 30323R 30324R	UL & CSA	20
Copper box	Cu #6-14	ADDER 1 2 3 4	30350 30351 30352 30353 30354	UL Rec. & CSA	30350R 30351R 30352R 30353R 30354R	UL & CSA	35

Note: To convert Midget or Class CC adder pole to single pole, use end barrier #U09301.
* Available in any number of poles. Replace last digit in Catalog Number with number of poles needed.
Example: 303112 is a 12-pole screw/double QC connector Midget Fuse Block. Total width of N poles = (N x .76) + .08 inches. 12 poles = (12 x .76") + .08" = 9.20".

Recommended mounting screws for all Midget and Class CC fuse blocks: #8 (.164" dia.)

Dimensions



Adder 1 Pole 2 Pole 3 Pole

CLASS H, K & R

250 VOLT/FUSE BLOCKS

Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

Figure 6

Figure 7

Figure 8

Recommended mounting screws for all 30A and 60A fuse blocks: #10 (.190" dia.)

250 Volt, 30 & 60 Ampere Class H, K and R Fuse Blocks

AMPERE RATING	POLES	CONNECTOR TYPE	CONNECTOR WIRE RANGE	CATALOG NUMBER TYPE OF CLIP: CLASS H & K NON-SPRING REINFORCED	CATALOG NUMBER TYPE OF CLIP: CLASS H & K SPRING REINFORCED	CATALOG NUMBER TYPE OF CLIP: CLASS R SPRING REINFORCED	FIG.	CONNECTOR TORQUE In - lb
30 GFPC INSULATOR	ADDER	BOX	Al/Cu #2-14	20300	20305	20305R	1	35
	1			20301*	20306*	20306R*	2	
	2			20302	20307	20307R	3	
	3			20303	20308	20308R	4	
	ADDER	SCREW	Cu #10-14	20310	20315	20315R	1	20
	1			20311*	20316*	20316R*	2	
	2			20312	20317	20317R	3	
	3			20313	20318	20318R	4	
	ADDER	PRESSURE PLATE	Cu #10-14	20320	20325	20325R	1	20
	1			20321*	20326*	20326R*	2	
	2			20322	20327	20327R	3	
	3			20323	20328	20328R	4	
	ADDER	BOX	Cu** #4-14	-	20355	20355R	1	35
	1			-	20356*	20356R*	2	
	2			-	20357	20357R	3	
	3			-	20358	20358R	4	
60 GFPC INSULATOR	ADDER	BOX	Al/Cu #2-14	20600	20605	20605R	5	45
	1			20601	20606	20606R	6	
	2			20602	20607	20607R	7	
	3			20603	20608	20608R	8	
	ADDER	BOX	Cu** #4-14	-	20655	20655R	5	45
	1			-	20656	20656R	6	
	2			-	20657	20657R	7	
	3			-	20658	20658R	8	

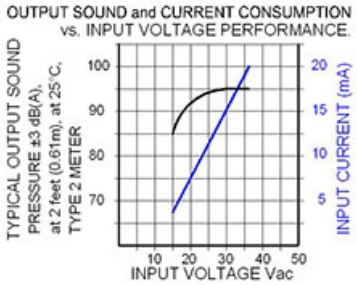
Note: To convert 30A adder pole to single pole, use end barrier #U09322. To convert 60A adder pole to single pole, use end barrier #U09365.

* 1-pole, 30A block does not accept adder pole.

** Fuse blocks have copper box connectors and clips and are for copper wires only. These are specifically designed with the same coefficient of expansion as copper wire for improved heat cycling and meet or exceed OEM "no aluminum" specifications.

Floyd Bell Inc
SOUND SOLUTIONS

AudioLarm II Series
MW-09-550-Q



More Information

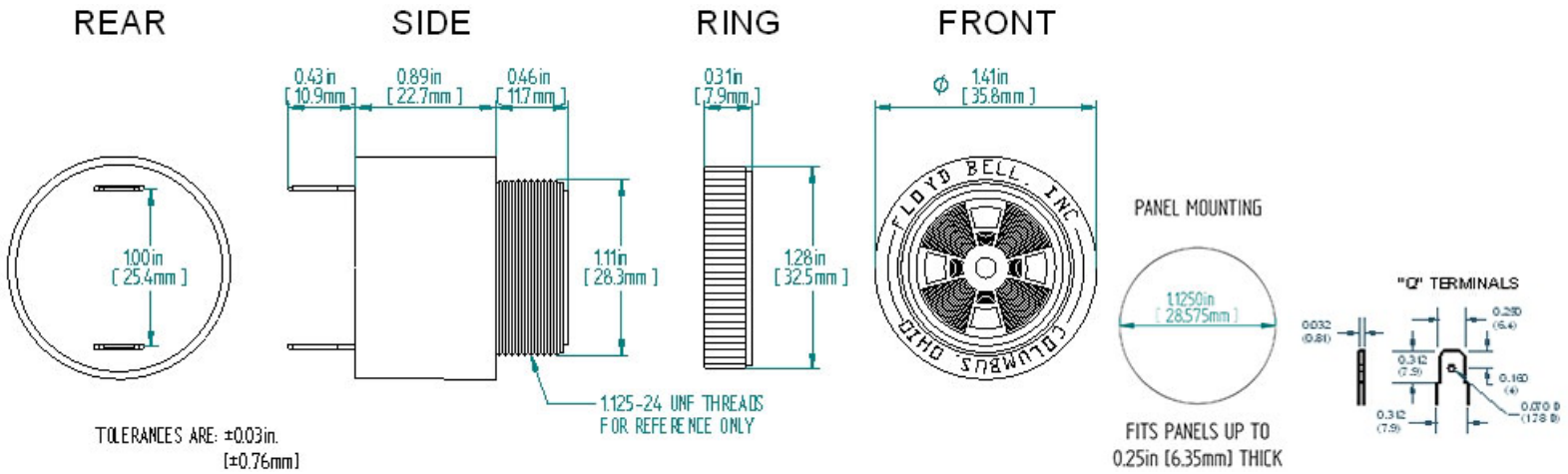
UL Recognized

Rohs Compliant

Specifications

Mounting	Panel Mount
Operating Mode	Medium Loud Extra Fast Warble Tone
Operating Voltage	15-36 Vac/dc
Operating Frequency	2600±250 Hz to 3000±250 Hz
Typical Operating Current	5 mA at 15 Vac/dc 20 mA at 36 Vac/dc
Typical Sound Pressure	85 ±5 dB(A) at 15 Vac/dc at 24 inches (61 cm), at 25°C 95 ±5 dB(A) at 36 Vac/dc at 24 inches (61 cm), at 25°C
Termination	Quick Connect Blades
Termination Strength	Pull test with a maximum of 22 pounds (10 kg) load
Operating Temperature	-20_C to +65_C
Storage Temperature	-40_C to +85_C
Surge Voltage	20% over maximum rated voltage for less than 5 minutes
Reverse Voltage Protection	To the maximum operating voltage
Construction Materials	Case- Plastic _NORYL_ N-190, Flame Retardant UL 94-VO, Black Internal Circuit- Audio-oscillator and piezoelectric driver Potting- 2 parts epoxy resin or silicone, black Diaphragm- Stainless Steel 304
Gasket	Gasket (sold separately) 0.062" thick, 60 Durometer Neoprene
Construction Materials	ASTM B117 Certified - Withstands exposure to salt spray for 300 hours IP 68 Certified - Withstands water submergence and dust exposure Humidity- 95% relative humidity at +40_C continuously for 100 hours. Vibration- Withstands vibration between 0 and 55 Hz. on all axes.
Life Expectancy	10 years under normal operating conditions.
Warranty	For a period of two years from the date of manufacture under normal operating conditions.
Notes	This product is not intended as a life safety device.
Terms and Conditions of Sale	Link here

Dimensions


REAR
SIDE
RING
FRONT
1.00 in
[25.4mm]
0.43 in
[10.9mm]
0.89 in
[22.7mm]
0.46 in
[11.7mm]
1.11 in
[28.3mm]
1.125-24 UNF THREADS
FOR REFERENCE ONLY
0.31 in
[7.9mm]
1.28 in
[32.5mm]
ϕ 1.41 in
[35.8mm]
FLOYD BELL INC
COLUMBUS OHIO
TOLERANCES ARE: ±0.03 in.
[±0.76mm]
PANEL MOUNTING
1.1250 in
[28.575mm]
FITS PANELS UP TO
0.25 in [6.35mm] THICK
"Q" TERMINALS
0.032
(0.81)
0.250
(6.4)
0.312
(7.9)
0.160
(4)
0.312
(7.9)

PANELITE™ ENCLOSURE LIGHTS OVERVIEW

INDUSTRY STANDARDS

PANELITE LED and Fluorescent Enclosure Lights

UL 508A Component Recognized; File No. E61997 cUL Component Recognized per CSA C22.2 No 14; File No. E61997

CSA File No. 42186
Maintains UL/CSA Type 4, 4X and 12 enclosure rating when properly installed in a Hoffman enclosure.

230 VAC Fluorescent Enclosure Light

UL 508A Component Recognized; File No. E234324 cUL Component Recognized per CSA C22.2 No 14; File No. E61997

CE

LED Light

UL 508A Component Recognized; File No. E234324 cUL Component Recognized per CSA C22.2 No 14; File No. E234324

CE
Ingress protection : IP 20
Maintains enclosure type rating up to 4X when installed per instructions

APPLICATION

Versatile, slim-profile LED and fluorescent lights provide mounting flexibility and are easy to install in any enclosure. Terminal blocks allow for easy wiring. Accessories include ganging cables, power cords and door switches, all provided with plug-and-play connectors for easy connection to the terminal blocks with an innovative terminal connection system. LED version provides superior lighting performance with minimal power consumption.

FEATURES

- Slim profile allows light to be tucked up out of the way for easy panel installation
- Versatile mounting allows the light to be positioned horizontally or vertically; two-way mounting provides for ideal orientation
- Includes mounting hardware for the following enclosure installations: PROLINE™ Frame, Enclosure Top, Panel Mount and Unistrut
- On/off switch incorporated in light; optional remote door switch accessory available to activate light when enclosure door is opened (230 VAC Fluorescent Enclosure Light has switch or door-activated sensor)

PANELITE Only:

- Mounting tabs provide easy access point for attachment hardware; light does not need to be disassembled for installation
- Up to five lights can be daisy-chained together
- Plug-and-play terminal connection system:
  - Pre-wired connection sockets on both ends of light allow use of Hoffman cable accessories
  - Optional terminal blocks snap into the connection sockets allowing customers to use own wiring methods; two terminal blocks provided with each light kit
  - Power supply can be wired manually with Hoffman PANELITE Power Cable with Leads or with Hoffman optional PANELITE Power Cord
  - Ganging cables are available in 2-, 4- and 6-ft. lengths to easily join up to five lights together using one power supply
  - Remote door switch for easy door activation eliminates need to mount light in the exact location required to activate the light

LED Light Only:

- Mechanical screw- or magnetic mount (non-slip rubberized)
- Protection Class II (double insulated)
- Operating temperature -22 F to 140 F (-30 C to 60 C)
- On / Off or motion-sensor activation
- LED lights with 900 LM illumination; 120° angle of illumination
- Low, 5-watt power requirement
- Light-weight, all-composite construction
- Input and output connectors included with light (16 AWG)

SPECIFICATIONS

PANELITE:

- Extruded aluminum center support
- Black composite end caps
- Black composite mounting tabs
- Each light fixture includes two mounting tabs, two pre-wired connection sockets, two optional terminal blocks that snap into the connection sockets and enclosure attachment hardware (bulb not included with fluorescent light)

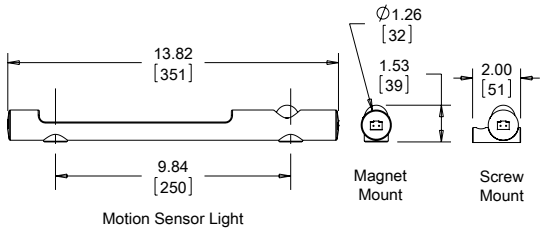
230 VAC Fluorescent Enclosure Light:

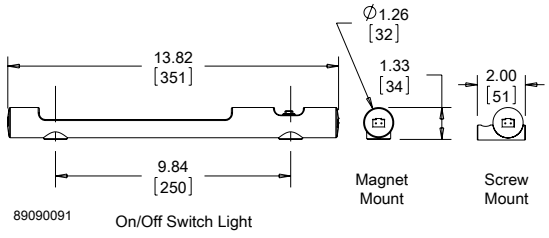
- Light gray composite construction – UL 94V-0 material
- Hardware kit provides fasteners to mount to PROLINE, NEMA (4, 4X, 12, and 13), CONCEPT™ , FUSION™ and other cabinets
- Easy-access terminal block that accommodates up to 16 AWG wires
- Fluorescent light bulb included (2G7 Base)

LED Light:

- LED (Light Emitting Diode) low-power light kit
- Screw mounting using included hardware kit (maintains enclosure rating up to UL Type 4X)
- No user-serviceable parts
- Life expectancy of 60,000 hours at 68 F (20 C) under specifications
- Operating temperature: -22 to +140 F (-30 to +60 C) under specifications
- 5-watt power consumption
- Transparent, composite construction

LED LIGHT KIT





LED light kits provide interior enclosure lighting. These light kits are ideal for remote and darkened enclosure applications. The light can be mechanically fastened with included hardware to maintain enclosure UL listing (up to Type 4X), or can be magnetically attached to flat steel surfaces. The lights have auto-sensing circuitry (AC voltage 90 VAC to 260 VAC and DC voltage 20 VDC to 60 VDC). LED lights are light-weight and in a small form factor while providing 900 LM of 6500K light. Power consumption for all models is 5 watts.

BULLETIN: A80LT

Catalog Number	AxBxC in./mm	Weight (oz)	Weight (gm)	Mounting Style	Power Source	Activation	Voltage
LEDA1M35	1.34 x 1.26 x 13.82 34 x 32 x 351	4.8	135	Magnetic	AC	On/off switch	90 VAC-260 VAC
LEDA2M35	1.54 x 1.26 x 13.82 39 x 32 x 351	5.0	140	Magnetic	AC	IR Motion Sensor	90 VAC-260 VAC
LEDA1S35	1.42 x 2.05 x 13.82 36 x 52 x 351	4.8	135	Screw	AC	On/off switch	90 VAC-260 VAC
LEDA2S35	1.63 x 2.05 x 13.82 41 x 52 x 351	5.0	140	Screw	AC	IR Motion Sensor	90 VAC-260 VAC
LEDD1M35	1.34 x 1.26 x 13.82 34 x 32 x 351	4.8	135	Magnetic	DC	On/off switch	20 VDC-60 VDC
LEDD2M35	1.54 x 1.26 x 13.82 39 x 32 x 351	5.0	140	Magnetic	DC	IR Motion Sensor	20 VDC-60 VDC
LEDD1S35	1.42 x 2.05 x 13.82 36 x 52 x 351	4.8	135	Screw	DC	On/off switch	20 VDC-60 VDC
LEDD2S35	1.63 x 2.05 x 13.82 41 x 52 x 351	5.0	140	Screw	DC	IR Motion Sensor	20 VDC-60 VDC

LED LIGHT INPUT CONNECTOR/CABLE ASSEMBLY

The input connector/cable assembly is used to provide supply power to the LED light. Pre-assembled connector/cable assembly with 78.7-in. (2000 mm) long cable whip. Cables are constructed of 16 AWG copper wire.

BULLETIN: A80LT

Catalog Number	A in./mm	Power Source	Use with
LEDA20C	78.74 2000	AC	AC LED Lights
LEDD20C	78.74 2000	DC	DC LED Lights

LED LIGHT EXTENSION CONNECTOR/CABLE ASSEMBLY

The extension connector/cable assembly is used to connect adjacent LED lights (daisy chain). Up to 10 LED lights can be ganged or connected in series. Pre-assembled connector/cable assembly with 39.4-in. (1000 mm) long cable between input and output connectors. Cables are constructed of 16 AWG copper wire.

BULLETIN: A80LT

Catalog Number	A in./mm	Power Source	Use with
LEDA10E	39.37 1000	AC	AC LED Lights
LEDD10E	39.37 1000	DC	DC LED Lights

REMOTE DOOR SWITCHES

- Remote door switch activates the light when the enclosure door is opened
- Mounts on enclosure frame and includes mounting hardware
- Mounting plate is 14 gauge steel with a plated finish
- Can be hard-wired to the PANELITE LED or Fluorescent light or connected via the PANELITE Door Switch Cable

BULLETIN: A80LT, P20

Catalog Number	Description
ALFSWD	Door switch assembly (order connection cable separately)
PLFSWD	Door switch assembly for PROLINE™ (order connection cable separately)

TOUCH-SAFE UL LIGHT SWITCH

APPLICATION

The Touch-Safe light switch is designed to be used with Hoffman™ light kits (AC and DC). It provides a UL listed touch-safe switch that can be used on many enclosure types and includes hardware for most applications. The light switch maintains enclosure overall rating up to UL 508A Type 4X or 12.

FEATURES

- UL listed for a touch-safe wire connection
- Easily mounted to various enclosure types; common bracket and hardware included for many enclosure types (NEMA, CONCEPT™ /FUSION™ G7, PROLINE™ , Freestanding Type 12)
- Cable PG compression hub
- Wide operating temperature range: -49°F to +158°F (-45°C to 70°C)
- Rugged die-cast anodized zinc construction
- Connection 3 cage clamps for solid and stranded wire AWG 20-14 (0.5-2.5mm²)
- Protection class I (grounded)

BULLETIN: A80LT

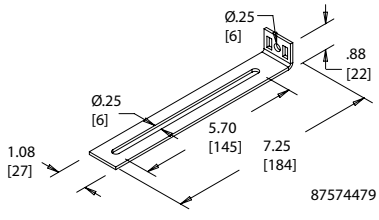
Catalog Number	Max. Cable Dia.	Max. Voltage
LDSWITCH	.375 in.	250 AC / 48 DC

MOUNTING BRACKET KIT FOR LIGHT PACKAGE

Kit simplifies mounting light package in Hoffman PROLINE™ disconnect enclosures. Includes brackets, all mounting hardware and complete instructions.

BULLETIN: A80LT

Catalog Number	Description
PDLFBRKT	Mounting Bracket Kit

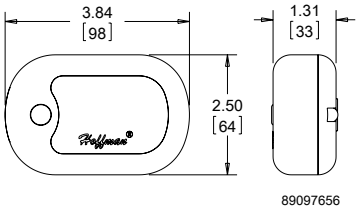


LED PUCK LIGHT

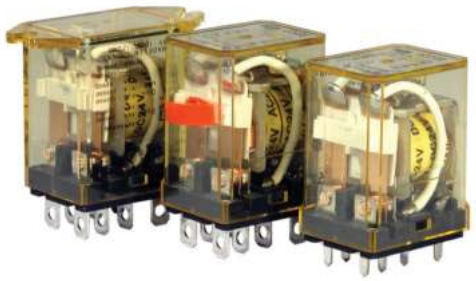
The LED Puck Light is ideal for remote and darkened applications. This versatile light provides mounting flexibility; it can be magnetically attached to flat steel surfaces or can be hung with a swivel hook. This small form factor, light-weight LED light provides superior lighting performance with minimal power consumption. It can be used as a three-LED flashlight or as a 24-LED work light with operating temperature of 40 F to 120 F (4 C to 48 C). An on/off switch is incorporated in the light and three AAA batteries are included.

BULLETIN: A80LT

Catalog Number	AxBxC in./mm	Product Weight
LEDPUCK	2.25 x 3.75 x 1.38 57 x 95 x 35	0.22 lbs.



RH Series - Compact Power Relays



- Small, industrial 10A General Purpose relay
- SPDT, DPDT, 3PDT, 4PDT contacts
- Options: Indicator LED, check-button, top-mounting and surge-suppression diodes
- DIN rail, through panel, and PCB-type sockets available
- SPDT and DPDT 500K cycle UL tested for maximum life expectancy
- RoHS compliant

RH 1 B – U L AC24V

Contact Configuration
1: SPDT
2: DPDT
3: 3PDT
4: 4PDT

Terminal Type
B: Blade (.187")
V2: PCB

Options
Blank: Standard Relay
L: Indicator Light
C: Check button
T: Top Mounting*
D: Diode (DC Coil Voltage Only)

Coil Voltage

AC6V	**DC6V**
AC12V	**DC12V**
AC24V	**DC24V**
AC120V	**DC48V**
AC240V	**DC110V**

*Diode, Indicator light, and check button not available with top mount option
1. For RH2B use AC110-120V
2. For RH2B use AC220-240V
3. For RH2B use DC100-110V

		RH1	RH2	RH3	RH4
Specs	Contact Material	Silver cadmium oxide (AgCdO)			
	Contact Rating	10A			
	Minimum Load (reference values)	30mA@24V DC, 100mA@5V DC			
	Dimensions (W x D x H) mm	14 x 27.5 x 42	21 x 27.5 x 42	31 x 27.5 x 42	41 x 27.5 x 42

		Standard DIN rail Mount	Finger-safe DIN rail Mount	Through Panel Mount	PCB Mount
					
Sockets (for Blade Terminal Models)	RH1B	SH1B-05	SH1B-05C	SH1B-51	SH1B-62
	RH2B	SH2B-05	SH2B-05C	SH2B-51	SH2B-62
	RH3B	SH3B-05	SH3B-05C	SH3B-51	SH3B-62
	RH4B	SH4B-05	SH4B-05C	SH4B-51	SH4B-62

		Relays / Sockets	Description	For DIN rail mount Socket	For Through Panel & PCB Mount Socket
Accessories	Hold Down Springs & Clips	RH1B	Pullover Wire Spring	SY2S-02F1	SY4S-51F1
		RH2B		SY4S-02F1	
		RH3B		SH3B-05F1	
		RH4B		SH4B-02F1	
	DIN rail	All DIN rail mount sockets	Aluminum DIN rail (1 meter length)	BNDN1000	–
			DIN rail End Stop	BNL-5	–

Top Selling RH Relays	
Part Number	Description
RH2B-ULAC24V	RH Relay, DPDT, with Indicator Light 24V AC
RH1B-ULAC24V	RH Relay, SPDT, with Indicator Light 24V AC
RH2B-UAC110-120V	RH Relay, DPDT, 110-120V AC
RH2B-UTAC110-120V	RH Relay, DPDT, Top Mount, 110-120V AC
RH2B-ULAC110-120V	RH Relay, SPDT, with Indicator Light, 110-120V AC
RH1B-UDC24V	RH Relay, SPDT, 24V DC
RH1B-UAC120V	RH Relay, SPDT, 120V AC
RH3B-ULAC24V	RH Relay, 3PDT, with Indicator Light, 24V AC
RH4B-ULAC120V	RH Relay, 4PDT, with Indicator Light, 120V AC
RH1B-UCDC24V	RH Relay, SPST, Check button, 24V DC

Switching Power Supplies
PS5R-V Series

STANDARDS COMPLIANCE

Applicable Standards	Mark	File No. or Organization
UL508 UL1310[1] ANSI/ISA 12.12.01 CSA C22.2 No.107.1 CSA C22.2 No.213 CSA C22.2 No.223[1]	c UL us	UL/c-UL Listed File No. E467154, E177168
EN60950-1 EN50178 EN61204-3 EN50581	TÜV	TÜV SÜD[2]
	CE	EU Low Voltage Directive, EMC Directive RoHS Directive
SEMI F47	—	EPRI

Note 1: PS5R-VA/VB/VC/VD/VE only
Note 2: EN60950-1, EN50178 only

PART NUMBERS

Output Capacity	Part Number	Input Voltage	Output Voltage	Output Current
7.5W	PS5R-VA05	100 to 240V AC (Voltage range: 85 to 264V AC / 100 to 370V DC)	5V	1.5A
	PS5R-VA12		12V	0.6A
	PS5R-VA24		24V	0.3A
10W	PS5R-VB05		5V	2.0A
15W	PS5R-VB12		12V	1.3A
	PS5R-VB24		24V	0.65A
30W	PS5R-VC12		12V	2.5A
	PS5R-VC24		24V	1.3A
60W	PS5R-VD24		24V	2.5A
90W	PS5R-VE24		24V	3.75A
120W	PS5R-VF24		24V	5.0A
240W	PS5R-VG24		24V	10.0A

Part Number Structure

PS5R - V □ □

Output Capacity
A: 7.5W
B: 10W/15W
C: 30W
D: 60W
E: 90W
F: 120W
G: 240W

Output Voltage
05: 5V[3]
12: 12V[4]
24: 24V

Note 3: PS5R-VA/VB only
Note 4: PS5R-VA/VB/VC only
Use only for interpreting part numbers.
Do not use for developing part numbers.

PRODUCT DESCRIPTION

DIN-rail mount switching power supplies with global approvals for both industrial and hazardous locations

KEY FEATURES

- Compact size preserves panel space
- Slim size (width):
  22.5mm (10W/15W/30W)
  36mm (60W/90W)
  46mm (120W)
  60mm (240W)
- Universal Voltage Input:
  85-264V AC/100-370V DC
- Wide operating temperature range
- Spring-up terminals accept ring & fork terminals
- Approved for use in Class I Division 2 hazardous locations
- Can be installed in 6 directions
- 10W ~ 90W meet NEC Class 2 output ratings
- Overcurrent protection with auto-reset
- Meets SEMI F47 Sag Immunity (208V AC input)
- RoHS compliant
- Five-year factory warranty

SPECIFICATIONS

Model		5V DC output	PS5R-VA05	PS5R-VB05	-	-	-	-	-
		12V DC output	PS5R-VA12	PS5R-VB12	PS5R-VC12	-	-	-	-
		24V DC output	PS5R-VA24	PS5R-VB24	PS5R-VC24	PS5R-VD24	PS5R-VE24	PS5R-VF24	PS5R-VG24
Output Capacity			7.5W	15W (5V Model is 10W)	30W	60W	90W	120W	240W
Input	Rated Input Voltage (Single-phase two-wire)[1]		100 to 240V AC (Voltage range: 85 to 264V AC/100 to 370V DC) (Load ≤ 80% at 100-105V DC)						
	Frequency		50/60 Hz						
	Input Current (Typ.)	100V AC	5V: 0.20A 12V, 24V: 0.18A	5V: 0.25A 12V, 24V: 0.35A	0.7A	1.3A	1.1A	1.4A	2.7A
		230V AC	5V: 0.12A 12V, 24V: 0.10A	5V: 0.14A 12V, 24V: 0.19A	0.3A	0.8A	0.6A	0.7A	1.2A
	Inrush Current (Typ.) (Ta=25°C, cold start)	100V AC	15A	18A					14A
		230V AC	36A	45A				41A	30A
	Leakage Current	120V AC	0.5mA max.						
		230V AC	1.0mA max.						
	Efficiency (Typ.) (at rated output)[2]	100V AC	5V: 74%, 12V: 79%, 24V: 80%	5V: 77%, 12V: 82%, 24V: 84%	12V: 83%, 24V: 85%	86%	88%		89%
		230V AC	5V: 73%, 12V: 77%, 24V: 76%	5V: 73%, 12V: 80%, 24V: 81%	12V: 85%, 24V: 87%	86%	89%		90%
	Power Factor (Typ.)	100V AC	—	—	—	—	0.99		
		230V AC	—	—	—	—	0.86	0.92	0.96
Output	Rated Voltage/Current		5V/1.5A, 12V/0.6A, 24V/0.3A	5V/2.0A[3], 12V/1.3A, 24V/0.65A	12V/2.5A, 24V/1.3A	24V/2.5A	24V/3.75A	24V/5A	24V/10A
	Adjustable Voltage Range		±10%				±5%	±10%	
	Output Holding Time (Typ.) (at rated output)	100V AC	45ms	5V: 53ms, 12V: 34ms, 24V: 36ms	12V: 13ms, 24V: 15ms	13ms	20ms	30ms	
		230V AC	285ms	5V: 330ms 12V: 215ms 24V: 230ms	12V: 110ms 24V: 110ms	105ms	30ms	33ms	40ms
	Start Time (at rated input and output)		500ms max.	500ms max.	600ms max.	800ms max.		700ms max.	800ms max.
	Rise Time (at rated input and output)		5V, 12V: 200ms max 24V: 250ms max	5V, 12V: 200ms max. 24V: 250ms max.	200ms max.				
	Regulation	Input Fluctuation	0.4% max.						
		Load Fluctuation	5V: 2.5% max. 12V, 24V: 1.0% max.		1.0% max.				
		Temperature Change	0.04%/°C max. (-10 to +65°C)	0.05%/°C max. (-10 to +65°C)	12V: 0.05%/°C max. (-10 to +50°C) 24V: 0.05%/°C max. (-10 to +55°C)	0.05%/°C max. (-10 to +55°C)	0.05%/°C max. (-10 to +50°C)	0.05%/°C max. (-25 to +55°C)	0.05%/°C max. (-25 to +50°C)
		Ripple (including noise)	5V: 8% p-p max. (-25 to -10°C) 12V: 6% p-p max. (-25 to -10°C) 24V: 4% p-p max. (-25 to -10°C)	5V: 8% p-p max. (-25 to -10°C) 12V: 6% p-p max. (-25 to -10°C) 24V: 4% p-p max. (-25 to -10°C)	12V: 6% p-p max. (-25 to -10°C) 24V: 4% p-p max. (-25 to -10°C)	4% p-p max. (-25 to -10°C)			
			5V: 5% p-p max. (-10 to +0°C) 12V: 2.5% p-p max. (-10 to +0°C) 24V: 1.5% p-p max. (-10 to +0°C)	5V: 5% p-p max. (-10 to +0°C) 12V: 2.5% p-p max. (-10 to +0°C) 24V: 1.5% p-p max. (-10 to +0°C)	12V: 2.5% p-p max. (-10 to +0°C) 24V: 1.5% p-p max. (-10 to +0°C)	1.5% p-p max. (-10 to +0°C)			
			5V: 2.5% p-p max. (0 to +65°C) 12V: 1.5% p-p max. (0 to +65°C) 24V: 1% p-p max. (0 to +65°C)	5V: 2.5% p-p max. (0 to +65°C) 12V: 1.5% p-p max. (0 to +65°C) 24V: 1% p-p max. (0 to +65°C)	12V: 1.5% p-p max. (0 to +50°C) 24V: 1% p-p max. (0 to +55°C)	1% p-p max. (0 to +55°C)	1% p-p max. (0 to +50°C)	1% p-p max. (0 to +55°C)	1% p-p max. (0 to +50°C)
Overcurrent Protection			105% min. (auto reset)				101% min. (auto reset)	105% min. (auto reset)	
Operation Indicator			LED (green)						
Dielectric Strength	Between input and output terminals		3,000V AC, 1 minute						
	Between input and ground terminals		2,000V AC, 1 minute						
	Between output and ground terminals		500V AC, 1 minute						
Insulation Resistance			Between input and output terminals: 100MΩ min. (500V DC megger) Between input and ground terminals: 100MΩ min. (500V DC megger)						
Operating Temperature[4] (No freezing)			-25 to +75°C		-25 to +70°C		-25 to +65°C		
Operating Humidity (no condensation)			20 to 90% RH						
Storage Temperature (No freezing)			-25 to +75°C						
Storage Humidity (no condensation)			20 to 90% RH						
Vibration Resistance			10 to 55Hz, amplitude 0.375mm, 2 hours each in 3 axes (when used with BNL6 end clips)			10 to 55Hz, amplitude 0.33mm, 2 hours each in 3 axes (when used with BNL6 end clips) 10 to 55Hz, amplitude 0.375mm, 2 hours each in 3 axes (when used with BNL8 end clips)		10 to 55Hz, amplitude 0.21mm, 2 hours each in 3 axes (when used with BNL6 end clips) 10 to 55Hz, amplitude 0.375mm, 2 hours each in 3 axes (when used with BNL8 end clips)	10 to 55 Hz, amplitude 0.375mm, 2 hours each in 3 axes (when used with part no. BNL6 mounting clips)
Shock Resistance			300 m/s^2 (30G), 3 times each in 6 directions						
Expected Life[5]			8 years minimum (at the rated input, 50% load, operating temperature +40°C, standard mounting direction)						
EMC	EMI		EN61204-3 (Class B)						
	EMS		EN61204-3 (industrial)						
Safety Standards			UL508 (Listing), UL1310 Class 2, ANSI/ISA-12.12.01 CSA C22.2 No. 107.1, 213, 223 EN60950-1, EN50178					UL508 (Listing) ANSI/ISA-12.12.01 CSA C22.2 No. 107.1, 213 EN60950-1, EN50178	
Other Standard			SEMI F47 (at 208V AC input only)						
Degree of Protection			IP20 (EN60529)						
Dimensions (mm)			75H × 45W × 70D	90H × 22.5W × 95D		95H × 36W × 108D		115H × 46W × 121D	125H × 60W × 125D
Weight (approx.)			130g	140g	150g	260g	310g	470g	960g
Terminal Screw			M3.5						

*At normal temperature and humidity unless otherwise specified.
Note 1: DC input voltage is not subject to safety standards. When using on DC input, connect a fuse to the input terminal for DC input protection.
Note 2: Under stable state.
Note 3: PS5R-VB05 (5V DC/2.0A) is 10W (Up to 3.0A at Ta = 0 to 40°C. Not subject to safety standards above 2.0A.)
Note 4: See the output derating curves.
Note 5: Calculation of the expected life is based on the actual life of the aluminum electrolytic capacitor. The expected life depends on operating conditions.

CLASS CC KLDR SERIES FUSES

600 Vac • 300 Vdc • Time-Delay • 1/10-30 A

Specifications

Voltage Rating	AC: 600 V
	DC: 300 V
Amperage Rating	1/10 – 30 A
Interrupting Rating	AC: 200 kA rms symmetrical
	DC: 20 kA
Material	Body: Melamine
	Caps: Nickel-plated Bronze
Fuse Weight	.019 lb (8.62g)
Approvals	AC: Standard 248-4, Class CC
	UL Listed 1/10-30 A (File: E81895)
	CSA Certified 1/10-30 A (File: LR29862)
	DC: Littelfuse self-certified
Environmental	RoHS Compliant
Country of Origin	Mexico

Description

KLDR fuses are time-delay fuses designed to protect control transformers, solenoids and similar inductive components with high magnetizing currents during the first half-cycle. They provide excellent protection of motor branch circuits containing IEC or NEMA rated motor controllers or contactors.

Features/Benefits

- Meets UL and CSA standards
- Class CC fuses are the smallest 600 V, 200,000 A.I.R. fuses approved for branch circuit protection
- Rejection feature prevents use of fuses with lower interrupting ratings or voltage ratings when used with corresponding fuse holders
- Extremely current limiting reduces damage caused by heating and magnetic effects of short-circuit currents

Applications

- Transformer Protection

Web Resources

For additional informations, visit:
littelfuse.com/kldr

Recommended Fuse Holders

L60030C Series
LPSC Touch-Safe Series

Ordering Information

AMPERAGE RATINGS				
1/10	6/10	1 8/10	4 1/2	10
1/8	3/4	2	5	12
15/100	8/10	2 1/4	5 6/10	15
3/16	1	2 1/2	6	17 1/2
2/10	1 1/8	2 8/10	6 1/4	20
1/4	1 1/4	3	7	25
3/10	1 4/10	3 2/10	7 1/2	30
4/10	1 1/2	3 1/2	8	—
1/2	1 6/10	4	9	—

Part Numbering System

KLDR xxx T XP

Series

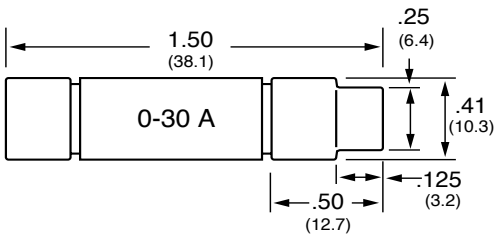
Amp Code
Refer to Amp Code Column in Electrical Specifications Table

Options
XP = RoHS Compliant

Package Quantity
T = 10
H = 100

SERIES	AMPERAGE	PACKAGE QUANTITY	CATALOG NUMBER	ORDERING NUMBER
KLDR	10	10	KLDR 10	KLDR010.TXP

Dimensions Inches (mm)



CLASS CC KLDR SERIES FUSES

Electrical Specifications

ORDERING NUMBER	AMPERAGE RATING	VOLTAGE RATING		INTERRUPTING RATING		UPC	MELT (PRE-ARC) I^2T (A^2SEC)	TOTAL CLEARING I^2T (A^2 SEC)	AGENCY APPROVALS		
		AC	DC	AC	DC				UL	CSA	RoHS
KLDR.100TXP	1/10	600	300	200 kA	20 kA	079458 96877	0.0004	0.0059	•	•	•
KLDR.125TXP	1/8	600	300	200 kA	20 kA	079458 96878	0.0007	0.0055	•	•	•
KLDR.150TXP	15/100	600	300	200 kA	20 kA	079458 96879	0.0016	0.0059	•	•	•
KLDR.187TXP	3/16	600	300	200 kA	20 kA	079458 96880	0.0040	0.0267	•	•	•
KLDR.200TXP	2/10	600	300	200 kA	20 kA	079458 79239	0.0018	0.0230	•	•	•
KLDR.250TXP	¼	600	300	200 kA	20 kA	079458 79240	0.0138	0.0967	•	•	•
KLDR.300TXP	3/10	600	300	200 kA	20 kA	079458 79241	0.0111	0.1005	•	•	•
KLDR.400TXP	4/10	600	300	200 kA	20 kA	079458 79242	0.0579	0.1420	•	•	•
KLDR.500TXP	½	600	300	200 kA	20 kA	079458 79243	0.0877	0.3121	•	•	•
KLDR.600TXP	6/10	600	300	200 kA	20 kA	079458 79244	0.1404	0.3742	•	•	•
KLDR.750TXP	¾	600	300	200 kA	20 kA	079458 79245	0.2911	1.972	•	•	•
KLDR.800TXP	8/10	600	300	200 kA	20 kA	079458 79246	0.2416	2.064	•	•	•
KLDR001.TXP	1	600	300	200 kA	20 kA	079458 79247	0.4494	5.883	•	•	•
KLDR1.12TXP	1-1/8	600	300	200 kA	20 kA	079458 79248	0.5049	5.149	•	•	•
KLDR1.25TXP	1-¼	600	300	200 kA	20 kA	079458 79249	0.4367	7.354	•	•	•
KLDR01.4TXP	1-4/10	600	300	200 kA	20 kA	079458 79250	0.8135	7.639	•	•	•
KLDR01.5TXP	1-½	600	300	200 kA	20 kA	079458 79251	0.9302	5.885	•	•	•
KLDR01.6TXP	1-6/10	600	300	200 kA	20 kA	079458 79252	0.7495	6.682	•	•	•
KLDR01.8TXP	1-8/10	600	300	200 kA	20 kA	079458 79253	0.9964	6.594	•	•	•
KLDR002.TXP	2	600	300	200 kA	20 kA	079458 79254	0.8615	14.01	•	•	•
KLDR2.25TXP	2-¼	600	300	200 kA	20 kA	079458 79255	1.126	26.41	•	•	•
KLDR02.5TXP	2-½	600	300	200 kA	20 kA	079458 79256	2.087	35.35	•	•	•
KLDR02.8TXP	2-8/10	600	300	200 kA	20 kA	079458 79257	21.28	45.47	•	•	•
KLDR003.TXP	3	600	300	200 kA	20 kA	079458 79258	23.21	55.99	•	•	•
KLDR03.2TXP	3-2/10	600	300	200 kA	20 kA	079458 79259	37.92	57.27	•	•	•
KLDR03.5TXP	3-½	600	300	200 kA	20 kA	079458 79260	21.42	109.4	•	•	•
KLDR004.TXP	4	600	300	200 kA	20 kA	079458 79261	83.81	258.6	•	•	•
KLDR04.5TXP	4-½	600	300	200 kA	20 kA	079458 79262	83.89	110.6	•	•	•
KLDR005.TXP	5	600	300	200 kA	20 kA	079458 79263	63.33	84.04	•	•	•
KLDR05.6TXP	5-6/10	600	300	200 kA	20 kA	079458 79264	87.66	114.0	•	•	•
KLDR006.TXP	6	600	300	200 kA	20 kA	079458 79265	129.5	161.9	•	•	•
KLDR6.25TXP	6-¼	600	300	200 kA	20 kA	079458 79266	147.6	261.7	•	•	•
KLDR007.TXP	7	600	300	200 kA	20 kA	079458 79267	202.4	513.4	•	•	•
KLDR07.5TXP	7-½	600	300	200 kA	20 kA	079458 79268	321.8	813.0	•	•	•
KLDR008.TXP	8	600	300	200 kA	20 kA	079458 79269	111.2	1,145	•	•	•
KLDR009.TXP	9	600	300	200 kA	20 kA	079458 79270	73.40	1,334	•	•	•
KLDR010.TXP	10	600	300	200 kA	20 kA	079458 79271	132.0	934.8	•	•	•
KLDR012.TXP	12	600	300	200 kA	20 kA	079458 79272	154.7	1,723	•	•	•
KLDR015.TXP	15	600	300	200 kA	20 kA	079458 79273	200.5	2,248	•	•	•
KLDR17.5TXP	17-½	600	300	200 kA	20 kA	079458 79274	87.50	722.8	•	•	•
KLDR020.TXP	20	600	300	200 kA	20 kA	079458 79275	123.8	1,363	•	•	•
KLDR025.TXP	25	600	300	200 kA	20 kA	079458 79276	226.0	1,710	•	•	•
KLDR030.TXP	30	600	300	200 kA	20 kA	079458 79277	299.6	1,990	•	•	•

DSN60 Switch-Rated Plugs & Receptacles – 60 A

UL/CSA Ratings

- **Max Amperage & Voltage**
  60 A, 600 VAC
- **Switch-Rating (AC Only)**
  Branch Circuit & Motor Circuit Disconnect Switching
- **Horsepower Ratings**

120V	1Ø	2 hp
240V	1Ø	3 hp
208V	3Ø	7.5 hp
240V	3Ø	7.5 hp
480V	3Ø	20 hp
600V	3Ø	20 hp

- **Short Circuit Rating**
  100kA Close & Withstand
  Testing was performed with RK1 current limiting fuses sized at 400% of the highest full load motor ampacity associated with the devices hp rating.
- **Environmental Ratings**
  Type 4X/IP69/IP69K*
  *Also meets IP66/IP67 requirements
- **Temperature Range**
  Min -40°F/Max 140°F
  See pg 258 for temps below -15°F.
- **Wiring Capacity**
  Min 12 AWG Max 4 AWG
  Aux Contacts - Max 14 AWG
- **Certifications**
  UL 2682, UL 1682, CSA 182.1

Receptacle (female)

Inlet (male)

! Don't forget to add installation accessories to your order

North American UL/CSA Configurations

Voltage	Polarity	Part # Poly	Part # Poly
120V	1P+N+G	63-64165	63-68165
120 208V	3P+N+G	63-64167	63-68167
125V	1P+N+G	63-64075	63-68075
125 250V	2P+N+G	63-64076	63-68076
208V	2P+G	63-64162	63-68162
208V	3P+G	63-64163	63-68163
250V	2P+G	63-64072	63-68072
250V	3P+G	63-64073	63-68073
277V	1P+N+G	63-64045	63-68045
277 480V	3P+N+G	63-64047	63-68047
347 600V	3P+N+G	63-64147	63-68147
480V	2P+G	63-64042	63-68042
480V	3P+G	63-64043	63-68043
600V	2P+G	63-64142	63-68142
600V	3P+G	63-64143	63-68143

For international configurations and ratings (IEC,CE) visit meltric.com/international-catalog or contact Customer Service at 800-433-7642.

Main Options

Auxiliary/Pilot Contacts

Mushroom Pawl

Padlock Pawl

Closed Lid Configuration
Recommended for cord applications to keep lid tucked in to avoid damage.

Receptacle Options	Suffix #
With 2 Auxiliary/Pilot Contacts	Recept # -972
With 3 Auxiliary/Pilot Contacts	Recept # -973
With 4 Auxiliary/Pilot Contacts	Recept # -974
Straight Insertion	Recept # -352
Self-Ejecting Connector Release**	Recept # -354
Mushroom Pawl	Recept # -375
Padlock Pawl	Recept # -843
Padlockable Mushroom Pawl	Recept # -375-843
Metal Pawl	Recept # -824
Closed Lid Configuration	Recept # -NC
With Auxiliary Switch	Recept # -270+

Notes: + Not UL/CSA listed.

Inlet Options	Suffix #
With 2 Auxiliary/Pilot Contacts	Inlet # -972
With 3 Auxiliary/Pilot Contacts	Inlet # -973
With 4 Auxiliary/Pilot Contacts	Inlet # -974
Self-Ejecting Plug Release**	Inlet # -338
With No Lockout Hole	Inlet # -A155
For Auxiliary Switch	Inlet # -NNF*

Notes: * Order inlet with P+N+G configuration and receptacle with P+G configuration.
** For self-ejecting connectors and plugs, a -443 suffix must be added to the handle part number. See pages 243-244 for more information.

! See pages 235-244 for detailed information on these options

Order Example: 480V DSN60 + 2 auxiliary contacts
DSN60 Inlet 3P+G = 63-68043-***972***

INSTALLATION ACCESSORIES – SIZE 3

Unless indicated otherwise, accessories can be used with either poly or metal plugs and receptacles.

HANDLES

HANDLE w/NPT		Part # Poly	Part # Metal
 Poly / Metal	1/2"	513P0N05	593P0N05
	3/4"	513P0N07	593P0N07
	1"	513P0N10	593P0N10
	1 1/4"	513P0N12	593P0N12

For available cord grips, see page 167. Add -443 for self-ejecting.

POLY HANDLE w/CORD GRIP	Cable Range	Part #
	.520 - .680"	713P0CP5
	.680 - .980"	713P0DP4
	.980 - 1.260"	713P0EP4

METAL HANDLE w/CORD GRIP		
	.625 - .750"	793P0CS4
	.750 - .875"	793P0DS1
	.875 - 1.000"	793P0DS3
	1.000 - 1.125"	793P0ES2

POLY HANDLE		
	.39 - 1.18"	513P0D30

POLY HANDLE w/BUILT IN DRAW GRIPS		
	.39 - 1.18"	513P0D30473
	Makes connector closures easier.	

POLY HANDLE w/CLAMP & BUSHING		
	.750 - .875"	713P0S14
	.875 - 1.000"	713P0S16
	1.000 - 1.125"	713P0S18
	1.125 - 1.250"	713P0S20
	1.250 - 1.375"	713P0S22

ANGLES

POLY ANGLE			
	30°	513M3	
	70°	513M7	Panel mounting only.

METAL ANGLE			
	0°	593M0	
	30°	593M3	
	FS/FD Box 30°	793M3FS	* Base measures approximately 4.2" x 2.7". Due to the variation in sizes of FS boxes, please verify that your FS box matches our dimensions, if not call Customer Service for other solutions.
	70°	593M7	

BOXES

POLY CONDUIT ENTRY w/NPT			Part #	
 * 13.5 in³	30°	1/2"	513B3N05	* Interior volume with receptacle installed.
	30°	3/4"	513B3N07	
	30°	1"	513B3N10	

POLY WALL BOX w/ANGLE				
 * 179.41 in³	70°		513C7000	70° poly boxes are not drilled. Contact Customer Service if factory drilled is required.
		Ground Bar	51AA089	* Interior volume with receptacle installed.

POLY ANGLE WITH METAL BOX w/NPT				
 * 177.7 in³	70°	1/2"	713C7N05	* Interior volume with receptacle installed.
	70°	3/4"	713C7N07	
	70°	1"	713C7N10	
	70°	1 1/4"	713C7N12	
	70°	1 1/2"	713C7N15	

METAL BOX w/NPT			
	0°	1/2"	7T1F0N05
	0°	3/4"	7T1F0N07
	0°	1"	7T1F0N10
	0°	1 1/4"	7T1F0N12

POLY ANGLE WITH METAL BOX w/NPT				
 * 29.6 in³	30°	1/2"	713C3N05	* Interior volume with receptacle installed.
	30°	3/4"	713C3N07	
	30°	1"	713C3N10	
	30°	1 1/4"	713C3N12	

NPT on top or bottom (if rotated). For other NPT configurations, contact Customer Service.

MISCELLANEOUS ACCESSORIES

FINGER DRAWPLATES		
	61-6A346	Set of Two (2) Recommended for cord to cord assembly applications, for easier connector closure.

PROTECTIVE INLET/PLUG CAP		
	61-6A426	For Inlets/Plugs Only.

PADLOCKABLE INLET/PLUG CAP		
	61-6A826	For Inlets/Plugs Only.

SPRING-LOADED PADLOCKABLE INLET/PLUG CAP		
	61-6A226	Metal – For Inlets/Plugs Only. -A155 suffix required to maintain water ingress protection.

CORD GRIP with or w/o MESH		
	see pg 167	

RECEPTACLE LOCKING PIN		
	LP-843	Requires Padlockable Pawl option (-843) on receptacle.

N-TRON
THE INDUSTRIAL NETWORK COMPANY

104TX

The N-Tron® 104TX is a low cost unmanaged four port Industrial Ethernet Switch. It is housed in a hardened, metal, DIN-Rail enclosure, and is designed for use in mission critical data acquisition, control, and Ethernet I/O applications.

PRODUCT FEATURES

- Compact, Space Saving Package
- Full IEEE 802.3 Compliance
- American Bureau of Shipping (ABS) Type Approval
- EN50155 for Railway applications
- Four 10/100BaseTX RJ-45 Ports
- Unmanaged Operation
- Extended Environmental Specifications
  - -40ºC to 80º Operating Temperature
  - >2M Hours MTBF
- Supports Full/Half Duplex Operation
- Up to 800 Mb/s Maximum Throughput
- MDIX Auto Sensing Cable
- Auto Sensing Speed and Flow Control
- Full Wire Speed Communications
- Store-and-forward Technology
- Redundant Power Inputs (10-30 VDC)
- LED Link/Activity Status Indication
- Hardened Metal DIN-Rail Enclosure

PRODUCT OVERVIEW

The 104TX Industrial Network Switch is designed to solve the most demanding industrial communication requirements while providing high throughput and minimum downtime.

The 104TX provides four RJ-45 auto sensing 10/100BaseTX ports. All ports are full/half duplex capable, using "state of the art" Ethernet switching technology. The 104TX auto-negotiates the speed and flow control capabilities of the four TX port connections, and configures itself automatically. Since the 104TX is auto sensing, there will be no need to make extensive wiring changes if upgrades are made to the host computers, plant systems, or Ethernet I/O modules. The switching fabric simply scales up or down automatically to match specific network environments.

The 104TX supports up to 2,000 MAC addresses, enabling these products to support extremely sophisticated and complex network architectures.

The 104TX is an ideal candidate for upgrading existing hubs and repeaters to increase bandwidth and determinism by virtually eliminating network collisions. The N-Tron 104TX combines affordability and the plug & play simplicity of the unmanaged hub.

The 104TX can simplify plant wiring by eliminating the need to bring data acquisition and control network connections back to a climate controlled environment.

The 104TX has extended operating environmental specifications to meet the harsh needs of the industrial environment. For cost savings and convenience the network switch can be DIN-Rail mounted alongside Ethernet I/O or other Industrial Equipment.

To increase reliability the 104TX provides dual redundant power inputs. LED's are provided to display the link status and activity of each port.

N-TRON
THE INDUSTRIAL NETWORK COMPANY

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
ISO 9001:2008

104TX SPECIFICATIONS

Case Dimensions

Height:	2.9"	(7.3cm)
Width:	1.5"	(3.8 cm)
Depth:	3.6"	(9 cm)
Weight:	0.6 lbs.	(0.28 kg)
DIN-Rail:	35mm	

Electrical

Input Voltage:	10-30 VDC
Steady Input Current:	215mA@24V
Inrush:	7.8Amp/0.7ms@24V

Environmental

Operating Temperature:	-40°C to 80°C
Storage Temperature:	-40°C to 85°C
Operating Humidity:	10% to 95% (Non Condensing)
Operating Altitude:	0 to 10,000 ft.

Reliablity

MTBF:	>2 Million Hours

Network Media

10BaseT:	>Cat3 Cable
100BaseTX:	>Cat5 Cable

Connectors

10/100BaseTX:	Four (4) RJ-45 TX Copper Ports

Recommended Wiring Clearance

Front:	2" (5.08 cm)
Top:	1" (2.54 cm)

BENEFITS

Industrial Network Switch

- Compact Size / Small Footprint
- Extended Environmental Specifications
- Hardened Metal DIN-Rail Enclosure
- High Performance
- High MTBF >2M Hours
- ESD Protection Diodes on RJ-45 Ports
- Surge Protection Diodes on Power Inputs

Ease of Use

- Plug & Play Operation
- Auto Sensing 10/100BaseTX
- Auto Negotiation Full/Half Duplex
- MDIX Auto Cable Sensing
- Unmanaged Operation

Increased Performance

- Full Wire Speed Capable
- Full Duplex Capable
- Eliminates Network Collisions
- Increases Network Determinism

Regulatory Approvals

FCC Title 47 Part 15 Class A; ICES-003-Class A
CE: EN61000-6-2,4; EN61000-4-2,3,4,5,6; EN55011
UL Listed (US and Canada) per ANSI/ISA-12.12.01-2007, Class I, Div 2, Groups A,B,C,D,T4A
ABS Type Approval for Shipboard Applications
DNV Type Approval Certification
EN50155 for Railway Applications
RoHS Compliant; GOST-R Certified

Designed to comply with:
IEEE 1613 for Electric Utility Substations;
and NEMA TS1/TS2 for Traffic Control Equipment

www.N-Tron.com

N-TRON
THE INDUSTRIAL NETWORK COMPANY

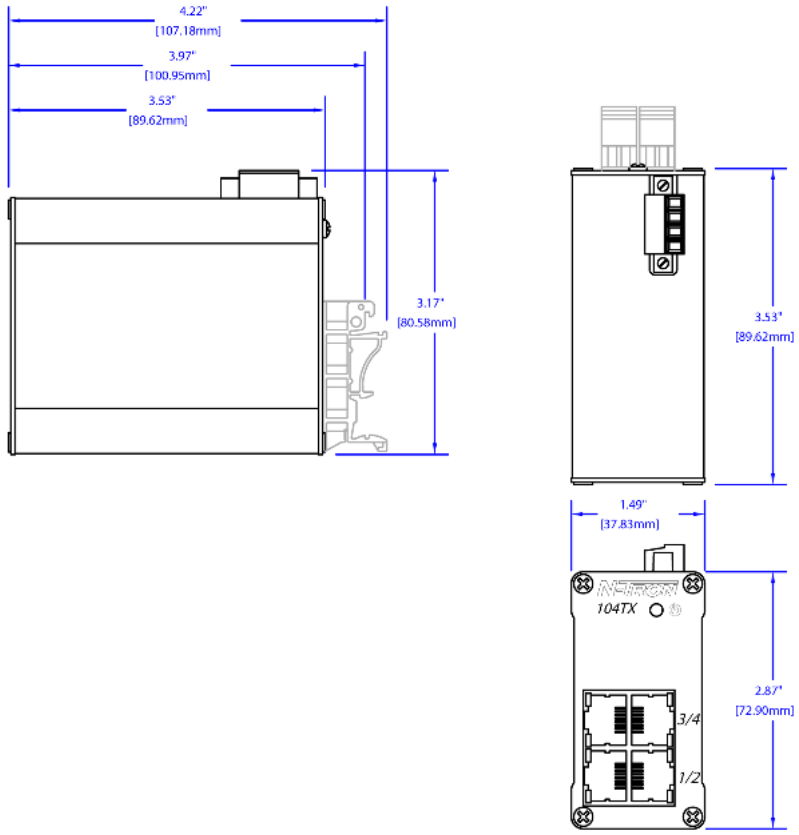
QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
ISO 9001:2008

Ordering Information

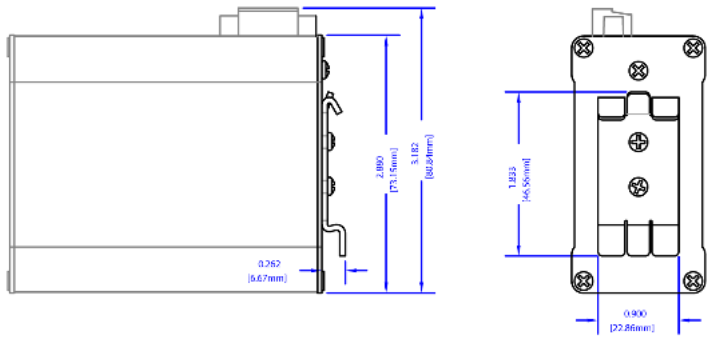
104TX	Four 10/100BaseTX Ports with isolated DIN Rail Mount
104TX-MDR	Four 10/100BaseTX Ports with Metal DIN Rail Mount (MDR) option*
NTPS-24-1.3	DIN-Rail Power Supply 24V@1.3 Amp
1000-PM	Panel Mount Option**

* MDR option must be specified with switch order - not field upgradable
**1000-PM Panel mount kit requires the MDR Metal DIN Rail option.

104TX with Standard DIN rail Mount



Optional MDR Metal DIN Rail Mount



Fuse modular terminal block - UT 4-HESILED 24 (5X20) - 3046090

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Lever-type fuse terminal block, black, for 5 x 20 mm G fuse inserts, with LED for 24 V DC

Product Features

- An extremely compact design
- Test connection on both sides in safety lever
- Tested for railway applications

Key Commercial Data

Packing unit	1 pc
Weight per Piece (excluding packing)	18.42 g
Custom tariff number	85369085
Country of origin	Germany

Technical data

General

Note	The current is determined by the fuse used, the voltage by the selected LED. If the fuse is faulty, the downstream circuit will not be disconnected.
Number of levels	1
Number of connections	2
Nominal cross section	4 mm²
Color	black
Insulating material	PA
Flammability rating according to UL 94	V0
Area of application	Railway industry
	Mechanical engineering
	Plant engineering
Fuse	G / 5 x 20
Fuse type	Glass
Rated surge voltage	6 kV

Fuse modular terminal block - UT 4-HESILED 24 (5X20) - 3046090

Technical data

General

Pollution degree	3
Overvoltage category	III
Insulating material group	I
Maximum power dissipation	max. 1.6 W (With single arrangement of the fuse terminal block in the event of overload)
LED voltage range	12 V AC/DC ... 30 V AC/DC
LED current range	0.31 mA ... 0.95 mA
Connection in acc. with standard	IEC 60947-7-3
Maximum load current	6.3 A (the current is determined by the fuse used)
Nominal current I_N	6.3 A
Nominal voltage U_N	24 V
Open side panel	nein

Dimensions

Width	6.2 mm
Length	57.8 mm
Height NS 35/7,5	73 mm
Height NS 35/15	80.5 mm

Connection data

Conductor cross section solid min.	0.14 mm²
Conductor cross section solid max.	6 mm²
Conductor cross section flexible min.	0.14 mm²
Conductor cross section flexible max.	6 mm²
Conductor cross section AWG min.	26
Conductor cross section AWG max.	10
Conductor cross section flexible, with ferrule without plastic sleeve min.	0.14 mm²
Conductor cross section flexible, with ferrule without plastic sleeve max.	4 mm²
Conductor cross section flexible, with ferrule with plastic sleeve min.	0.14 mm²
Conductor cross section flexible, with ferrule with plastic sleeve max.	4 mm²
2 conductors with same cross section, solid min.	0.14 mm²
2 conductors with same cross section, solid max.	1.5 mm²
2 conductors with same cross section, stranded min.	0.14 mm²
2 conductors with same cross section, stranded max.	1.5 mm²
2 conductors with same cross section, stranded, ferrules without plastic sleeve, min.	0.14 mm²
2 conductors with same cross section, stranded, ferrules without plastic sleeve, max.	1.5 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, min.	0.5 mm²

Fuse modular terminal block - UT 4-HESILED 24 (5X20) - 3046090

Technical data

Connection data

2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max.	2.5 mm²
Connection method	Screw connection
Stripping length	9 mm
Internal cylindrical gage	A4
Screw thread	M3
Tightening torque, min	0.6 Nm
Tightening torque max	0.8 Nm

Classifications

eCl@ss

eCl@ss 4.0	27141116
eCl@ss 4.1	27141116
eCl@ss 5.0	27141116
eCl@ss 5.1	27141116
eCl@ss 6.0	27141116
eCl@ss 7.0	27141116
eCl@ss 8.0	27141116

ETIM

ETIM 2.0	EC000897
ETIM 3.0	EC000899
ETIM 4.0	EC000899
ETIM 5.0	EC000899

UNSPSC

UNSPSC 6.01	30211811
UNSPSC 7.0901	39121410
UNSPSC 11	39121410
UNSPSC 12.01	39121410
UNSPSC 13.2	39121410

Approvals

Approvals

Fuse modular terminal block - UT 4-HESILED 24 (5X20) - 3046090

Approvals

Approvals

CSA / UL Recognized / KEMA-KEUR / cUL Recognized / LR / GL / RS / IECEE CB Scheme / DNV / EAC / cULus Recognized

Ex Approvals

Approvals submitted

Approval details

CSA

	B	C
mm²/AWG/kcmil	26-10	26-10
Nominal current IN	6.3 A	6.3 A
Nominal voltage UN	24 V	24 V

UL Recognized

	B	C
mm²/AWG/kcmil	26-10	26-10
Nominal current IN	6.3 A	6.3 A
Nominal voltage UN	600 V	600 V

KEMA-KEUR

mm²/AWG/kcmil	0.14-4
Nominal current IN	6.3 A
Nominal voltage UN	24 V

Fuse modular terminal block - UT 4-HESILED 24 (5X20) - 3046090

Approvals

cUL Recognized

	B	C
mm²/AWG/kcmil	26-10	26-10
Nominal current IN	6.3 A	6.3 A
Nominal voltage UN	600 V	600 V

LR

GL

RS

IECEE CB Scheme

mm²/AWG/kcmil	0.14-4
Nominal current IN	6.3 A
Nominal voltage UN	24 V

DNV

EAC

cULus Recognized

Ex REPEATER / POWER SUPPLY

- **1- or 2-channel version**
- **3- / 5-port 3.75 kVAC galvanic isolation**
- **Loop supply > 17.1 V in Ex area**
- **20 programmable measurement ranges**
- **Universal supply by AC or DC**

Application:

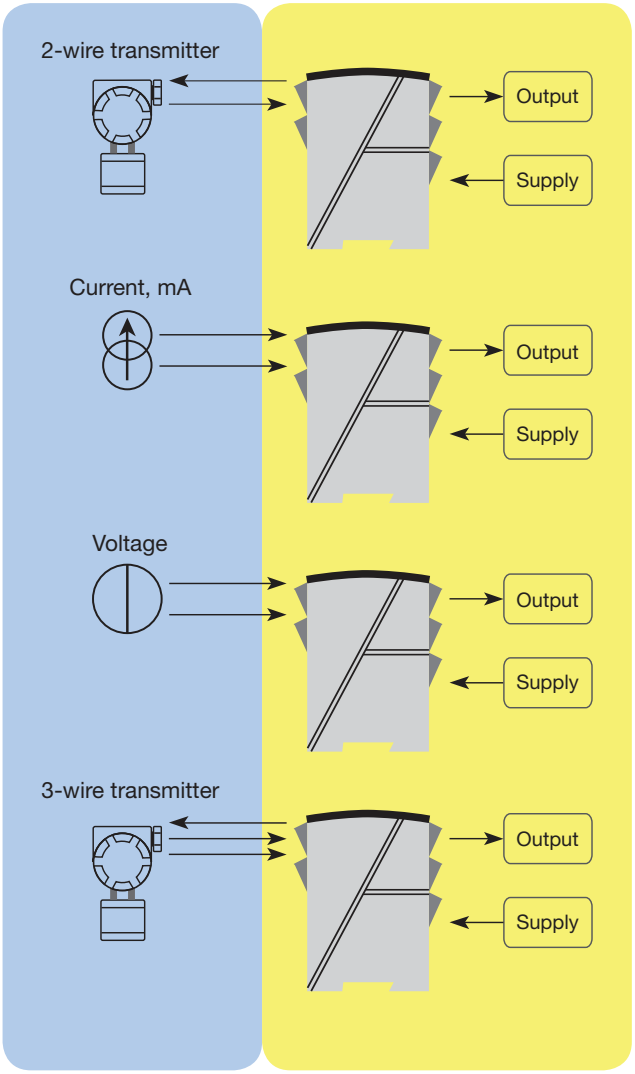
- Supply voltage and safety barrier for 2-wire transmitters mounted in a hazardous area.
- Safety barrier for analogue current / voltage signals from a hazardous area.
- 1 : 1 or signal conversion of analogue current / voltage signals.

Technical characteristics:

- The 20 factory-calibrated measurement ranges in the 5104B can be selected by the internal DIP-switches without the need for recalibration. Special measurement ranges can be delivered.
- PR5104B is based on microprocessor technology for gain and offset. The analogue signal is transmitted at a response time of less than 25 ms.
- Inputs, outputs, and supply are floating and galvanically separated.
- The output can be connected either as an active current / voltage transmitter or as a 2-wire transmitter.

Mounting / installation:

- Mounted vertically or horizontally on a DIN rail. By way of the 2-channel version up to 84 channels per metre can be mounted.
- **NB:** 5104B is recommended as Ex barrier for 5331B, 5333B, 5334B, 5343B, 6331B, 6333B, and 6334B.



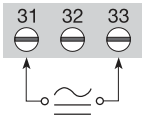
PR electronics
DS CERTIFIED QUALITY SYSTEM AND ENVIRONMENTAL MANAGEMENT SYSTEM DS/EN ISO 9001 DS/EN ISO 14001
Lerbakken 10 · DK-8410 Rønde
Tel. +45 8637 2677 · Fax +45 8637 3085
www.prelectronics.dk

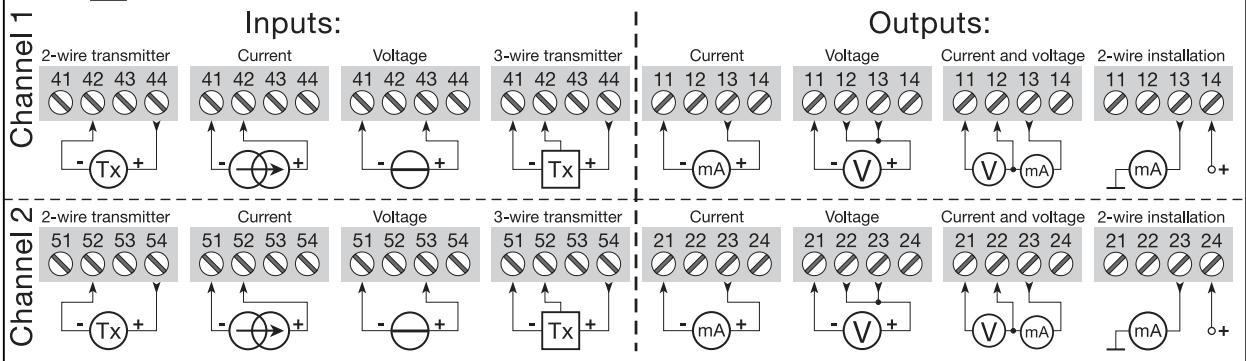
Order: 5104B

Type	Input	Output	Channels
5104B	0…20 mA : A 4…20 mA : B 0…10 V : E 2…10 V : F Special : X	Special : 0 0…20 mA : 1 4…20 mA : 2 0…1 V : 4 0.2…1 V : 5 0…10 V : 6 2…10 V : 7	Single : A Double : B

Connections:

Supply:





Electrical specifications:

Specifications range:
-20°C to +60°C

Common specifications:

Supply voltage, universal	21.6...253 VAC 50...60 Hz or 19.2...300 VDC
Internal consumption	≤ 2 W (2 channels)
Max. consumption	≤ 3 W (2 channels)
Fuse	400 mA SB / 250 VAC
Isolation voltage, test / operation	3.75 kVAC / 250 VAC
Signal / noise ratio	Min. 60 dB (0...100 kHz)
Response time (0...90%, 100...10%)	< 25 ms
Calibration temperature	20...28°C

Accuracy, the greater of the general and basic values:

General values		
Input type	Absolute accuracy	Temperature coefficient
All	≤ ±0.1% of span	≤ ±0.01% of span / °C

Basic values		
Input type	Basic accuracy	Temperature coefficient
mA	≤ ±16 µA	≤ ±1.6 µA/°C
Volt	≤ ±8 mV	≤ ±0.8 mV/°C

EMC immunity influence	< ±0.5% of span
Extended EMC immunity:	
NAMUR NE 21, A criterion, burst	< ±1% of span

Auxiliary supply:	
Loop supply (pin 44...42 and 54...52)	28...17.1 VDC / 0...20 mA
Max. wire size	1 x 2.5 mm² stranded wire
Screw terminal torsion	0.5 Nm
Relative humidity	< 95% RH (non-cond.)
Dimensions (HxWxD)	109 x 23.5 x 130 mm
DIN rail type	DIN 46277
Protection degree	IP20
Weight	225 g

Current input:

Measurement range	0...20 mA
Min. measurement range (span)	16 mA
Max. offset	20% of max. value
Input resistance	Nom. 10 Ω + PTC 10 Ω

Voltage input:

Measurement range	0...10 VDC
Min. measurement range (span)	8 VDC
Max. offset	20% of max. value
Input resistance	> 2 MΩ

Current output and 2-wire 4...20 mA output:

Signal range (span)	0...20 mA
Min. signal range (span)	16 mA
Max. offset	20% of max. value
Load (max.)	20 mA / 600 Ω / 12 VDC
Load stability	≤ 0.01% of span / 100 Ω
Current limit	≤ 28 mA
Max. external loop supply	29 VDC
Effect of external loop supply voltage change	< 0.005% of span / V

Voltage output:

Signal range (span)	0...1 VDC / 0...10 VDC
Min. signal range (span)	0.8 VDC / 8 VDC
Max. offset	20% of max. value
Load (min.)	500 kΩ

EEx / I.S. approval:

DEMKO 99ATEX126013	II (1) GD [EEx ia] IIC
Applicable in zone	0, 1, 2, 20, 21 or 22

Ex / I.S. data:

U_m	: 250 V
U_o	: 28 VDC
I_o	: 93 mADC
P_o	: 0.65 W
L_o	: 3 mH
C_o	: 0.08 µF

UL, applicable in zone	IS, Cl. I, Div. 1, Gr. A, B, C, D IS, Cl. I, zone 0 / 1, Gr. IIC IS, Cl. II, Div. 1 Gr. E, F, G
UL Control Drawing No.	5104QU01

Marine approval:

Det Norske Veritas, Ships & Offshore	Stand. for Certific. No. 2.4

GOST R approval:

VNIIFTRI, Cert No.	See homepage

Observed authority requirements:	**Standard:**
EMC 2004/108/EC	EN 61326-1
LVD 2006/95/EC	EN 61010-1
PELV/SELV	IEC 364-4-41 and EN 60742
ATEX 94/9/EC	EN 50014, EN 50020 and EN 50281-1-1
UL	UL 913, UL 508

Of span = Of the presently selected range

UB10.241

24V, 10A, DC-UPS

DC-UPS Control Unit

- Requires Only One 12V Battery for a 24V Output
- Stable Output Voltage in Buffer Mode
- Superior Battery Management for Longest Battery Life
- Comprehensive Diagnostic and Monitoring Functions
- Replace Battery Signal Included
- Electronically Overload and Short Circuit Protected
- 50% Power Reserves
- Selectable Buffer Time Limiter
- 3 Year Warranty

Product Description

This uninterruptible power supply (UPS) controller UB10.241 is an addition to standard 24V power supplies to bridge power failures or voltage fluctuations. Expensive downtimes, long restart cycles and loss of data can be avoided.

The DC-UPS includes a professional battery management system which charges and monitors the battery to achieve the longest battery service life as well as many diagnostic functions that ensure a reliable operation of the entire system.

A unique feature of the UB10.241 is that only one 12V battery is required to buffer the 24V output. This makes matching batteries unnecessary and allows a precise battery charging and testing.

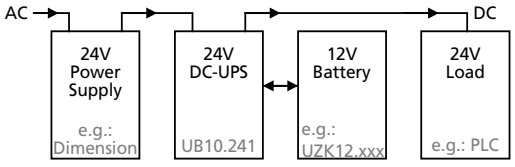
The UB10.241 requires one external 12V battery for which two preassembled battery modules are available. A lightweight 7Ah battery which can be mounted on the DIN rail and a 26Ah module that can be panel mounted for longer buffer times.

In addition to the UB10.241, the UBC10.241 UPS includes the same controller with an integrated 5Ah battery.

Short-form Data

Input voltage	nom. 24Vdc	
range	22.5-30Vdc	
Output current	min.15A	Normal mode
	min.10A	Buffer mode
Output voltage	typ. 0.23V lower as input voltage	Normal mode
	22.25V	Buffer mode, 10A
Allowed batteries	3.9Ah to 40Ah	VRLA lead acid
Temperature range	-25 to +70°C	Operational
Derating	0.43A/°C	+60°C to +70°C normal mode
Dimensions	49x124x117mm	WxHxD
Buffer time	typ. 6'45"	7Ah battery module
(at 10A)	typ. 55'	26Ah battery module

Typical setup of a DC-UPS system with the UB10.241:



Order Numbers

DC-UPS	**UB10.241**	Standard controller
Accessory	UZK12.072	Battery module 12V 7Ah
	UZO12.072	Mounting kit w/o battery
	UZK12.261	Battery module 12V 26Ah
	UZO12.26	Mounting kit w/o battery
	ZM1.WALL	Panel/Wall mount bracket
	ZM10.WALL	Panel/Wall mount bracket

Main Approvals

For details and the complete approval list, see chapter19.

UL 508 — UL 60950-1 — Class I Div 2

Marine — Marine

BR/SUxxxUC Series
UL 489 and UL 1077 – AC/DC Rated Miniature Circuit Breakers

Circuit Protection

Weidmüller

Engineered Protection for Automation and Process Applications
- Thermal magnetic
- Available for B, C or D curve characteristics
- Common amperage values available 1A to 63A (see back page)

Design Flexibility
- 1-, 2- and 3-pole options
- Optional accessory modules for signalling, change-over and remote tripping
- Optional cuttable busbars and busbar accessories

Robust and Reliable
Wide operating temperature from -35°C...+70°C

Easy Accessory Connection
Snap-together construction
(No screws or extra parts needed)

Global Approvals
UL, CSA, IEC, CE

Industries
- Pharmaceutical and Food
- Chemical, Oil and Gas
- Automotive Manufacturing
- Rail Vehicles

UL 489

UL 1077

BR and SU Part Number Nomenclature

BR or SU **2** **D** **60** **UC**

- BR or SU: BR = Branch Rated Circuit Breakers; SU = Supplementary Protectors
- 2: No. of Poles = 1, 2 or 3
- D: Curve = B, C or D
- 60: Rated Amps = 1, 1.2, 1.5, 1.6, 2, 3, 4, 5, 6, 7, 8, 10, 12, 13, 15, 16, 20, 25, 30, 32, 35, 40, 50, 60, 63
- UC: AC/DC Rated

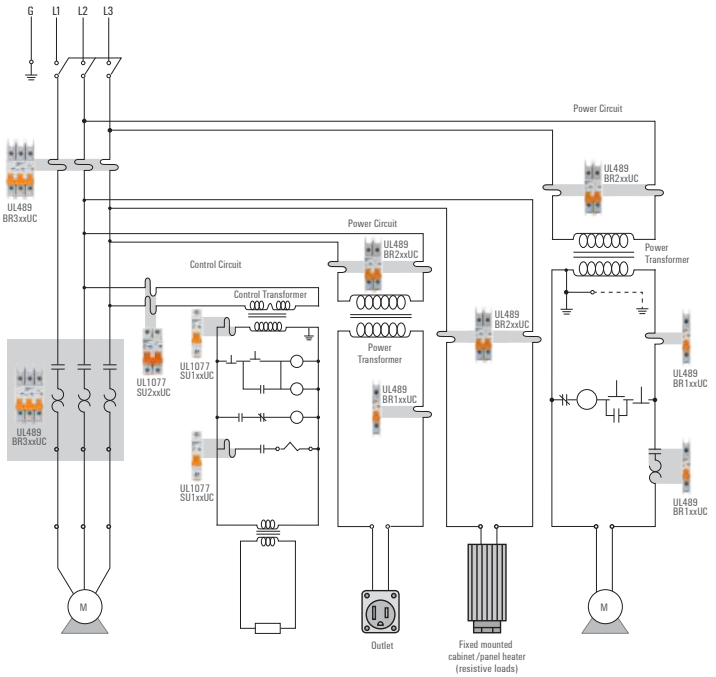
Sample Part Number

Branch Rated	Description
BR1B10UC	MCB 489 1P B 10A ACDC
Supplementary Protectors	**Description**
SU3D20UC	MCB 1077 3P D 20A ACDC

Sample Cuttable Busbars for UL 489 and UL 1077 Circuit Breakers

No. of Poles	No. of Devices	No. of Pins	Description	Part Number
1-Pole	57	57	MCB BUS BAR UL489 1 POLE 57 PIN	BRBB157
			MCB BUS BAR UL1077 1 POLE 57 PIN	SB157
2-Pole	28	56	MCB BUS BAR UL489 2 POLE 56 PIN	BRBB256
			MCB BUS BAR UL1077 2 POLE 56 PIN	SB256
3-Pole	19	57	MCB BUS BAR UL489 3 POLE 57 PIN	BRBB357
			MCB BUS BAR UL1077 3 POLE 57 PIN	SB357
3-Pole with Auxiliary Module Spacing	16	48	MCB BUS BAR UL489 3 POLE 48 PIN AUX	BRBB348A
			MCB BUS BAR UL1077 3 POLE 48 PIN AUX	SB3A48

Typical Installation



Accessory Modules

Type	Description	Part Number
Auxiliary Contact	MCB AUX Contact 1NC	BAU10UC
Bell Alarm Contact	MCB Bell Alarm Contact 1NC/1NO	BAU11UC
Shunt Trip	MCB SHUNT 1NC/1NO 24VDC	BST24VDC
	MCB SHUNT 1NC/1NO 120VAC	BST120VAC

Busbar Accessories for UL 489 Cuttable Busbars

Description	Part Number
Feeder Terminal, UL 489, 115 A	BRBBPWR35
Endcap for UL 489 Cuttable Busbar	BRBBECAP
Protective Cap for UL 489 cuttable busbar, 3 caps per bar	BRBBPCAP
Lock-on, Lock-off Device	LD10

For UL 1077 Supplementary Busbar Accessories see LIT1617 Product Guide

Information

Information is available for download on the web at **www.weidmuller.com.**

Ref. No.	Description
LIT1617	BR/SUxxxUC Series Product Guide

Weidmuller, Mexico
Blvd. Hermanos Serdán 698,
Col. San Rafael Oriente
Puebla, Puebla, Mexico
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Weidmuller, Canada
10 Spy Court
Markham, Ontario L3R 5H6
Telephone: (800) 268-4080
Facsimile: (905) 475-2798
Email: info1@weidmuller.ca
Website: www.weidmuller.ca

Weidmuller, United States
821 Southlake Blvd.
Richmond, Virginia 23236
Telephone: (800) 849-9343
Facsimile: (804) 379-2593
Email: info@weidmuller.com
Website: www.weidmuller.com

BR and SU Series

Description

1-, 2- and 3-pole thermal-magnetic miniature circuit breakers (MCBs) in accordance with EN 60947-2, UL 1077 and UL 489 for DIN-rail mounting, with toggle actuation, visual status indication and high rupture capacity. A positively trip-free snap action mechanism ensures reliable switching behavior. A range of trip characteristics and add-on modules allow a great variety of applications.

Typical Applications

- Protection of cables, motors, generators and transformers, thyristors and silicon rectifiers.
- Protection of computers and their peripheral equipment, industrial process control systems, telecommunications equipment, power supplies.

BR Series UL 489 version

SU Series IEC/EN60947-2 & UL 1077 version

Technical Data

Voltage rating and current rating range	
to IEC/EN 60947-2	1-pole: AC 240 V; 1 A...63 A; 2 and 3-pole: AC 415 V, 1 A...63 A
	1-pole: DC 80 V, 1 A...63 A
	2-pole: (2 poles connected in series) DC 125 V, 1...63 A
to UL 1077	1-pole: AC 277 V; 1 A...63 A; 2 and 3-pole: AC 480Y/277 V, 1 A...63 A
	1-pole: DC 60 V; 1 A...63 A
	2-pole (2 poles connected in series): DC 125 V; 1 A...63 A
to UL 489	1-pole: AC 120 V; 1 A...63 A; 2 and 3-pole: AC 240 V, 1 A...63 A; 1-pole: AC 277 V; 1 A...32 A; 2 and 3-pole: AC 480Y/277 V; 1 A...32 A;
	1-pole: DC 60 V; 1 A...63 A
	2-pole (2 poles connected in series); DC 125 V; 1 A...63 A
Typical life	
Mechanically	20,000 cycles
Electrically	6,000 cycles
Interupt capacity	
to IEC/EN 60947-2 (Ics)	AC 7,500 A / DC 10,000 A
to IEC/EN 60947-2 (Icu)	AC/DC 10,000 A
to UL 489	AC/DC 10,000 A

to UL1077

Number of poles	Un	In	TC	OL	SC
1-pole	AC 240 V	1...63 A	1	1	7.5 kA, U1
1-pole	AC 277 V	1...63 A	1	0	5 kA, U1
2-, 3-pole	AC 480 V	1...63 A	1	1	5 kA, U1
1-pole	DC 60 V	1...63 A	1	0	7.5 kA, U1
2-pole in series	DC 125 V	1...63 A	1	0	7.5 kA, U1

Insulation coordination	6 kV/3 (reinforced insulation at operating area)
Degree of protection	IP20
Vibration (sinusoidal) test to IEC 60068-2-6, test Fc	± 0.38 mm (10–57 Hz), 5 g (57–500 Hz) 10 frequency cycles per axis
Shock, test to IEC 60068-2-27, test Ea	30 g (11 ms)
Corrosion, test to IEC 60068-2-11, test Ka	96 hrs in 5% salt mist
Humidity, test to IEC 60068-2-78, test Cab	48 hours at 95% RH, temperature +40°C
Terminals	screw terminals; Vertical connection possible by means of busbars
Tightening torque	2 Nm max.
Cable cross section	≤35 mm²
Ambient temperature	-35°C...+70°C
Mounting	rail mounting
Mass	approx. 116 g per pole (EN 60947-2/ UL 1077) approx. 131 g per pole (UL 489)

Approvals

Approval authority	Standard	Rated voltage	Current ratings
TÜV	IEC/EN 60947-2	AC 240/415 V DC 80 V DC 125 V	1...63 A 1...63 A (1-pole) 1...63 A (2 poles in series)
UL	UL 1077 / CSA-C22.2 No. 235	AC 480Y/277 V DC 60 V DC 125 V	1...63 A 1...63 A (1-pole) 1...63 A (2 poles in series)
UL	UL 489 / CSA-C22.2 No. 5	AC 240 V AC 480Y/277 V DC 60 V DC 125 V	1...63 A 1...32 A 1...63 A (1-pole) 1...63 A (2 poles in series)

For information on Weidmuller's UL Certifications, visit the UL Online Certifications Directory and search by the UL file numbers E359481, E362204 and E359964.

BR Series Product Selection

x = B, C, or D Curve
(See Curve Drawings on page 9 and 10)

Amps	1 Pole		2 Pole		3 Pole	
1	**BR1x1UC**	MCB 489 1P x 1A ACDC	**BR2x1UC**	MCB 489 2P x 1A ACDC	**BR3x1UC**	MCB 489 3P x 1A ACDC
1.2	**BR1x1.2UC**	MCB 489 1P x 1.2A ACDC	**BR2x1.2UC**	MCB 489 2P x 1.2A ACDC	**BR3x1.2UC**	MCB 489 3P x 1.2A ACDC
1.5	**BR1x1.5UC**	MCB 489 1P x 1.5A ACDC	**BR2x1.5UC**	MCB 489 2P x 1.5A ACDC	**BR3x1.5UC**	MCB 489 3P x 1.5A ACDC
1.6	**BR1x1.6UC**	MCB 489 1P x 1.6A ACDC	**BR2x1.6UC**	MCB 489 2P x 1.6A ACDC	**BR3x1.6UC**	MCB 489 3P x 1.6A ACDC
2	**BR1x2UC**	MCB 489 1P x 2A ACDC	**BR2x2UC**	MCB 489 2P x 2A ACDC	**BR3x2UC**	MCB 489 3P x 2A ACDC
3	**BR1x3UC**	MCB 489 1P x 3A ACDC	**BR2x3UC**	MCB 489 2P x 3A ACDC	**BR3x3UC**	MCB 489 3P x 3A ACDC
4	**BR1x4UC**	MCB 489 1P x 4A ACDC	**BR2x4UC**	MCB 489 2P x 4A ACDC	**BR3x4UC**	MCB 489 3P x 4A ACDC
5	**BR1x5UC**	MCB 489 1P x 5A ACDC	**BR2x5UC**	MCB 489 2P x 5A ACDC	**BR3x5UC**	MCB 489 3P x 5A ACDC
6	**BR1x6UC**	MCB 489 1P x 6A ACDC	**BR2x6UC**	MCB 489 2P x 6A ACDC	**BR3x6UC**	MCB 489 3P x 6A ACDC
7	**BR1x7UC**	MCB 489 1P x 7A ACDC	**BR2x7UC**	MCB 489 2P x 7A ACDC	**BR3x7UC**	MCB 489 3P x 7A ACDC
8	**BR1x8UC**	MCB 489 1P x 8A ACDC	**BR2x8UC**	MCB 489 2P x 8A ACDC	**BR3x8UC**	MCB 489 3P x 8A ACDC
10	**BR1x10UC**	MCB 489 1P x 10A ACDC	**BR2x10UC**	MCB 489 2P x 10A ACDC	**BR3x10UC**	MCB 489 3P x 10A ACDC
12	**BR1x12UC**	MCB 489 1P x 12A ACDC	**BR2x12UC**	MCB 489 2P x 12A ACDC	**BR3x12UC**	MCB 489 3P x 12A ACDC
13	**BR1x13UC**	MCB 489 1P x 13A ACDC	**BR2x13UC**	MCB 489 2P x 13A ACDC	**BR3x13UC**	MCB 489 3P x 13A ACDC
15	**BR1x15UC**	MCB 489 1P x 15A ACDC	**BR2x15UC**	MCB 489 2P x 15A ACDC	**BR3x15UC**	MCB 489 3P x 15A ACDC
16	**BR1x16UC**	MCB 489 1P x 16A ACDC	**BR2x16UC**	MCB 489 2P x 16A ACDC	**BR3x16UC**	MCB 489 3P x 16A ACDC
20	**BR1x20UC**	MCB 489 1P x 20A ACDC	**BR2x20UC**	MCB 489 2P x 20A ACDC	**BR3x20UC**	MCB 489 3P x 20A ACDC
25	**BR1x25UC**	MCB 489 1P x 25A ACDC	**BR2x25UC**	MCB 489 2P x 25A ACDC	**BR3x25UC**	MCB 489 3P x 25A ACDC
30	**BR1x30UC**	MCB 489 1P x 30A ACDC	**BR2x30UC**	MCB 489 2P x 30A ACDC	**BR3x30UC**	MCB 489 3P x 30A ACDC
32	**BR1x32UC**	MCB 489 1P x 32A ACDC	**BR2x32UC**	MCB 489 2P x 32A ACDC	**BR3x32UC**	MCB 489 3P x 32A ACDC
35	**BR1x35UC**	MCB 489 1P x 35A ACDC	**BR2x35UC**	MCB 489 2P x 35A ACDC	**BR3x35UC**	MCB 489 3P x 35A ACDC
40	**BR1x40UC**	MCB 489 1P x 40A ACDC	**BR2x40UC**	MCB 489 2P x 40A ACDC	**BR3x40UC**	MCB 489 3P x 40A ACDC
50	**BR1x50UC**	MCB 489 1P x 50A ACDC	**BR2x50UC**	MCB 489 2P x 50A ACDC	**BR3x50UC**	MCB 489 3P x 50A ACDC
60	**BR1x60UC**	MCB 489 1P x 60A ACDC	**BR2x60UC**	MCB 489 2P x 60A ACDC	**BR3x60UC**	MCB 489 3P x 60A ACDC
63	**BR1x63UC**	MCB 489 1P x 63A ACDC	**BR2x63UC**	MCB 489 2P x 63A ACDC	**BR3x63UC**	MCB 489 3P x 63A ACDC

GFNT1-W

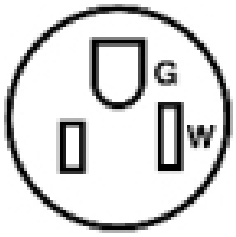
GFCI Receptacles

Color: White

UPC Code: 07847771255

Country of Origin: China

NEMA: 5-15R



Brand Features

Peace of mind, all the time. The SmartlockPro Self-Test GFCI tests itself even if you forget. Designed to meet the latest UL standard for auto-monitoring (self-test) our complete line of self-test GFCIs periodically conduct an automatic internal test to confirm that it can respond to a ground fault. With the slimmest profile on the market, the device allows for fast and easy installation, while Leviton's patented reset lockout mechanism prevents reset of the GFCI if it is not wired or operating correctly. The SmartlockPro Self-Test GFCI is the smart choice in ground fault circuit interrupter protection.

Item Description

15 Amp, 125 Volt Receptacle/Outlet, 20 Amp Feed-Through, Self-test SmartLock Pro Slim GFCI, monochromatic, back and side wired, nylon wallplate/faceplate and self grounding clip included - White

Technical Information

AC Horsepower Ratings

At Rated Voltage: 1 HP

Electrical Specifications

Dielectric Voltage: Withstands 1250VAC per UL 943 and CSA-C22.2 No. 144.1-06

Short Circuit Current Rating: 10KA

Temperature Rise: Max 30C after 100 cycles OL at 150 percent rated current

Environmental Specifications

Flammability: Rated V-2 per UL94

Operating Temperature: -35C to +66C

Material Specifications

Face Material: Thermoplastic

Body Material: Polycarbonate

Line Contacts: Brass Double Wipe .031 Thick

Terminal Screws: Plated Steel

Grounding Screw: Plated Steel

Yoke: Zinc-Plated Steel

Clamps: Brass

Notes: w/ Wallplate

Mechanical Specifications

Terminal ID: Brass-Hot, Green-Ground, Silver-Neutral

Terminal Accom.: 14-10 AWG

Product ID: Ratings are permanently marked on device

Product Features

Feature: Self-Test

Amperage: 15 Amp

Voltage: 125 Volt

NEMA: 5-15R

Pole: 2

Wire: 3

Standards and Certifications

NEMA: WD-6

ANSI: C-73

UL498: Yes

CSA C22.2 No. 42: Yes

NOM: Yes

MIL-SPEC: A-A-55459-SB

CSA-C22.2 No. 144.1-06: File LR-57811

Fed Spec WC-596: Yes

Trip Level: Class A, 5mA plus or minus 1mA

Termination: Back & Side

Face Material: Thermoplastic

Body Material: Polycarbonate

Grounding: Self-Grounding

Color: White

Strap Material: Galvanized Steel

Standards and Certifications: UL/CSA

Warranty: 2-Year Limited

Notes: w/ Wallplate

Grade: Commercial

Features and Benefits

- Provides continuous ground fault protection – detects and trips on actual ground fault even when self-test is being conducted
- On initial power up, tests the GFCI within 3 seconds
- Auto-monitoring exceeds the UL requirement
- Auto adapts and shifts to more frequent testing if potential problem is detected
- Status Indicator Light provides simple, intuitive feedback on power and protection status as well as indication of line/load reversal
- Patented Lockout Action prevents reset if GFCI is damaged and cannot respond to a ground fault
- Electronics are designed to minimize any false triggers
- Reduced depth makes it easier to install in any electrical box, even shallow ones
- Terminals allow for easy wiring options – back and side wire capable
- External back wire clamps provide visual indication of proper wire seating
- Withstands high torque and resists wire pullout
- Standard brass self-grounding clip
- Trip threshold meets or exceeds UL requirements for tripping time
- Improved immunity to high-frequency noise reduces nuisance tripping
- Advanced electronics design provides superior resistance to electrical surges and over-voltages
- Compatible with all Decora devices and wallplates; available in select Decora colors
- UL Fed Spec WC-596 rated.

SPECIFICATION SUBMITTAL

JOB NAME:		CATALOG NUMBERS:	
JOB NUMBER:			

Leviton Manufacturing Co., Inc.
201 North Service Road, Melville, NY 11747
Telephone: 1-800-323-8920 · FAX: 1-800-832-9538 · Tech Line (8:30AM-7:30PM E.S.T. Monday-Friday): 1-800-824-3005

Leviton Manufacturing of Canada, Ltd.
165 Hymus Boulevard, Pointe Claire, Quebec H9R 1E9 · Telephone: 1-800-469-7890 ·
FAX: 1-800-824-3005 · www.leviton.com/canada

Leviton S. de R.L. de C.V.
Lago Tana 43, Mexico DF, Mexico CP 11290 · Tel.: (+52)55-5082-1040 · FAX: (+52)5386-1797 · www.leviton.com.mx

Visit our Website at: www.leviton.com

Leviton has a global presence.
If you would like to know where your local Leviton office is located please go to: www.leviton.com/international/contacts/

Whitney Equipment Supplied Components

1ea. FEW325.100.H.1.S.4.A1.B.1.A.1.A.3.G.3.B.3.A.1.M5-.V3.CWM.T3

ABB MEASUREMENT & ANALYTICS | DATA SHEET | DS/WM-EN REV. AC

WaterMaster

Electromagnetic flowmeter

Measurement made easy

The perfect fit for all water and waste water applications

State-of-the-art technology

- revolutionary data storage enables transmitter interchange and commissioning without the need for re-configuration
- self-calibrating transmitter with ultra-low temperature coefficient for highest accuracy

Versatile and simple configuration

- 'Through-the-Glass' (TTG) configuration eliminating the need to remove the cover
- smart key based functionality
- 'Easy Setup' function

VeriMaster in situ verification software option

- enables the customer to perform in situ verification of the flowmeter system

Unparalleled service ability

- fault-finding Help texts on the display
- minimized downtime with replaceable electronics cartridges

MID and OIML R49:2006 approved with R49 self-checking

- type-approved to accuracy Class 1 and Class 2 for any pipe orientation and bidirectional flows
- type P-approved continuous self-checking of the sensor and transmitter to ensure the highest accuracy and long-term performance

The Company

ABB is an established world force in the design and manufacture of instrumentation for industrial process control, flow measurement, gas and liquid analysis and environmental applications.
As a world leader in process automation technology our worldwide presence, comprehensive service and application-oriented know-how make ABB a leading supplier of flow measurement products.

Introduction

Setting the standard for the Water Industry
The WaterMaster range, available in sizes 10 to 2400 mm (⅜ to 96 in.), is designed specifically for use on the many diverse applications encountered in the Water and Waste-water industry. The modular design concept offers flexibility, cost-saving operation and reliability while providing a long service life and exceptionally low maintenance.
Integration into ABB asset management systems and use of the self-monitoring and diagnostic functions increase the plant availability and reduce downtimes.
VeriMaster – the verification tool
An easy-to-use utility, available through the infra red service port. Uses the advanced self-calibration and diagnostic capability of WaterMaster, coupled with fingerprinting technology, to determine the accuracy status of the WaterMaster flowmeter to within ±1 % of its original factory calibration. VeriMaster also supports printing of calibration verification records for regulatory compliance.

Diagnostic functions
Using its diagnostic functions, the flowmeter monitors both its own operability and the process. Limit values for the diagnostic parameters can be set locally. When these limits are exceeded, an alarm is tripped. In the event of an error, diagnostic-dependent help text appears on the display. This considerably simplifies and accelerates the troubleshooting procedure.
In accordance with NAMUR NE107, alarms and warnings are classified with the status of 'Maintenance Required', 'Check Function', 'Failure' and 'Out of Specification'.

Flow performance
Utilizing its advanced filtering methods, the WaterMaster improves accuracy even under difficult conditions. WaterMaster has an operating flow range with ±0.4 % accuracy as standard (±0.2 % optional) in both forward and reverse flow directions.
Easy and quick commissioning
'Fit-and-Flow' data storage inside WaterMaster eliminates the need to match sensor and transmitter in the field. On initial installation, the self-configuration sequence automatically replicates into the transmitter all calibration factors, meter size and serial numbers, as well as customer site-specific settings, eliminating the potential for error.
Intuitive, convenient navigation
The 'Easy Setup' function reliably guides unpracticed users through the menu step by step. The smart key based functionality makes handling a breeze – it's just like using a cell phone. During configuration, the permissible range of each parameter is indicated on the display and invalid entries are rejected.
Universal transmitter – powerful and flexible
The backlit display can be rotated easily without the need for tools. The contrast is adjustable and the display fully-configurable. The character size, number of lines and display resolution (number of decimal points) can be set as required. In multiplex mode, several different display options can be pre-configured and invoked one after the other.
The smart modular design of the transmitter unit enables easy disassembly without the need to unscrew cables or unplug connectors. HART is used as the standard communications protocol. Optionally, the transmitter is available with PROFIBUS DP or MODBUS communication.
Assured quality
WaterMaster is designed and manufactured in accordance with international quality procedures (ISO 9001) and all flowmeters are calibrated on nationally-traceable calibration rigs to provide the end-user with complete assurance of both quality and performance of the flowmeter.

...Introduction

WaterMaster – always the first choice

WaterMaster sets the standard for the water industry. The specification, features and user benefits offered by this range are based on ABB's worldwide experience in this industry and they are all targeted specifically to the industry's requirements.

Submersible and buriable

WaterMaster sensors have a rugged, robust construction to ensure a long, maintenance-free life under the arduous conditions experienced in the Water and Waste Industry. The sensors are, as standard, inherently submersible (IP68, NEMA 6P), thus ensuring suitability for installation in chambers and metering pits that are susceptible to flooding.

A unique feature of the WaterMaster sensors is that sizes DN40 to DN2400 (1½ to 96 in. NB) are buriable; installation simply involves excavating to the underground pipe, fitting the sensor, cabling back to the transmitter and then backfilling the hole.

The WaterMaster family

Overview of the WaterMaster

A wide range of features and user benefits are built into WaterMaster as standard:

- bi-directional flow
- unique self-calibrating transmitter (patented) for the ultimate in stability and repeatability
- OIML-type continuous self-checking, with alarms, ensures both sensor and transmitter accuracy
- true electrode and coil impedance measurement
- comprehensive simulation mode
- universal switch-mode power supply (options are available for AC and DC supplies)
- comprehensive self-diagnostics compliant with NAMUR NE107
- programmable multiple-alarm capability
- bus options: HART (4 to 20 mA), PROFIBUS DP (RS485), MODBUS (RS485)
- 3 configurable pulse / frequency and alarm outputs
- advanced infrared service port supports remote HMI, HART, cyclic data out and parameter download
- VeriMaster in situ verification software available as option
- read-only switch and ultra-secure service password for total security

OIML / MID approved
WaterMaster has been type tested and Internationally approved to the highest accuracy class 1 and 2 for cold and hot potable water meters – OIML R49-1:2006 (Organisation Internationale de Métrologie Légale). For full details, OIML R49 is available to download from www.oiml.org. Its requirements are very similar to other International standards, such as EN14154 and ISO4064.

WaterMaster has been assessed by type approval at the National Measurement Office (NMO) to OIML R49:2006 and passed to the very highest accuracy designations for sizes DN40 to DN200 (1½ to 8 in. NB).

The approval is for:

- Class 1 and Class 2 accuracy (calibration option)
- Environmental class T50 for water temperatures of 0.1 to 50 °C (32.18 to 122 °F)
- Electromagnetic Environment E2 (10 V/m)
- Any pipe orientation
- 5 Diameters upstream pipe
- 0 Diameters downstream pipe
- Pressure Loss Class <0.25 bar (3.62 psi)
- Integral or remote transmitter (<200 m [<656 ft.] cable)
- DN40 to DN200 (1½ to 8 in. NB), bi-directional flow

A major advance in WaterMaster is the self-checking capabilities that meet and exceed the R49 requirements and is the first electromagnetic flowmeter to be approved to OIML Type P permanent self checking during normal operation (not just at startup) and alarm indication for:

- transmitter and sensor status, with an accuracy alarm
- program ROM and RAM status
- double, independent storage of totalizer values, in both the sensor and transmitter non-volatile memories
- display test

View the OIML R49-1:2006 certificate of conformity on the ABB library.

WaterMaster is also approved under the EU Measuring Instruments Directive (MID) 2014/32/EU, that covers putting into use water flowmeters for certain applications. MID WaterMaster is secured against tamping and is available as an option, along with fingerprinting for ABB VeriMaster in situ verification product, with certificate printout to ±1 % accuracy.

View the WaterMaster certificate of EC type-examination of a measuring instrument on the ABB library.

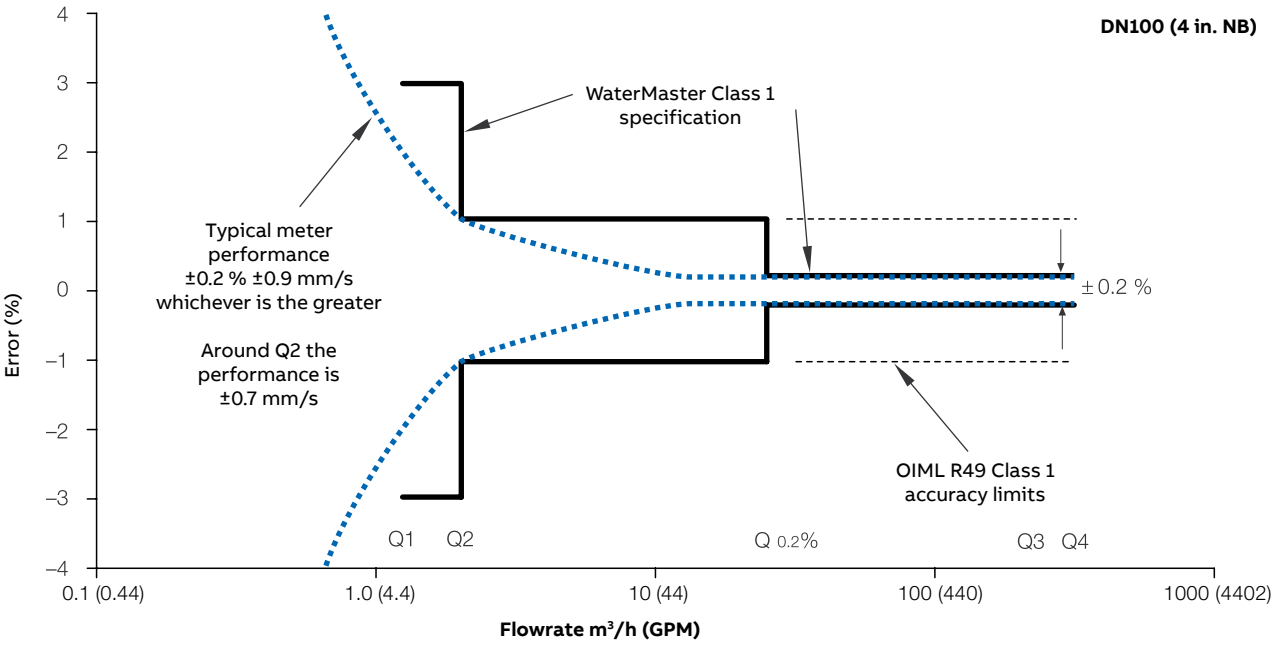
Superior control through advanced sensor design
The innovative, patented octagonal sensor design improves flow profile and reduces up- and down-stream piping requirements for the most commonly used sizes of 40 to 200 mm (1½ to 8 in.). This optimized full bore meter provides impressive results in the most difficult of installation requirements.

WaterMaster sensors are also available in reduced-bore geometries giving the ultimate in low-flow performance with a very high turn-down range.

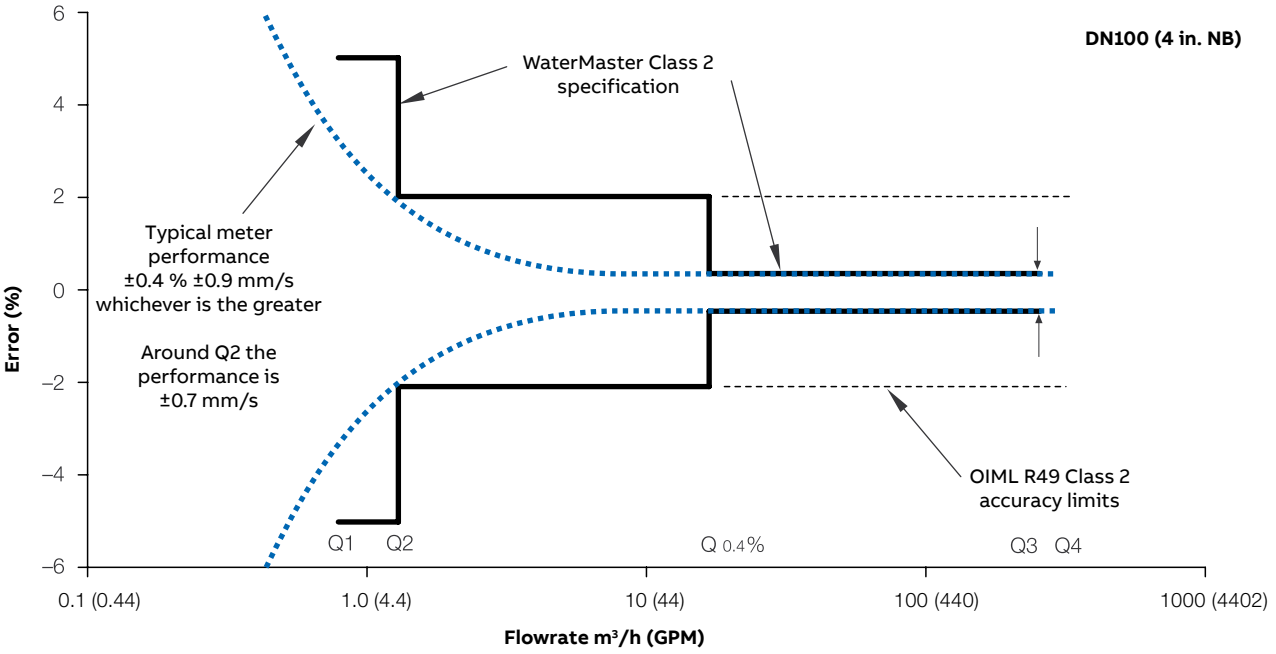
The unique design of the reduced-bore sensor conditions the flow profile in the measuring section so that distortions in the flow profile, either upstream or downstream, are flattened. The result is excellent in situ flowmeter performance, even with very bad hydraulic installation conditions.

Specification

WaterMaster specification to OIML R49 Class 1



WaterMaster specification to OIML R49 Class 2



Although OIML R49 does not define the flow accuracy below Q1, WaterMaster continues to measure flow at lower flow rates down to a cutoff velocity of ±5 mm/s (±0.2 in./s). The accuracy between cutoff and Q1 is typically ±0.9 mm/s (±0.04. in./s).

WaterMaster optimized full-bore meter (FEV) / full-bore meters (FEF, FEW) flow performance – m³/h

			Standard Calibration – 0.4 % Class 2			High Accuracy Calibration – 0.2 % Class 1		
DN	Q4	Q3	$Q_{0.4\%}$	Q2	Q1	$Q_{0.2\%}$	Q2	Q1
10	3.1	2.5	0.167	0.013	0.008	0.31	0.02	0.012
15	7.88	6.3	0.42	0.032	0.02	0.79	0.05	0.03
20	12.5	10	0.67	0.05	0.032	1.25	0.08	0.05
25	20	16	1.1	0.08	0.05	2	0.13	0.08
32	31.25	25	1.67	0.13	0.08	3	0.20	0.13
40*	50	40	4.2	0.2	0.13	6	0.32	0.2
50*	79	63	4.2	0.32	0.20	7.9	0.5	0.32
65*	125	100	6.7	0.5	0.32	12.5	0.8	0.5
80*	200	160	10.7	0.81	0.51	16	1.3	0.8
100*	313	250	16.7	1.3	0.79	25	2	1.25
125*	313	250	16.7	1.3	0.79	25	2	1.25
150*	788	630	42	3.2	2.0	63	5	3.2
200*	1,250	1,000	67	5.1	3.2	100	8	5
250	2,000	1,600	107	8.1	5.1	160	13	8
300	3,125	2,500	167	12.7	7.9	250	20	12.5
350	5,000	4,000	267	20.3	12.7	400	32	20
400	5,000	4,000	267	20.3	12.7	400	32	20
450	7,875	6,300	420	32	20	630	50	32
500	7,875	6,300	420	32	20	630	50	32
600	12,500	10,000	667	51	32	1000	80	50
700	20,000	16,000	1600	102	64	1600	160	100
750	20,000	16,000	1600	102	64	1600	160	100
30 in. (750)	20,000	16,000	1600	102	64	1600	160	100
800	20,000	16,000	1600	102	64	1600	160	100
900	31,250	25,000	2500	160	100	2500	250	156
1000	31,250	25,000	2500	160	100	2500	250	156
42 in	31,250	25,000	2500	160	100	2500	250	156
1100	31,250	25,000	2500	160	100	2500	250	156
1200	50,000	40,000	4000	256	160	4000	400	250
1350	78,750	63,000	6300	403	252	6300	630	394
1400	78,750	63,000	6300	403	252	6300	630	394
1500	78,750	63,000	6300	403	252	6300	630	394
60 in. (1500)	78,750	63,000	6300	403	252	6300	630	394
1600	78,750	63,000	6300	403	252	6300	630	394
1650	78,750	63,000	6300	403	252	6300	630	394
1800	125,000	100,000	10000	640	400	10000	1000	625
1950	125,000	100,000	10000	640	400	10000	1000	625
2000	125,000	100,000	10000	640	400	10000	1000	625
2200	200,000	160,000	16000	1024	640	16000	1600	1000
2400	200,000	160,000	16000	1024	640	16000	1600	1000

*** OIML R49 Certificate of Conformance to Class 1 and Class 2, with OIML R49 and MID versions available.**

Q2 = 1.6 * Q1

Q4 = 1.25 * Q3

Note: OIML R49–1 allow Class 1 only for meters with Q3 ³ 100 m³/h. Meters outside this range have been tested and conform to Class 1.

...Specification

WaterMaster optimized full-bore meter (FEV) with MID approval (equivalent to OIML R49:2006 Class2 accuracy) – m^3/h

DN	Q4	Q3	Q2	Q1	Q3/Q1
40	50	40	0.80	0.50	80
50	79	63	1.26	0.79	80
65	125	100	2.00	1.25	80
80	200	160	3.20	2.00	80
100	313	250	5.00	3.13	80
125	313	250	5.00	3.13	80
150	788	630	12.6	7.88	80
200	1,250	1,000	20.0	12.5	80

WaterMaster optimized full-bore meter (FEV) / full-bore meters (FEF, FEW) flow performance – gal/min

			Standard Calibration 0.4 % Class 2			High Accuracy Calibration 0.2 % Class 1		
NPS/NB (DN)	Q4	Q3	$Q_{0.4\%}$	Q2	Q1	$Q_{0.2\%}$	Q2	Q1
3/8 (10)	13.8	11	0.73	0.06	0.035	1.38	0.09	0.053
1/2 (15)	34.7	27.7	1.85	0.14	0.09	3.48	0.22	0.14
3/4 (20)	55	44	2.94	0.22	0.14	5.5	0.35	0.22
1 (25)	88	70.4	4.7	0.35	0.22	8.8	0.57	0.35
1 1/4 (32)	137.6	110	7.3	0.57	0.35	13.2	0.88	0.57
1 1/2 (40)	220	176	18.5	0.89	0.56	26.4	1.41	0.88
2 (50)	347	277	18.5	1.41	0.88	34.7	2.22	1.39
2 1/2 (65)	550	440	29.4	2.24	1.40	55.0	3.52	2.20
3 (80)	881	704	47.0	3.58	2.24	70.4	5.64	3.52
4 (100)	1,376	1,101	73.4	5.59	3.49	110	8.81	5.50
5 (125)	1,376	1,101	73.4	5.59	3.49	110	8.81	5.50
6 (150)	3,467	2,774	185	14.1	8.81	277	22.2	13.9
8 (200)	5,504	4,403	294	22.4	14.0	440	35.2	22.0
10 (250)	8,806	7,045	470	35.8	22.4	704	56.4	35.2
12 (300)	13,759	11,007	734	55.9	34.9	1,101	88.1	55.0
14 (350)	22,014	17,611	1,174	89.5	55.9	1,761	141	88.1
16 (400)	22,014	17,611	1,174	89.5	55.9	1,761	141	88.1
18 (450)	34,673	27,738	1,849	141	88.1	2,774	222	139
20 (500)	34,673	27,738	1,849	141	88.1	2,774	222	139
24 (600)	55,036	44,029	2,935	224	140	4,403	352	220
27/28* (700)	88,057	70,446	7,045	451	282	7,045	704	440
30 (750)	88,057	70,446	7,045	451	282	7,045	704	440
32 (800)	88,057	70,446	7,045	451	282	7,045	704	440
36 (900)	137,590	110,072	11,007	704	440	11,007	1,100	688
39/40* (1000)	137,590	110,072	11,007	704	440	11,007	1,100	688
42 (1050)	137,590	110,072	11,007	704	440	11,007	1,100	688
44 (1100)	137,590	110,072	11,007	704	440	11,007	1,100	688
48 (1200)	220,143	176,115	17,611	1,127	704	17,611	1,761	1,101
52 (1350)	346,726	277,381	27,738	1,775	1,110	27,738	2,773	1,733
54 (1400)	346,726	277,381	27,738	1,775	1,110	27,738	2,773	1,733
60 (1500)	346,726	277,381	27,738	1,775	1,110	27,738	2,773	1,733
66 (1600)	346,726	277,381	27,738	1,775	1,110	27,738	2,773	1,733
68 (1650)	346,726	277,381	27,738	1,775	1,110	27,738	2,773	1,733
77 (1800)	550,358	440,287	44,029	2,818	1,761	44,029	4,403	2,752
77 (1950)	550,358	440,287	44,029	2,818	1,761	44,029	4,403	2,752
78 (2000)	550,358	440,287	44,029	2,818	1,761	44,029	4,403	2,752
78 (2000)	550,358	440,287	44,029	2,818	1,761	44,029	4,403	2,752
84 (2200)	880,573	704,459	70,446	4,509	2,818	70,446	7,045	4,403
96 (2400)	880,573	704,459	70,446	4,509	2,818	70,446	7,045	4,403

*Size is dependent on flange specification

Q2 = 1.6 * Q1

Q4 = 1.25 * Q3

WaterMaster reduced-bore meter (FER) flow performance – m³/h (gal/min)

Size		Q_4	Q_3	Class 2 specification			R	Class 1 specification			R
				$Q_{0.4\,\%}$	Q_2	Q_1		$Q_{0.2\,\%}$	Q_2	Q_1	
mm	in.	m³ / h (Ugal / min)	m³ / h (Ugal / min)	m³ / h (Ugal / min)	m³ / h (Ugal / min)	m³ / h (Ugal / min)		m³ / h (Ugal / min)	m³ / h (Ugal / min)	m³ / h (Ugal / min)	
40	1 1/2	31 (138)	25 (110)	0.83 (1.05)	0.063 (0.28)	0.04 (0.18)	630	1.7 (7.48)	0.1 (0.44)	0.063 (0.28)	400
50	2	50 (220)	40 (176)	1.0 (4.40)	0.1 (0.44)	0.063 (0.28)	630	2.0 (8.8)	0.16 (0.7)	0.1 (0.44)	400
65	2 1/2	79 (347)	63 (277)	1.6 (7.04)	0.16 (0.7)	0.1 (0.44)	630	3.2 (10.56)	0.25 (1.1)	0.16 (0.7)	400
80	3	125 (550)	100 (440)	2.0 (8.80)	0.25 (1.1)	0.16 (0.7)	630	4.0 (17.6)	0.4 (1.76)	0.25 (1.1)	400
100	4	200 (880)	160 (704)	3.2 (10.56)	0.41 (1.8)	0.25 (1.1)	630	6.4 (28)	0.64 (2.8)	0.4 (1.76)	400
125	5	200 (880)	160 (704)	3.2 (10.56)	0.41 (1.8)	0.25 (1.1)	630	6.4 (28)	0.64 (2.8)	0.4 (1.76)	400
150	6	500 (2200)	400 (1760)	8.0 (35.20)	1.0 (4.4)	0.63 (2.77)	630	16 (70.4)	1.6 (7)	1.0 (4.4)	400
200	8	788 (3470)	630 (2770)	13.0 (57.2)	1.6 (7.04)	1.0 (4.4)	630	25 (110)	2.5 (11)	1.6 (7)	400
250	10	1250 (5500)	1000 (4400)	20 (88)	2.5 (11.01)	1.6 (7)	630	40 (176)	4.0 (17.6)	2.5 (11)	400
300	12	2000 (8810)	1600 (7045)	32 (140.8)	4.1 (18.05)	2.5 (11)	630	64 (281.6)	6.4 (28)	4.0 (17.6)	200
350	14	2000 (8810)	1600 (7045)	32 (140.8)	6.4 (28.18)	4.0 (17.6)	400	64 (281.6)	12.8 (56)	8.0 (35.2)	200
375	15	2000 (8810)	1600 (7045)	32 (140.8)	6.4 (28.18)	4.0 (17.6)	400	64 (281.6)	12.8 (56)	8.0 (35.2)	200
400	16	3125 (13760)	2500 (11007)	50 (220)	10 (44)	6.3 (27.7)	400	100 (440)	20 (88)	12.5 (55)	200
450	18	3125 (13760)	2500 (11007)	50 (220)	10 (44)	6.3 (27.7)	400	100 (440)	20 (88)	12.5 (55)	200
500	20	5000 (22014)	4000 (17610)	80 (352)	16 (70.45)	10 (44)	400	160 (70.4)	32 (141)	20 (88)	200
600	24	7875 (34670)	6300 (27740)	126 (554.4)	25.2 (110.9)	15.8 (70)	400	252 (1108)	50.4 (222)	31.5 (138.7)	200

Q2 = 1.6 * Q1

Q4 = 1.25 * Q3

Q3/Q1 = R

Specification – Sensor

Functional specification

Temperature limitations

Ambient temperature

Remote transmitter	–20 to 70 °C (–4 to 158 °F)
Integral transmitter	–20 to 60 °C (–4 to 140 °F)
Process temperature	See table below.
	0.1 to 50 °C (32.2 to 122 °F)
	OIML R49:2006 T50 Approved

			Medium temperature °C (°F)	
Code	**Lining**	**Flange material**	**Minimum**	**Maximum**
FEF, FEW3	Hard rubber	Carbon steel	–10 (14)	80 (176)
		Stainless steel	–10 (14)	80 (176)
FEW1	PTFE	Carbon steel	–10 (14)	80 (176)
		Stainless steel	–25 (–13)	80 (176)
FEW3	PTFE	Carbon steel	–10 (14)	80 (176)
		Stainless steel	–10 (14)	80 (176)
FEW3	Elastomer	Carbon steel	–5 (23)	80 (176)
		Stainless steel	–5 (23)	80 (176)
FEF, FER	Elastomer	Carbon steel	–6 (21)	70 (158)
FEV	Polypropylene		–6 (21)	70 (158)

Pressure limitations

As flange rating

PN25 Max Process Temp 50 °C (122 °F)

PN40 Max Process Temp 40 °C (104 °F)

OIML / MID Approved Meters 16 bar (232 psi)

UL Fire Service approved meters 285 psi

Pressure equipment directive 97/23/EC

This product is applicable in networks for the supply, distribution and discharge of water and associated equipment and is therefore exempt.

IP rating

IP68 (NEMA 6) to 7 m (20 ft.) depth

Note. Not sizes DN10 to DN32 (3/8 – 1 ¼ in. NB)

IP67 (NEMA 4X) – DN10 to DN32 (3/8 – 1 ¼ in. NB)

Buriable (sensor only)

FEV – DN40 to 200 (1 ½ to 8 in. NB)

FER – DN40 to 600 (1 ½ to 24 in. NB)

FEF – DN250 to 600 (10 to 24 in. NB)

FEW – DN450 to 2400 (18 to 96 in. NB)

to 5 m (16 ft.) depth

Conductivity

>20 µS cm–1

Transmitter mounting

Integral (not FEF) or remote

Electrical connections

20 mm glands

½ in. NPT

20 mm armored glands

Sensor cable

ABB WaterMaster cable available in two forms – standard and armored

Maximum length 200 m (660 ft.)

Suspended solids

Suspended solids percentage of process medium should not exceed 6 % of total volume

Physical specification

Wetted parts

Electrode material

Stainless steel 316 L / 316 Ti

Super-austenitic steel

Hastelloy® C-22 and Hastelloy C4

(other electrode materials available on request)

Potential equalizing rings

Minimum of 1 recommended

Lining material / potable water approvals

			Potable Water Approvals					
Code	**Size Range**	**Liner**	**WRAS**	**WRAS 60°C**	**ACS**	**DVGW**	**NSF-61**	**AZ/ NZS 4020**
FEW1	DN10 to 32 (⅜ to 1¼ in. NB)	PTFE	✓					
FEW3	DN10 to 600 (⅜ to 24 in. NB)	PTFE						
FEW3	DN40 to 2400 (1½ to 96 in. NB)	Elastomer	✓					✓
FEW3	DN40 to 2400 (1½ to 96 in. NB)	Hard rubber	✓	✓		✓	✓	
FEV	DN40 to 200 (1½ to 8 in. NB)	Poly-propylene	✓		✓	✓	✓	✓
FEF	DN250 to 600 (10 to 24 in. NB)	Elastomer	✓		✓	✓	✓	✓
FEF	DN250 to 600 (10 to 24 in. NB)	Hard rubber	✓	✓		✓	✓	
FER	DN40 to 600 (1½ to 24 in. NB)	Elastomer	✓		✓	✓	✓	✓

*Size is dependent on flange specification

Lining protection plates

Not required

Installation conditions (recommended)

	Straight pipe requirements	
	Upstream	Downstream
FEW / FEF	5 x DN	2 x DN
FEV	5 x DN	0 x DN
FER	0 x DN	0 x DN

Pressure loss

Negligible at Q3	All full bore meters
<0.25 bar (<3.62 psi) at Q3	FEV (DN40 to 200 [1½ to 8 in. NB])
<0.63 bar (<9.13 psi) at Q3	FER (DN40 to 600 [1½ to 24in. NB])

Non-wetted parts

Flange material

Carbon steel	DN20 to DN2400 (¾ to 96 in. NB)
Stainless steel	DN10 to DN2400 (⅜ to 96 in. NB)
SG iron	FEV – DN40 to DN150 [1 ½ to 6 in. NB)
	FER – DN40 to DN150 [1 ½ to 6 in. NB)

Meter tube

Stainless steel	DN10 to DN2400 (⅜ to 96 in. NB)

Housing material

Carbon steel	FEV – DN40 to 200 (1½ to 8 in. NB)
	FEW – DN450 to 2400 (18 to 96 in. NB)
Plastic FEF –	DN250 to 600 (10 to 24 in. NB)
Aluminium	FEW – DN10 to 400 (⅜ to 16 in. NB)

Terminal box material

Polycarbonate

Cable gland material

Plastic, brass

Paint specification

Zinc-based primed (all sensors), paint coat ≥70 µm thick
RAL 9002 (light grey)

Specification – transmitter

Functional specification

Power supply

Mains	85 to 265 V AC @ <7 VA
Low voltage	24 V AC +10 % /–30 % @ <7 VA
DC	24 V ±30 % @ <0.4 A

Supply voltage fluctuations within the specified range have no effect on accuracy

Digital Outputs (3)

Rating 30 V @ 220 mA, open collector, galvanically isolated*
Maximum output frequency 5250 Hz
1 off dedicated to Alarm / Logic, programmable function
2 off configurable to either Pulse / Frequency or Alarm/ Logic function

Current output – HART FEX100 variant

4 to 20 mA or 4 to 12/20 mA (active), galvanically isolated*
Maximum loop resistance 750 W
HART protocol Version 5.7 (HART registered)
Signal levels compliant with NAMUR NE 43 (3.8 to 20.5 mA)
Low alarm 3.6 mA, High alarm 21.8 mA

Additional accuracy

±0.1 % of reading
Temperature coefficient: typically <±20 ppm/°C

RS485 Communications – PROFIBUS FEX100-DP variant

Registered name: FEX100-DP
RS485 (9.6kbps to 1.5Mbps), galvanically isolated
DPV0, DPV1
PA Profile 3.01
Standard idents: 9700, 9740, 9741
FEX100-DP specific ident: 3431
3 Concurrent MS2 master connections

RS485 Communications – MODBUS FEX100-MB variant

MODBUS RTU protocol
RS485 (9.6kbps to 115.2kbps), galvanically isolated

Electrical connections

20 mm glands ½ in. NPT, 20 mm armored glands

Temperature limitations

Ambient temperature	–20 to 60 °C (–4 to 140 °F)
Temperature coefficient	Typically <±10 ppm/°C @ Vel ³0.5 mls

* When installed, do not leave galvanically isolated circuits (pulse and current) floating.

Environmental protection

Humidity:	0 to 100 %
Rating:	IP67 (NEMA 4X) to 1m (3.3 ft.) depth

Tamper-proof security

Write access prevented by internal switch combined with external security seals for MID applications

Languages

English, French, German, Italian, Spanish, Polish

Infrared service port

USB adapter (accessory), USB 1.1. and 2.0 compatible
Driver software for Windows 2000, XP, 7 (32-bit) and Vista

Housing material

Powder-coated aluminium with glass window

Paint specification

Paint coat ³70 µm thick RAL 9002 (light grey)

Transmitter vibration testing

Vibration level: 7 m/s²
Frequency range: 20 to 150 Hz
No. of sweeps in 3 orthogonal planes: 20
Undetectable shift in transmitter span or zero performance

Hazardous approvals

FM & FMc Class 1 Div 2
(FM listing NI / 1 / 2 / ABCD / T4, S / II, III / 2 / FG /T4, Ta=60C; Type 4X, IP67 – for transmitter and integral mounting
Ta=70C, Type 6P, IP68 – for remote sensor type, IP67 on DN10 to 32 [3/8 to 11/4 in.NB])
(FMc listing NI / 1 / 2 / ABCD / T4, DIP / II, III / 2 / FG /T4, Ta=60C; Type 4X, IP67 – for transmitter and integral mounting
Ta=70C, Type 6P, IP68 – for remote sensor type, IP67 on DN10 to 32 [3/8 to 11/4 in.NB])
FET, FEV, FEW and FEF DN700 to 2200 (27/28* to 84 in. NB) only
*Size is dependent on flange specification

ATEX/UKEX* Zone 2, 21 & 22
II 3 G Ex nA IIC T5 Gc
II 2 D Ex tb IIIC T100°C Db
TA = –20°C to +60°C (integral transmitter)
TA = –20°C to +70°C (remote sensor)
IECEx* Zone 2, 21 & 22
Ex tb IIIC T100°C Db
Ex nA IIC T5 Gc
TA = –20°C to +60°C (integral transmitter)
TA = –20°C to +70°C (remote sensor)
*FEW, FEV, FET and FEF ³700 (27/28 in. NB) only

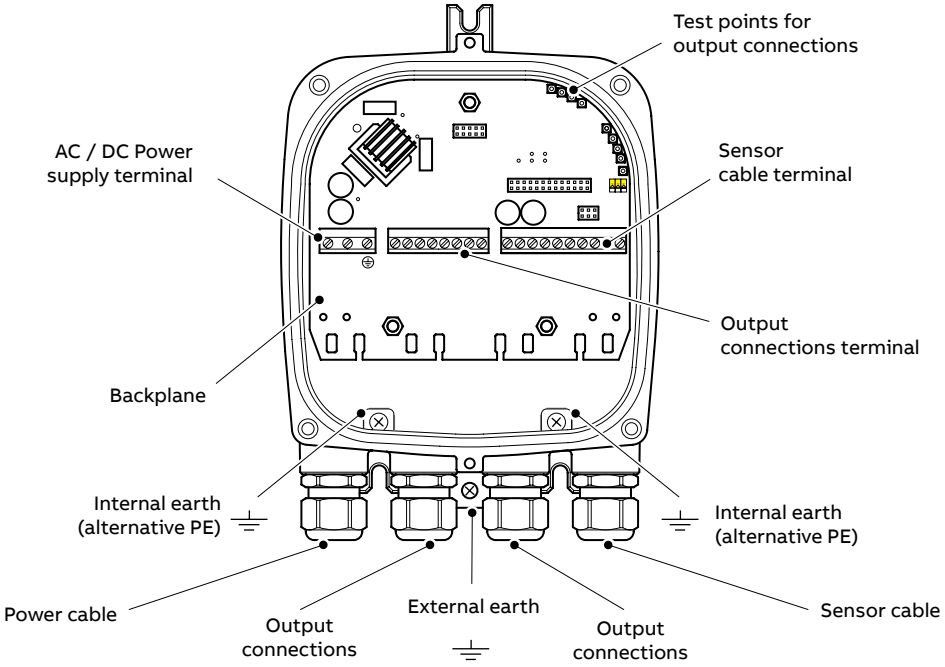
Declaration of Conformance

Copies of CE certification will be available on request.
WaterMaster has OIML R49:2006 Certificate of Conformity to accuracy class 1 and 2 (FEV DN40 to 200 [1½ to 8 in.NB]).
Copies of accuracy certification are available on request.
WaterMaster (FEV DN40 to 200 [1½ to 8 in.NB]) has been type examined under directive MID 2014/32/EU, Annex MI-001. Copies of this certificate are available on request.

Transmitter connections

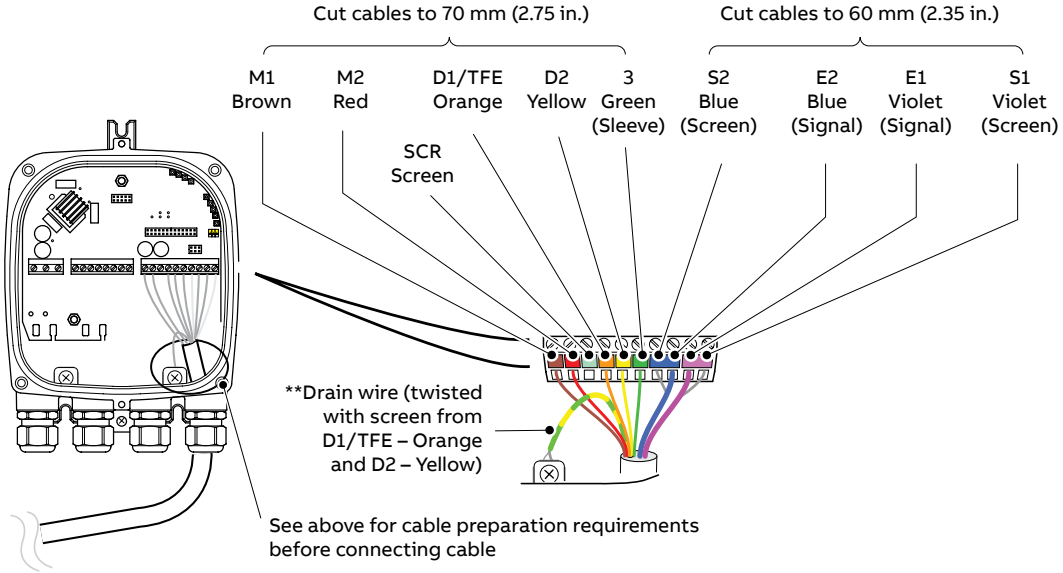
Transmitter terminal connections overview

This section is intended to give an overview of installation of a flowmeter. For Installation requirements, technical information and Health and safety precautions – refer to the User Guide OI/FET100–EN.



Cable gland / conduit entry (Remote transmitter shown)

Sensor cable terminal connections and recommended cable lengths



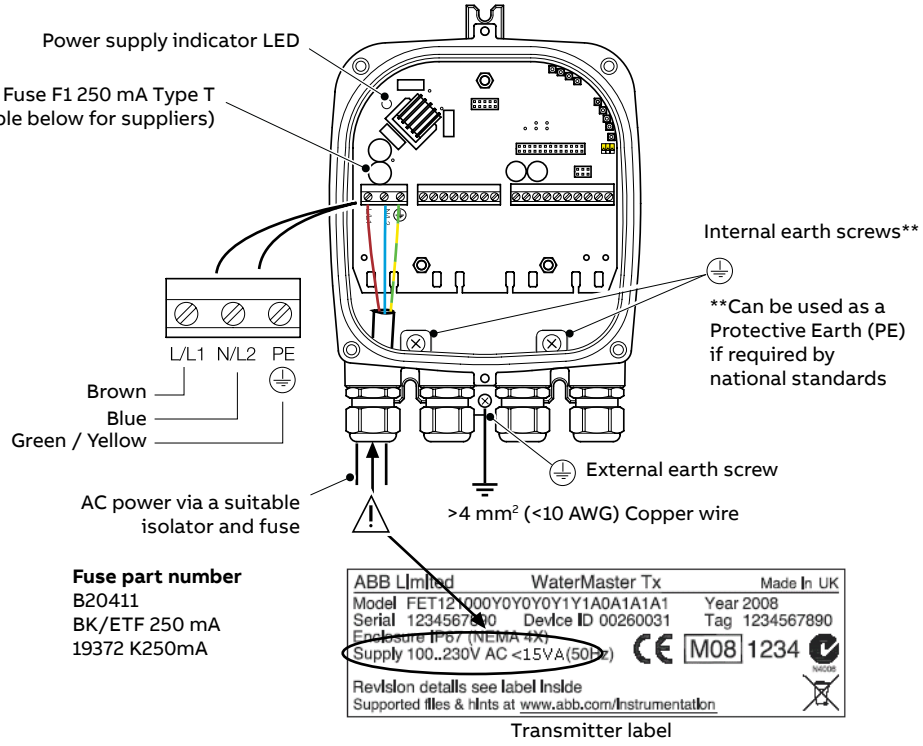
*Inner wire
**For cathodically-protected systems (or if the transmitter enclosure does not have an earth screw) connect the drain wire to terminal SCR.

Sensor cable connections at transmitter terminal block – remote transmitter

...Transmitter connections

Power supply connections

AC power supply

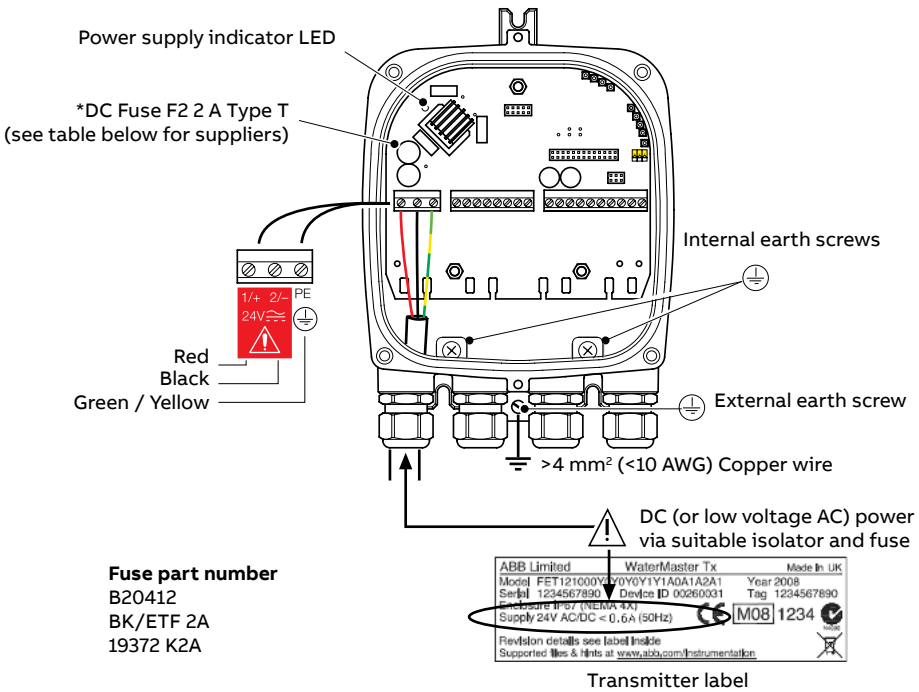


Transmitter label

***Fuse supplier**	**Fuse part number**
ABB	B20411
Bussmann	BK/ETF 250 mA
Wickmann	19372 K250mA

AC power supply connections

DC (and low voltage AC) power supply



Transmitter label

***Fuse supplier**	**Fuse part number**
ABB	B20412
Bussmann	BK/ETF 2A
Wickmann	19372 K2A

DC (and low voltage AC) power supply connections

Configuration DIP switches

Three configuration DIP switches are mounted on the transmitter backplane board.

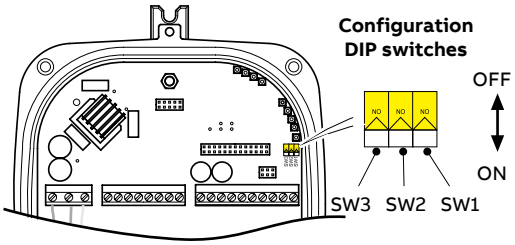
These are factory-set as follows:

- Remote transmitter – all OFF
- Integral transmitter – SW3 ON

For MID-compliant flowmeters the read-only / MID protection switch is set to 'ON' to ensure the meter is secure from tampering.

For HART software versions prior to 01.02.XX, this switch (set after commissioning) prevents login via the keypad or bus at any security level.

From HART software version 01.03.XX onwards and for all PROFIBUS software versions, on MID meters, all metrological-related parameters are locked and inaccessible at the Service level. Standard and Advanced user level parameters can still be modified via the HMI or bus.

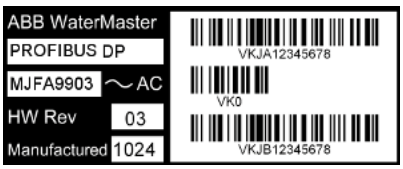


DIP Switch functions
SW1 – Read-only / MID Protection
SW2 – (future product)
SW3 – Internal sensor memory

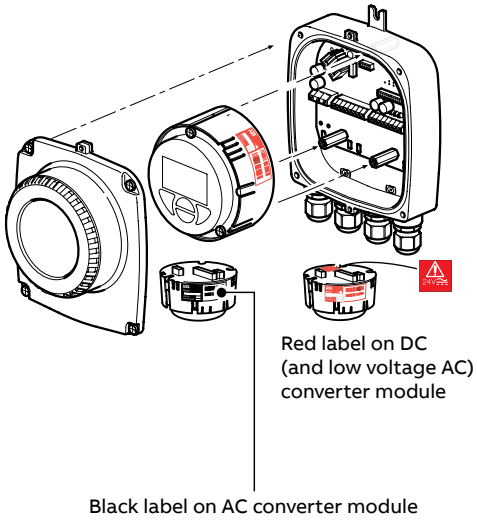
Configuration DIP switches

Transmitter module identification

Note. The communications bus type is HART FEX100 if not specified on the transmitter module label. An example of the PROFIBUS FEX100-DP variant transmitter module label is shown below.



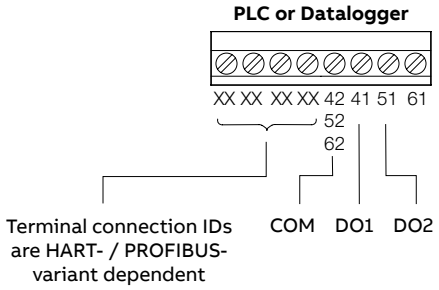
PROFIBUS FEX-100P label



Transmitter module identification

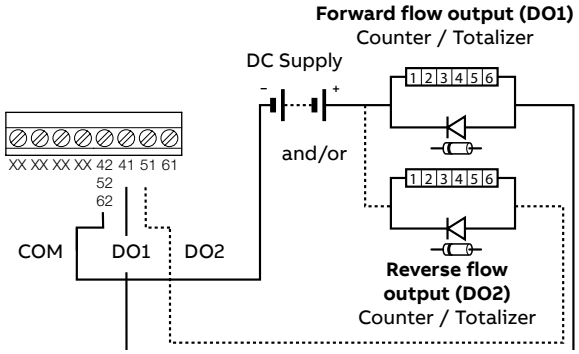
Output connections

Frequency outputs

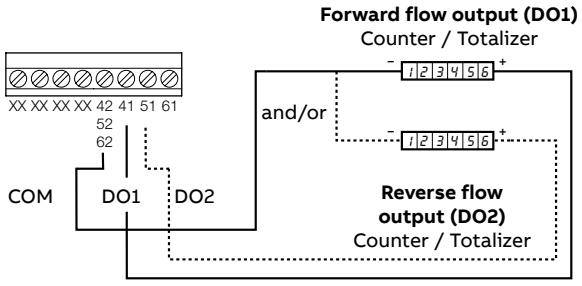


PLC / Datalogger connections

Note. Digital outputs DO1 and DO2 are polarity sensitive. The common (negative) connection for these outputs is designated 'COM'.

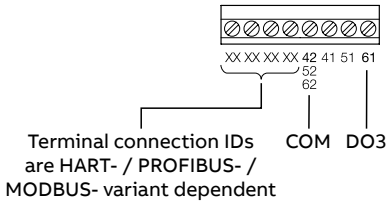


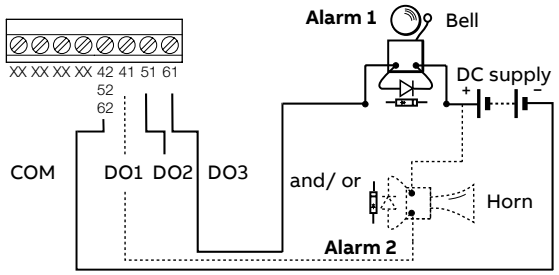
Electromechanical connections



Telemetry / Electronic counters connections

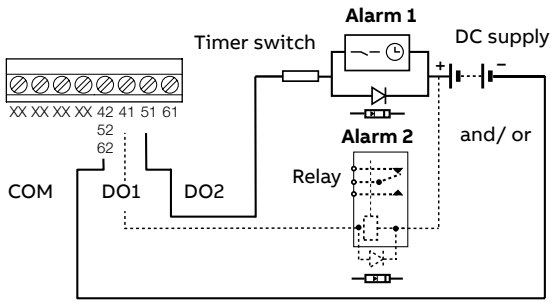
Alarm outputs





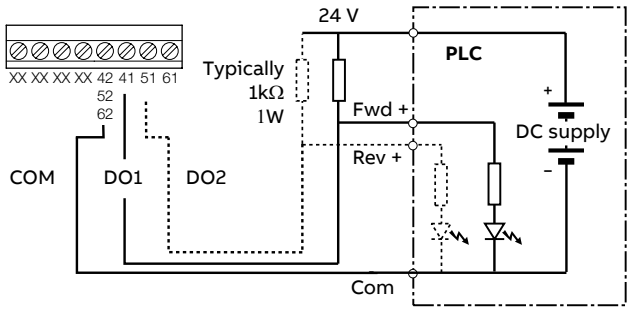
Note.

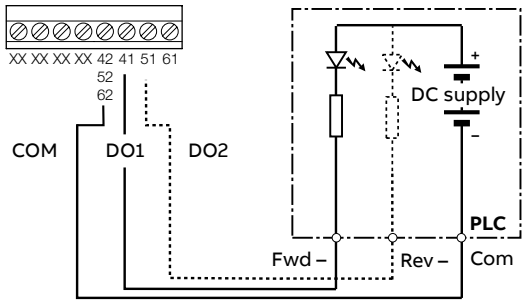
- Normal alarm / logic output is from DO3 (terminal 61). DO1 (41) and DO2 (51) can also be configured as alarms if required but are then NOT available as frequency / pulse outputs as shown in **Electromechanical connections** and **Telemetry / Electronic counters connections**, opposite.
- Bell and horn shown for example only. Any suitable alarm device may be used (for example, lamp, siren, buzzer etc.).



Note. Relay and timer switch shown for example only.

PLC interface

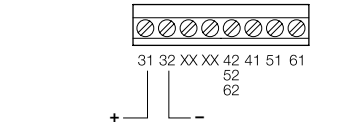




Note.

- WaterMaster digital outputs are NPN optocoupled transistors used as switches.
- Maximum allowed voltage at collector is 30 V DC
- Maximum allowed current across transistor is 220 mA.

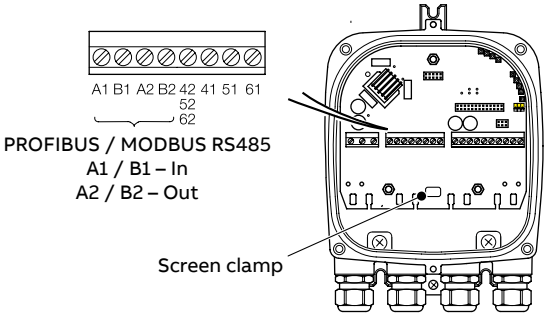
Current output (4 to 20 mA) – HART (FEX100) variant



Refer to IM/WMP for HART-Protocol communication details

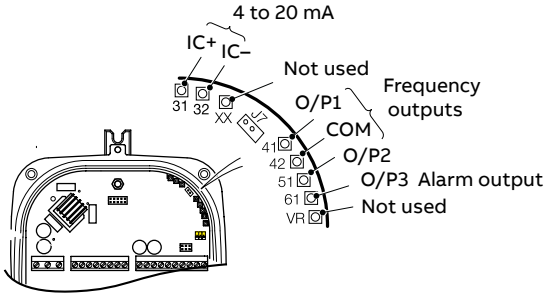
Current output (4 to 20 mA) – HART (FEX100) variant

RS485 communications – PROFIBUS (FEX100-DP) and MODBUS (FEX100-MB) variants



Test point access

Note. A typical DVM probe can access (fit) the PCB's test holes.



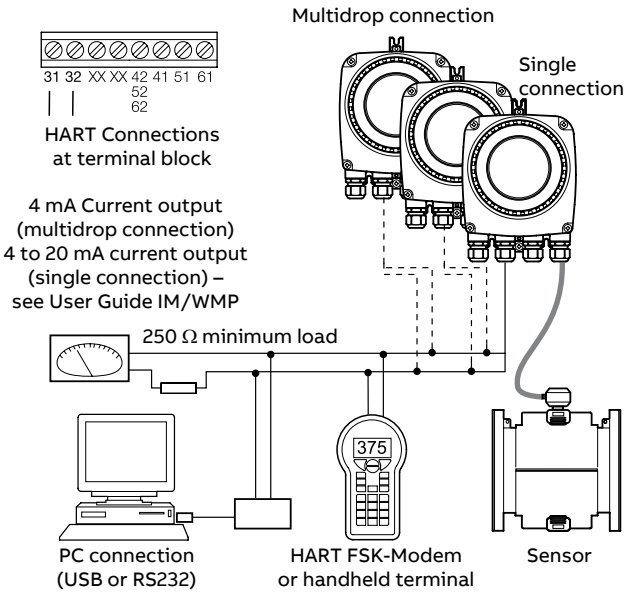
*These 2 test points are connected on the HART FEX100 backplane only (they are present on the PROFIBUS FEX100-DP / MODBUS FEX100-MB backplane but not connected)

Digital communication

The transmitter has the following options for digital communication.

HART protocol

The unit is registered with HART Communication Foundation.



HART protocol	
Configuration	Directly on the Device Software Asset Vision Basic (+ HART – DTM)
Transmission	Install a HART modem (FSK [Frequency Shift Keyed]-Modem) for HART-Communication when connecting to a PC. The HART-Modem converts the analog 4 to 20 mA signal into a digital output signal (Bell Standard 202) and connects to the PC using a USB (or RS232C) connector
Max. signal amplitude	1.2 mA
Current output load	Min. 250W, max. = 560W
Cable	AWG 24 twisted
Max. cable length	1500 m (4921 ft.)
Baud rate	1.200 baud

System integration

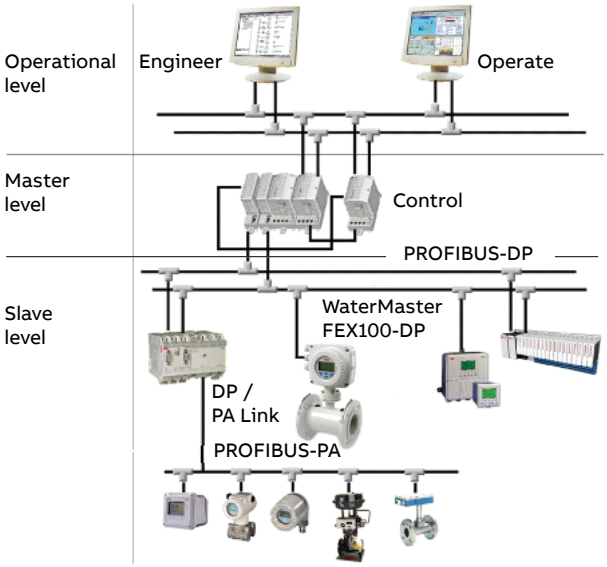
WaterMaster can be integrated into control systems and configuration devices using any Frame application, such as ABB AssetVision or similar third-party applications. ABB Device Type Managers (DTMs) for WaterMaster provide a unified structure for accessing device parameters, configuring and operating the devices and diagnosing problems. FDT (Field Device Tool) technology standardizes the communication and configuration interface between all field devices and host systems.

PROFIBUS DP protocol

PROFIBUS is a manufacturer-independent, open Fieldbus standard for a wide range of applications in manufacturing, process and building automation. Manufacturer independence and openness are ensured by the international standard EN 50170.

PROFIBUS DP ID no.	0x3431
Alternative standard ID no.	0x9701 or 0x9741
Configuration	Directly on the device Software Asset Vision Basic (+PROFIBUS DP-DTM)
Transmission signal	Accuracy to IEC 61158-2
Cable	Shielded, twisted cable (accurate to IEC 61158-2, types A or B)

All devices are connected in a bus structure ('line') as shown in below. Up to 32 stations (master or slaves) can be linked to create one 'segment', although it is recommended not to install more than 16 devices on a single segment. Each end of a segment must be terminated by an active bus terminating resistor. Both bus terminators must always be powered to ensure fault-free operation, therefore it is strongly recommended that they are connected to a back-up power supply. The use of bus amplifiers (repeaters) and segment couplers can be used to extend the network.



System integration

The GSD file for WaterMasters specifies the device-specific Ident No. 3431. It conforms to the PROFIBUS standard, providing a clear and comprehensive description of each instrument in a precisely defined format.

This enables the system configuration tool to use the information automatically when configuring a PROFIBUS bus system.

The ABB GSD file (Ident No. 3431) is divided into 2 sections:

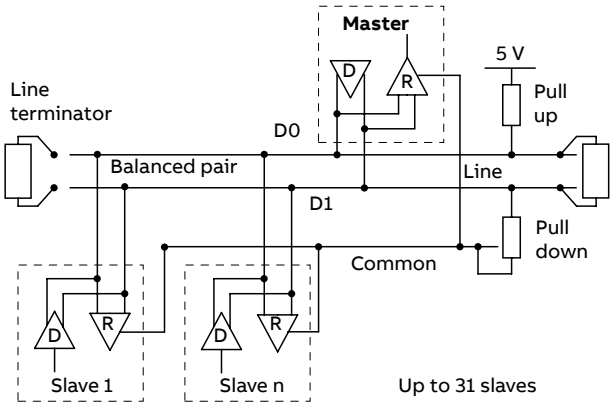
- General specifications
  - Identification of the device, together with hardware and software versions, baud rates supported and the possible time intervals for monitoring times.
- DP slave-related specifications
  - Information about the user parameter block for device-specific configuration and modules containing details of the input and output data that can be exchanged cyclically with a PROFIBUS master.

The WaterMaster GSD file (ABB_3431.gsd) is available for download from the ABB website at: www.abb.com/fieldbus (follow the link for PROFIBUS DP field devices).

MODBUS protocol

MODBUS is an open standard that is owned and administered by an independent group of device manufacturers called the Modbus Organization (www.modbus.org).

Using the MODBUS protocol, devices from different manufacturers exchange information on the same communications bus without the need for special interface equipment. WaterMaster FEX100-MB follows the specification for Modbus Over Serial Line V1.02, using 2-wire TIA/EIA-485 (RS485) physical layer.



For example, WaterMaster FEX100–MOD

Cable Properties

The end-to-end length of the trunk cable must be limited. The maximum length depends on the Baud rate, the cable (gauge, capacitance or characteristic impedance), the number of loads on the daisy chain and the network configuration (2-wire or 4-wire).

For 9600 Baud rate and AWG26 (or wider) gauge, the maximum length is 1000 m (3280 ft.). Where 4-wire cabling is used as a 2-wire cabling system the maximum length must be divided by 2. The tap cables must be short, never more than 20 m (65.6 ft.). If a multi-port tap is used with n derivations, each one must have a maximum length of 40 m (131 ft.) divided by n.

The maximum serial data transmission line length for RS485 systems is 1200 m (3937 ft.). The lengths of cable that can be used are determined by the cable type, typically:

- Up to 6 m (19.7 ft.) – standard screened or twisted pair cable.
- Up to 300 m (984 ft.) – twin twisted pair with overall foil screen and an integral drain wire – for example, Belden 9502 or equivalent.
- Up to 1200 m (3937 ft.) – twin twisted pair with separate foil screens and integral drain wires – for example, Belden 9729 or equivalent.

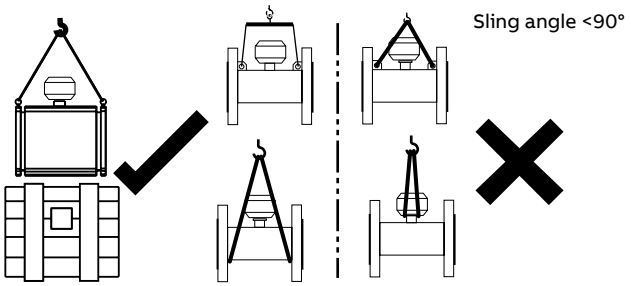
Category 5 cables may be used for RS485-MODBUS to a maximum length of 600 m (1968 ft.). For the balanced pairs used in an RS485-system, a characteristic impedance with value higher than 100W is preferred especially for 19200 and higher Baud rates.

Installation requirements

This section is intended to give an overview of installation of a flowmeter. For Installation requirements, technical information and Health and Safety precautions refer to User Guide OI/FEF/FEV/FEW–EN.

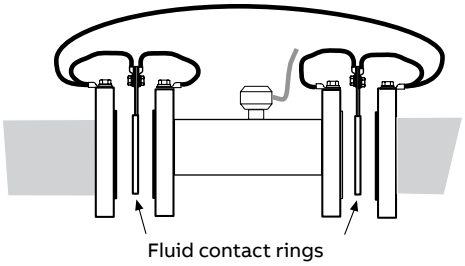
Unpacking the flowmeter

Care must be taken when lifting the flowmeter to use the lifting hooks provided or sling under the body of the meter. Never lift using the terminal connection box of the sensor cable as this will cause damage and invalidate warranty.



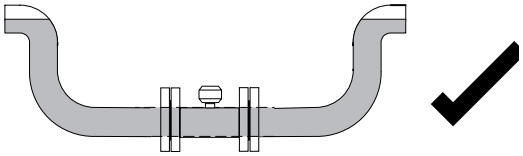
Grounding

The flowmeter sensor must be cross-bonded to the upstream and downstream pipes. For technical reasons, this potential should be identical to the potential of the metering fluid. The fluid connection is made by installing 2 fluid contact rings (for grounding).



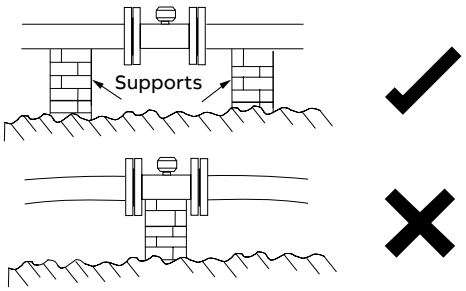
Mounting

The installation conditions shown below must be observed to achieve the best operational results.
The sensor tube must always be completely full.

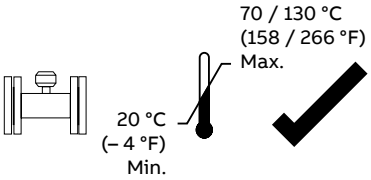


The flow direction must correspond to the identification plate. The device measures the flowrate in both directions. Forward flow is the factory setting.

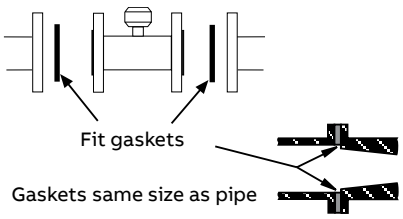
The devices must be installed without mechanical tension (torsion, bending). If required support the pipeline.



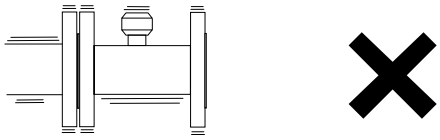
The flange seals must be made from a compatible material for the fluid and fluid temperatures if required.



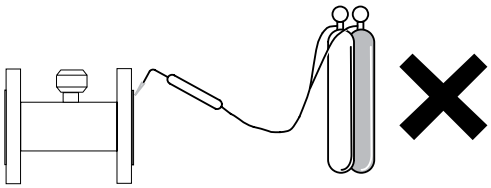
Seals must not extend into the flow area since possible turbulence could influence the device accuracy.



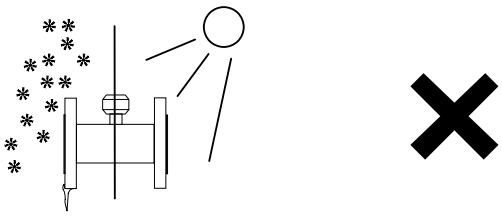
The pipeline may not exert any unallowable forces and torques on the device, such as vibration.



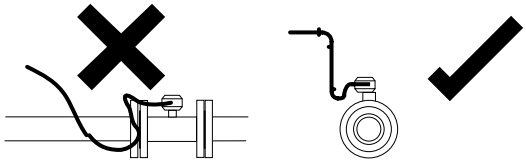
The flowmeter must not be submitted to any localized heat during installation; take care to remember this is a measuring instrument.



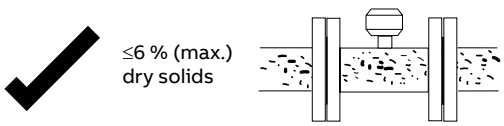
The flowmeter must not be exposed to direct sunlight or provide for appropriate sun protection where necessary.



The cable to the flowmeter should be installed neatly or within a conduit, both loose or conduit should have a u shape below the terminal connection box height to allow any water run off to avoid any capillary action into the flowmeter sensor.

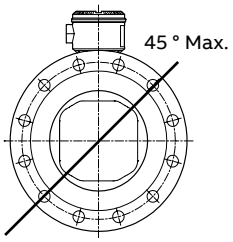


Ensure a maximum 6 % dry solids content flow through pipe – for higher dry solids content, refer to ABB's ProcessMaster range.



Electrode axis

Electrode axis should be horizontal if at all possible or no more than 45° from horizontal.



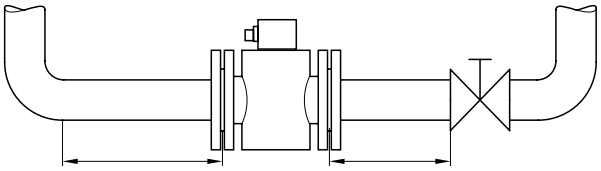
Upstream and Downstream pipe sections

The metering principle is tolerant of the flow profile.

- Wherever possible do not install fittings (for example, manifolds, valves) directly in front of the flowmeter sensor.
- Butterfly valves should be installed so that the valve plate does not extend into the flowmeter sensor.
- Valves or other turn-off components should be installed in the Downstream pipe section.

Experience has shown that, in most installations, straight upstream sections 3 x DN long and straight downstream sections 2 x DN long are normally sufficient. We would recommend conditions of 5 x DN straight upstream and 2 x DN straight downstream where possible.

For reduced-bore meters (FER), these straight pipe sections are often not necessary.



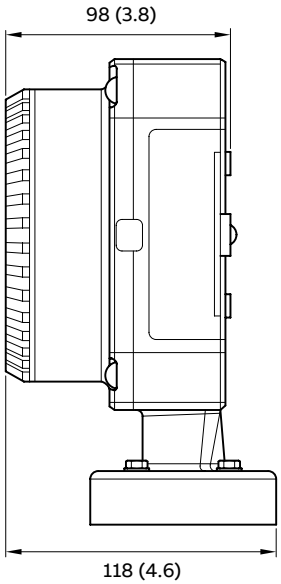
5 x DN (FEW, FEF)
0 x DN (FER)
5 x DN (FEV)

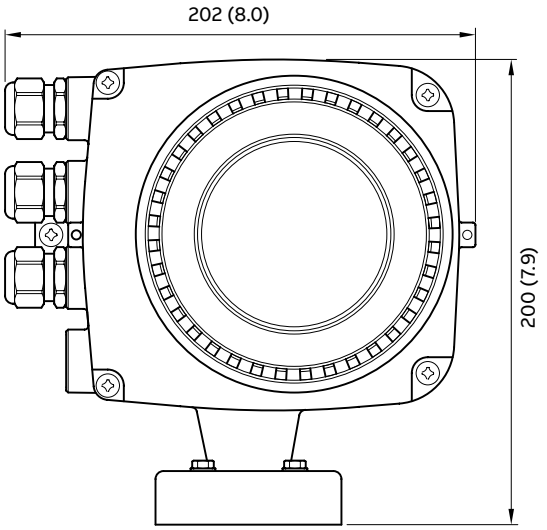
2 x DN (FEW, FEF)
0 x DN (FER)
0 x DN (FEV)

Transmitter dimensions

Integral transmitter

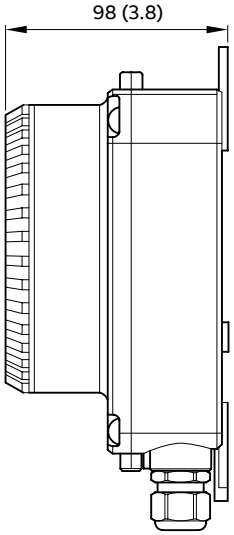
Dimensions in mm (in.)

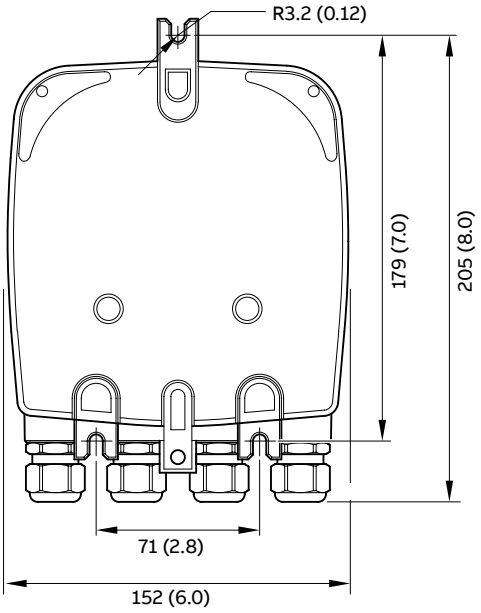




Remote transmitter

Dimensions in mm (in.)

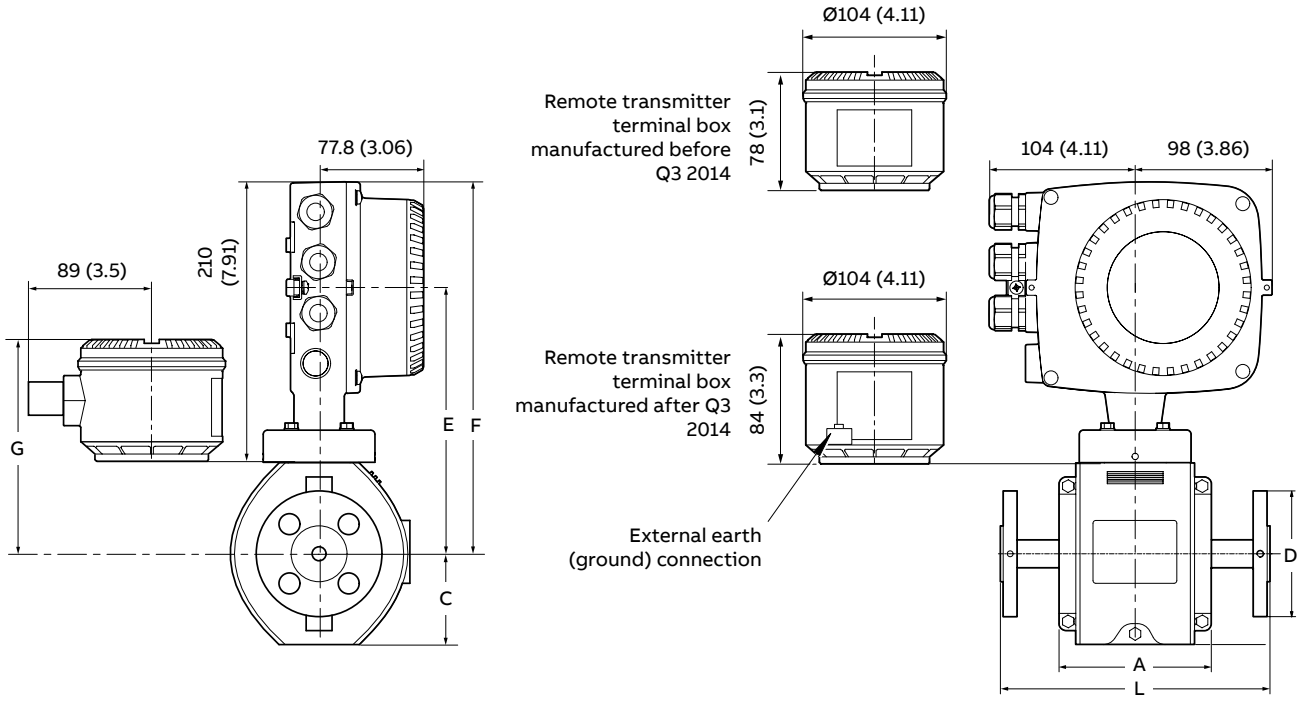




Sensor dimensions

FEW – DN10 to 125 (⅜ to 5 in. NB)

Dimensions in mm (in.)



DN10 to 125 (⅜ to 5 in. NB) (FEW)

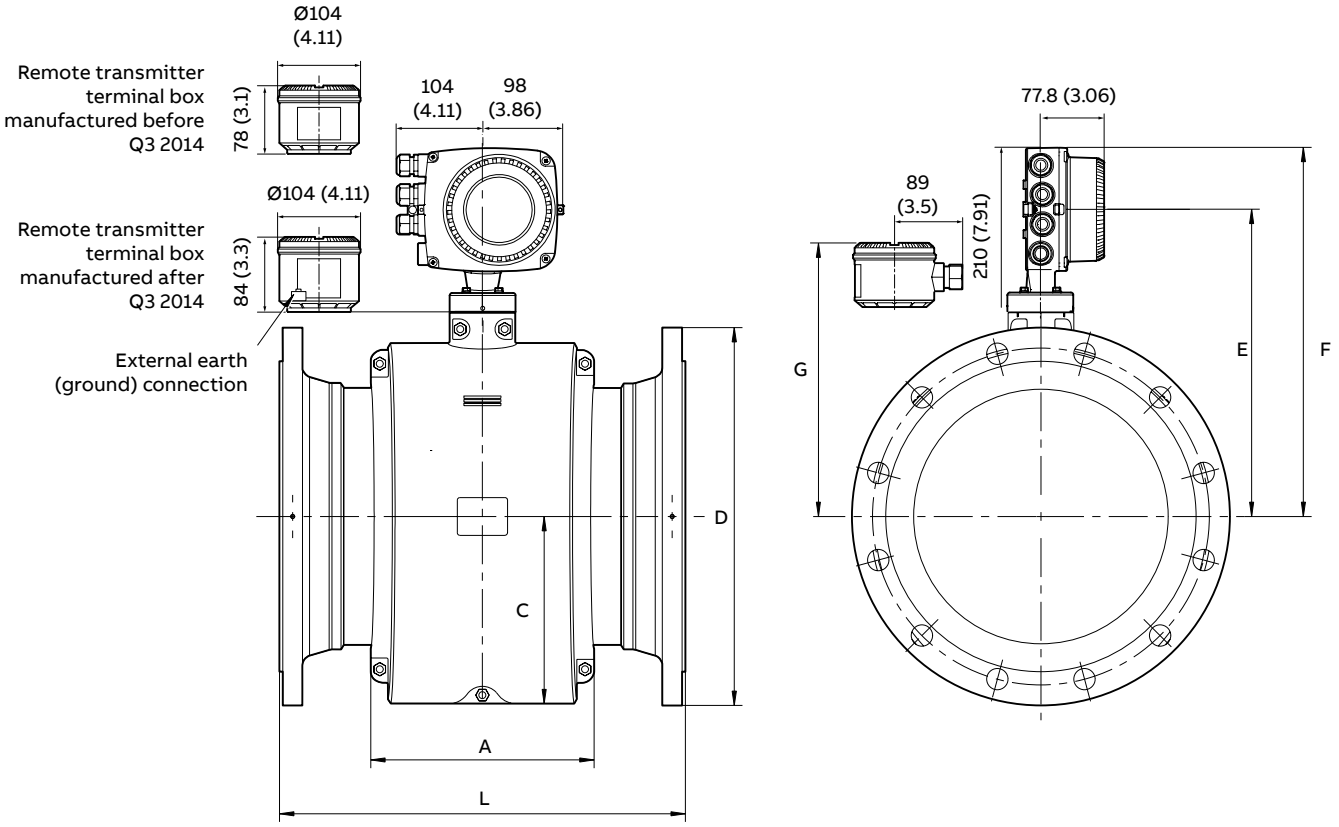
...Sensor dimensions

DN	Process connection type	Dimensions in mm (in.)							Approx. weight in kg (lb)	
		D	L	F	C	E	G	A	Integral	Remote
DN10 (3/8 in.)	JIS10K	90 (3.54)	200 (7.87)	268 (10.55)	82 (3.23)	193 (7.6)	148 (5.83)	113 (4.45)	6 (13)	4 (9)
	PN10 to 40	90 (3.54)								
	ASME B16.5 CL150	90 (3.54)								
	ASME B16.5 CL300	96 (3.78)								
DN15 (1/2 in.)	PN10 to 40	95 (3.74)								
	JIS5K	80 (3.15)								
	JIS10K	95 (3.74)								
	ASME B16.5 CL300	95 (3.74)								
	ASME B16.5 CL150	90 (3.54)								
DN20 (3/4 in.)	PN10 to 40	105 (4.13)							8 (18)	6 (13)
	JIS5K	85 (3.35)								
	JIS10K	100 (3.94)								
	ASME B16.5 CL300	115 (4.53)								
	ASME B16.5 CL150	98 (3.86)								
DN25 (1 in.)	PN10 to 40	115 (4.53)		268 (10.55)	82 (3.23)	193 (7.6)	148 (5.83)	113 (4.45)	9 (20)	7 (15)
	JIS5K	95 (3.74)								
	JIS10K	125 (4.88)								
	ASME B16.5 CL300	125 (4.88)								
	ASME B16.5 CL150	108 (4.25)								
DN32 (1 1/4 in.)	PN10 to 40	140 (5.51)		275 (10.83)	92 (3.62)	200 (7.87)	155 (6.10)	113 (4.45)	10 (22)	8 (18)
	JIS5K	115 (4.53)								
	JIS10K	135 (5.31)								
	ASME B16.5 CL300	135 (5.31)								
	ASME B16.5 CL150	117 (4.61)								
DN40 (1 1/2 in.)	PN10 to 40	150 (5.91)							11 (24)	9 (20)
	JIS5K	120 (4.72)								
	JIS10K	140 (5.51)								
	ASME B16.5 CL300	155 (6.10)								
	ASME B16.5 CL150	127 (5.00)								
DN50 (2 in.)	PN10 to 40	165 (6.5)	200 (7.87)	281 (11.06)	97 (3.82)	206 (8.11)	161 (6.34)	115 (4.53)	12 (26)	10 (22)
	JIS5K	130 (5.12)								
	JIS10K	155 (6.10)								
	AS4087 PN16	150 (5.91)								
	AS4087 PN35	165 (6.50)								
	ASME B16.5 CL150	152 (5.98)								
	ASME B16.5 CL300	165 (6.50)								
DN65 (2 1/2 in.)	PN10 to 40	185 (7.28)		292 (11.50)	108 (4.25)	217 (8.54)	172 (6.77)	104 (4.09)	13 (29)	11 (24)
	JIS5K	155 (6.10)								
	JIS10K	175 (6.89)								
	AS4087 PN16	165 (6.50)								
	AS4087 PN35	185 (7.28)								
	ASME B16.5 CL150	178 (7.01)								
	ASME B16.5 CL300	190 (7.48)							15 (33)	13 (29)
DN80 (3 in.)	PN10 to 40	200 (7.87)		292 (11.5)	108 (4.25)	217 (8.54)	172 (6.77)	104 (4.09)	17 (37)	15 (33)
	JIS5K	180 (7.09)								
	JIS10K	185 (7.28)								
	AS4087 PN16	185 (7.28)								
	AS4087 PN35	205 (8.07)								
	ASME B16.5 CL150	190 (7.48)								
	ASME B16.5 CL300	210 (8.28)							19 (42)	17 (37)
DN100 (4 in.)	PN10 to 16	220 (8.66)	250 (9.84)	314 (12.36)	122 (4.8)	239 (9.41)	194 (7.64)	125 (4.92)	19 (42)	17 (37)
	PN25 to 40	235 (9.25)							23 (51)	21 (46)
	JIS5K	200 (7.87)							19 (42)	17 (37)
	JIS10K	210 (8.27)								
	AS4087 PN16	215 (8.46)								
	AS4087 PN35	230 (9.06)							23 (51)	21 (46)
	ASME B16.5 CL300	255 (1.04)							30 (66)	28 (62)
	ASME B16.5 CL150	229 (9.00)							21 (51)	19 (42)
DN125 (5 in.)	PN10 to 16	250 (9.84)		324 (12.76)	130 (5.12)	249 (9.8)	204 (8.03)	125 (4.92)	22 (48)	20 (44)
	PN25 to 40	270 (10.63)							29 (64)	27 (59)
	JIS5K	235 (9.25)							22 (48)	20 (44)
	JIS10K	250 (9.84)								
	ASME B16.5 CL150	254 (10.00)								
	ASME B16.5 CL300	280 (11.02)							35 (77)	33 (73)

DN10 to 125 (3/8 to 5 in. NB) (FEW) dimensions / weights

FEW – DN150 to 400 (6 to 16 in. NB)

Dimensions in mm (in.)



DN150 to 400 (6 to 16 in. NB) (FEW)

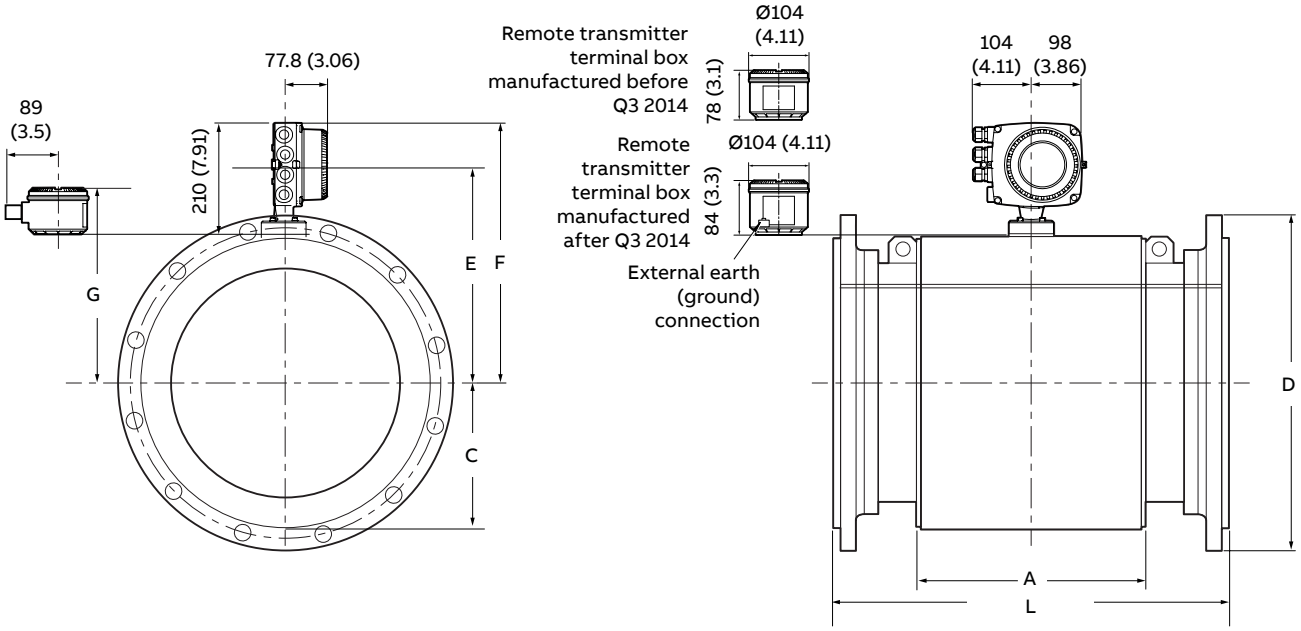
...Sensor dimensions

DN	Process connection type	Dimensions in mm (in.)							Approx. weight in kg (lb)	
		D	L	F	C	E	G	A	Integral	Remote
DN150 (6 in.)	PN10 to 16	285 (11.22)	300 (11.81)	371 (14.61)	146 (9.88)	296 (11.65)	251 (9.88)	166 (6.54)	33 (73)	31 (68)
	PN25 to 40	300 (11.81)							39 (86)	37 (81)
	JIS5K	265 (10.43)							33 (73)	31 (68)
	JIS10K	280 (11.02)							33 (73)	31 (68)
	AS4087 PN16	280 (11.02)							33 (73)	31 (68)
	AS4087 PN35	305 (11.81)							39 (86)	37 (81)
	ASME B16.5 CL300	320 (12.60)							47 (103)	45 (99)
	ASME B16.5 CL150	279 (10.98)							33 (73)	31 (68)
DN200 (8 in.)	PN10	340 (13.39)	350 (13.78)	411 (16.18)	170 (6.69)	336 (13.23)	291 (11.46)	200 (7.87)	41 (90)	39 (86)
	PN16	340 (13.39)							41 (90)	39 (86)
	PN25	360 (14.17)							55 (121)	53 (117)
	PN40	375 (14.76)							65 (143)	63 (139)
	AS4087 PN16	335 (13.19)							41 (90)	39 (86)
	AS4087 PN35	370 (14.57)							65 (143)	63 (139)
	JIS5K	320 (12.60)							41 (90)	39 (86)
	JIS10K	330 (12.99)							41 (90)	39 (86)
	ASME B16.5 CL300	380 (14.96)							72 (158)	70 (154)
	ASME B16.5 CL150	345 (13.58)							50 (110)	48 (106)
DN250 (10 in.)	PN10	395 (15.55)	450 (17.72)	426 (16.77)	198 (7.80)	351 (13.82)	306 (12.05)	235 (9.62)	61 (134)	59 (130)
	PN16	405 (15.94)							65 (143)	63 (139)
	PN25	425 (16.73)							84 (185)	82 (180)
	PN40	450 (17.72)							95 (209)	93 (205)
	AS4087 PN16	405 (15.94)							65 (143)	63 (139)
	AS4087 PN35	430 (16.93)							95 (209)	93 (205)
	JIS5K	385 (15.16)							65 (143)	63 (139)
	JIS10K	400 (15.75)							65 (143)	63 (139)
	ASME B16.5 CL300	445 (17.52)							105 (231)	103 (227)
	ASME B16.5 CL150	405 (15.94)							70 (154)	68 (150)
DN300 (12 in.)	PN10	445 (17.52)	500 (19.69)	449 (17.68)	228 (8.98)	374 (14.72)	329 (12.95)	272 (10.71)	74 (163)	72 (158)
	PN16	460 (18.11)							80 (176)	78 (172)
	PN25	485 (19.09)							100 (220)	98 (216)
	JIS5K	430 (16.93)							80 (176)	78 (172)
	JIS10K	445 (17.52)							80 (176)	78 (172)
	AS4087 PN16	455 (17.91)							80 (176)	78 (172)
	AS4087 PN35	490 (19.29)							130 (286)	128 (282)
	ASME B16.5 CL300	520 (20.47)							150 (330)	148 (326)
	ASME B16.5 CL150	485 (19.09)							105 (231)	103 (227)
	PN40	515 (20.28)	600 (23.62)						130 (286)	128 (282)
DN350 (14 in.)	PN10	505 (19.88)	550 (21.65)	464 (18.27)	265 (10.43)	389 (15.31)	344 (13.54)	322 (12.68)	95 (209)	93 (205)
	PN16	520 (20.47)							110 (242)	108 (238)
	PN25	555 (21.85)							145 (319)	143 (315)
	JIS5K	480 (18.90)							95 (209)	93 (205)
	JIS10K	490 (19.29)							95 (209)	93 (205)
	AS4087 PN16	525 (20.67)							130 (286)	128 (282)
	AS4087 PN35	550 (21.65)							185 (407)	183 (403)
	ASME B16.5 CL300	585 (23.03)							140 (308)	138 (304)
	ASME B16.5 CL150	535 (21.06)							105 (231)	103 (227)
	PN40	580 (22.83)	650 (25.59)						195 (429)	193 (425)
DN400 (16 in.)	PN10	565 (22.24)	600 (23.62)	506 (19.92)	265 (10.43)	431 (16.97)	386 (15.20)	322 (12.68)	103 (227)	101 (222)
	PN16	580 (22.83)							126 (277)	124 (273)
	PN25	620 (24.41)							170 (374)	168 (370)
	JIS5K	540 (21.26)							103 (227)	101 (223)
	JIS10K	560 (22.05)							116 (255)	114 (251)
	AS4087 PN16	580 (22.83)							154 (339)	152 (335)
	AS4087 PN35	610 (24.02)							302 (664)	300 (660)
	ASME B16.5 CL300	650 (25.59)							265 (583)	263 (578)
	ASME B16.5 CL150	600 (23.62)							175 (385)	173 (381)
	PN40	660 (25.98)	650 (25.59)						258 (568)	256 (564)

DN150 to 400 (6 to 16 in. NB) (FEW) dimensions / weights

FEW – DN450 to 600 (18 to 24 in. NB)

Dimensions in mm (in.)



DN450 to 2400 (18 to 96 in. NB) (FEW)

DN	Process connection type	Dimensions in mm (in.)							Approx. weight in kg (lb)	
		D	L	F	C	E	G	A	Integral	Remote
DN450 (18 in.)	PN10	615 (24.21)	600 (23.62)	514 (20.24)	310 (12.20)	439 (17.28)	394 (15.51)	328 (12.91)	173 (381)	171 (377)
	PN16	640 (25.20)							188 (414)	186 (410)
	JIS5K	605 (23.82)							165 (364)	163 (359)
	JIS10K	620 (24.41)							177 (390)	175 (386)
	AS4087 PN16	640 (25.20)							232 (511)	230 (507)
	AS4087 PN35	675 (26.57)							328 (723)	326 (718)
	ASME B16.5 CL300	710 (27.95)							368 (811)	366 (807)
	ASME B16.5 CL150	635 (25.00)							250 (551)	248 (547)
	PN25	670 (26.38)	686 (27.01)						245 (540)	243 (536)
	PN40	685 (26.97)							315 (694)	313 (690)
DN500 (20 in.)	PN10	670 (26.38)	600 (23.62)	514 (20.24)	310 (12.20)	439 (17.28)	394 (15.51)	367 (14.45)	190 (418)	188 (413)
	PN16	715 (28.15)							240 (528)	238 (524)
	JIS5K	655 (25.79)							190 (418)	188 (413)
	JIS10K	675 (26.57)								
	AS4087 PN16	705 (27.76)							290 (638)	288 (634)
	AS4087 PN35	735 (28.94)							435 (957)	433 (953)
	ASME B16.5 CL150	700 (27.56)							300 (660)	298 (656)
	ASME B16.5 CL300	775 (30.51)	762 (30.00)						490 (1080)	488 (1076)
	PN25	730 (28.74)	700 (27.56)						300 (661)	298 (657)
	PN40	755 (29.72)	762 (30.00)						392 (864)	390 (860)
DN600 (24 in.)	PN10	780 (30.71)	800 (31.50)	565 (22.24)	361 (14.21)	490 (19.29)	445 (17.52)	469 (18.46)	284 (626)	282 (622)
	PN16	840 (33.07)							318 (700)	316 (695)
	PN25	845 (33.27)							460 (1012)	458 (1008)
	JIS5K	770 (30.31)							275 (605)	273 (600)
	JIS10K	795 (31.30)							306 (673)	304 (668)
	AS4087 PN16	825 (32.48)							382 (840)	380 (835)
	AS4087 PN35	850 (33.46)							452 (994)	450 (990)
	ASME B16.5 CL300	915 (36.02)							550 (1210)	548 (1205)
	ASME B16.5 CL150	815 (32.09)							425 (935)	423 (930)
	PN40	890 (35.04)	890 (35.04)						600 (1320)	598 (1316)

DN450 to 600 (18 to 24 in. NB) (FEW) dimensions / weights

…Sensor dimensions

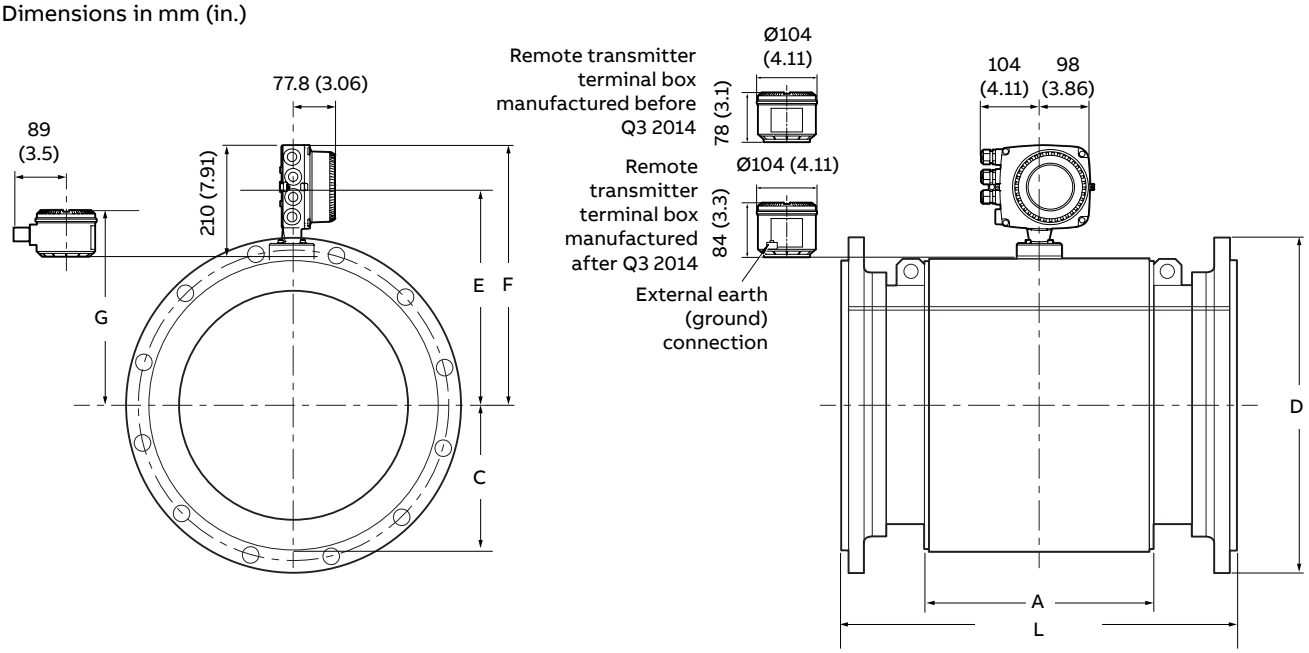
FEW – DN700 to 2400 (28 to 96 in. NB) for optional lay length 1.3 x DN (Ordering code JK)

Note:

For DN700 to 2400, FEW is available in two different lay lengths:

- For lay lengths that are 1.3 times the nominal diameter (where L = 1.3 × DN), refer to pages 28 to 31.
- For lay lengths that are 1.0 x times the nominal diameter (where L = 1.0 × DN), refer to pages 32 to 35.

Dimensions in mm (in.)



DN700 to 2400 (28 to 96 in. NB) (FEW)

DN	Process connection type	Dimensions in mm (in.)							Approx. weight in kg (lb)	
		D	L (1.3 × DN)	F	C	E	G	A	Integral	Remote
DN700 (28 in.)	JIS 5K	875 (34.45)	910 (35.83)	604 (23.77)	403 (15.87)	528 (20.79)	494 (19.44)	444 (17.48)	261 (575)	259 (570)
	JIS 10K	905 (35.63)							326 (718)	324 (713)
	PN6	860 (33.86)							232 (511)	230 (506)
	PN10	895 (35.24)							320 (704)	318 (700)
	PN16	910 (35.83)							440 (968)	438 (964)
	AWWA C207 CLASS B	927 (36.50)							296 (652)	294 (647)
	AWWA C207 CLASS D	927 (36.50)							327 (720)	325 (715)
	AS4087 PN16	910 (35.83)							404 (889)	402 (885)
	AS2129 TABLE-D	910 (35.83)							308 (678)	306 (674)
	AS2129 TABLE-E	910 (35.83)							382 (841)	380 (836)
	PN25	960 (37.80)							487 (1072)	485 (1067)
	PN40	995 (39.17)							632 (1391)	630 (1386)
	AWWA C207 CLASS E	927 (36.50)							519 (1142)	517 (1138)
	AWWA C207 CLASS F	1035 (40.75)							764 (1681)	762 (1677)
	AS4087 PN35	935 (36.80)							584 (1285)	582 (1281)
	ASME CL150 SERIES A	925 (36.42)							548 (1206)	546 (1202)
	ASME CL150 SERIES B	835 (32.87)							368 (810)	366 (806)
	ASME CL300 SERIES B	920 (36.22)							680 (1496)	678 (1492)
DN750 (30 in.)	JIS 5K	945 (37.20)	990 (38.98)	630 (24.79)	429 (16.89)	554 (21.81)	520 (20.47)	444 (17.48)	299 (658)	297 (654)
	JIS 10K	970 (38.19)							375 (825)	373 (821)
	AWWA C207 CLASS B	984 (38.74)							324 (713)	322 (709)
	AWWA C207 CLASS D	984 (38.74)							395 (869)	393 (865)
	AS4087 PN16	995 (39.17)							516 (1136)	514 (1131)
	AS2129 TABLE-D	995 (39.17)							390 (858)	388 (854)
	AS2129 TABLE-E	995 (39.17)							503 (1107)	501 (1103)
	AWWA C207 CLASS E	984 (38.74)							547 (1204)	545 (1199)
	AWWA C207 CLASS F	1092 (43.99)							843 (1855)	841 (1851)
	AS4087 PN35	1015 (39.96)							713 (1569)	711 (1565)
	ASME CL150 SERIES A	985 (38.78)							593 (1305)	591 (1301)
	ASME CL150 SERIES B	885 (34.84)							368 (810)	366 (806)
	ASME CL300 SERIES B	990 (38.98)							797 (1754)	795 (1749)
DN800 (32 in.)	JIS 5K	995 (39.17)	1040 (40.04)	654 (25.74)	453 (17.83)	578 (22.76)	544 (21.42)	542 (21.34)	332 (731)	330 (726)
	JIS 10K	1020 (40.16)							417 (918)	415 (913)
	PN6	975 (38.39)							285 (627)	283 (623)
	PN10	1015 (39.96)							420 (924)	418 (920)
	PN16	1025 (40.35)							490 (1078)	488 (1074)
	AWWA C207 CLASS B	1060 (41.73)							384 (845)	382 (841)
	AWWA C207 CLASS D	1060 (41.73)							463 (1019)	461 (1015)
	AS4087 PN16	1060 (41.73)							583 (1283)	581 (1279)
	AS2129 TABLE-D	1060 (41.73)							440 (968)	438 (964)
	AS2129 TABLE-E	1060 (41.73)							572 (1259)	570 (1254)
	PN25	1085 (42.72)							643 (1415)	641 (1411)
	PN40	1140 (44.88)							919 (2022)	917 (2018)
	AWWA C207 CLASS E	1060 (41.73)							689 (1516)	687 (1512)
	AWWA C207 CLASS F	1150 (45.28)							954 (2099)	952 (2095)
	AS4087 PN35	1060 (41.73)							802 (1765)	800 (1760)
	ASME CL150 SERIES A	1060 (41.73)							751 (1653)	749 (1648)
	ASME CL150 SERIES B	940 (37.01)							456 (1004)	454 (999)
	ASME CL300 SERIES B	1055 (41.54)							985 (2167)	983 (2163)
DN900 (36 in.)	JIS 5K	1095 (43.11)	1170 (46.06)	705 (27.7()	504 (19.84)	629 (24.76)	595 (23.43)	570 (22.44)	428 (942)	426 (938)
	JIS 10K	1120 (44.09)							504 (1109)	502 (1105)
	PN6	1075 (42.32)							354 (779)	352 (775)
	PN10	1115 (43.90)							505 (1111)	503 (1107)
	PN16	1125 (44.29)							590 (1298)	588 (1294)
	AWWA C207 CLASS B	1168 (45.98)							480 (1056)	478 (1052)
	AWWA C207 CLASS D	1168 (45.98)							556 (1224)	554 (1219)
	AWWA C207 CLASS E	1168 (45.98)							889 (1956)	887 (1952)
	AWWA C207 CLASS F	1270 (50.00)							1214 (2671)	1212 (2667)
	AS4087 PN16	1175 (46.26)							766 (1686)	764 (1681)
	AS2129 TABLE-D	1175 (46.26)							574 (1263)	572 (1259)
	AS2129 TABLE-E	1175 (46.26)							753 (1657)	751 (1653)
	PN25	1185 (46.65)							843 (1855)	841 (1851)
	PN40	1250 (49.21)							1219 (2682)	1217 (2678)
	AS4087 PN35	1185 (46.65)							1103 (2427)	1101 (2423)
	ASME CL150 SERIES A	1170 (46.06)							1022 (2249)	1020 (2244)
	ASME CL150 SERIES B	1055 (41.54)							655 (1441)	653 (1437)
	ASME CL300 SERIES B	1170 (46.06)							1206 (2654)	1204 (2649)

DN700 to 900 (28 to 36 in. NB) (FEW) dimensions / weights

…Sensor dimensions

…FEW – DN700 to 2400 (28 to 96 in. NB) for optional lay length 1.3 × DN (Ordering code JK)

DN	Process connection type	Dimensions in mm (in.)							Approx. weight in kg (lb)	
		D	L (1.3 × DN)	F	C	E	G	A	Integral	Remote
DN1000 (40 in.).	JIS 5K	1195 (47.05)	1300 (51.18)	755 (29.71)	554 (21.81)	679 (26.73)	645 (25.40)	624 (24.57)	512 (1127)	510 (1122)
	JIS 10K	1235 (48.62)							643 (1415)	641 (1411)
	PN6	1175 (46.26)							460 (1012)	458 (1008)
	PN10	1230 (48.43)							690 (1518)	688 (1514)
	PN16	1255 (49.41)							850 (1870)	848 (1866)
	AWWA C207 CLASS B	1289 (50.75)							578 (1272)	576 (1268)
	AWWA C207 CLASS D	1289 (50.75)							735 (1617)	733 (1613)
	AWWA C207 CLASS E	1289 (50.75)							1104 (2429)	1102 (2425)
	AWWA C207 CLASS F	1378 (54.25)							1445 (3179)	1443 (3175)
	AS4087 PN16	1255 (49.41)							903 (1987)	901 (1983)
	AS2129 TABLE-D	1255 (49.41)							682 (1501)	680 (1496)
	AS2129 TABLE-E	1255 (49.41)							905 (1991)	903 (1987)
	PN25	1320 (51.97)							1095 (2409)	1093 (2405)
	PN40	1360 (53.54)							1486 (3270)	1484 (3265)
	AS4087 PN35	1275 (50.20)							1316 (2896)	1314 (2891)
	ASME CL150 SERIES A	1290 (50.79)							1221 (2687)	1219 (2682)
	ASME CL300 SERIES A	1240 (48.82)							1421 (3127)	1419 (3122)
	ASME CL150 SERIES B	1175 (46.26)							809 (1780)	807 (1776)
	ASME CL300 SERIES B	1275 (50.20)							1560 (3432)	1558 (3428)
DN1050 (42 in.)	AWWA C207 CLASS B	1346 (5299)	1365 (53.74)	808 (31.82)	608 (23.92)	733 (28.84)	699 (27.52)	624 (24.57)	668 (1470)	666 (1466)
	AWWA C207 CLASS D	1346 (5299)							772 (1699)	770 (1694)
	AWWA C207 CLASS E	1346 (5299)							1246 (2742)	1244 (2737)
	AWWA C207 CLASS F	1448 (57.01)							1674 (3683)	1672 (3679)
	ASME CL150 SERIES B	1225 (48.23)							910 (2002)	908 (1998)
	ASME CL150 SERIES A	1345 (52.95)							1389 (3056)	1387 (3052)
	ASME CL300 SERIES A	1290 (50.79)							1626 (3578)	1624 (3573)
	ASME CL300 SERIES B	1335 (52.56)							1804 (3969)	1802 (3965)
DN1100 (44 in.)	JIS 5K	1305 (51.38)	1430 (56.30)						590 (1298)	588 (1294)
	JIS 10K	1345 (52.95)							770 (1694)	768 (1690)
	AWWA C207 CLASS B	1403 (55.24)							700 (1540)	698 (1536)
	AWWA C207 CLASS D	1403 (55.24)							891 (1961)	889 (1956)
	AWWA C207 CLASS E	1404 (55.26)							1289 (2836)	1287 (2832)
	AWWA C207 CLASS F	1505 (59.25)							1806 (3974)	1804 (3969)
	PN10	2760 (108.66)							728 (1602)	726 (1598)

DN1000 to 1100 (40 to 44 in. NB) (FEW) dimensions / weights

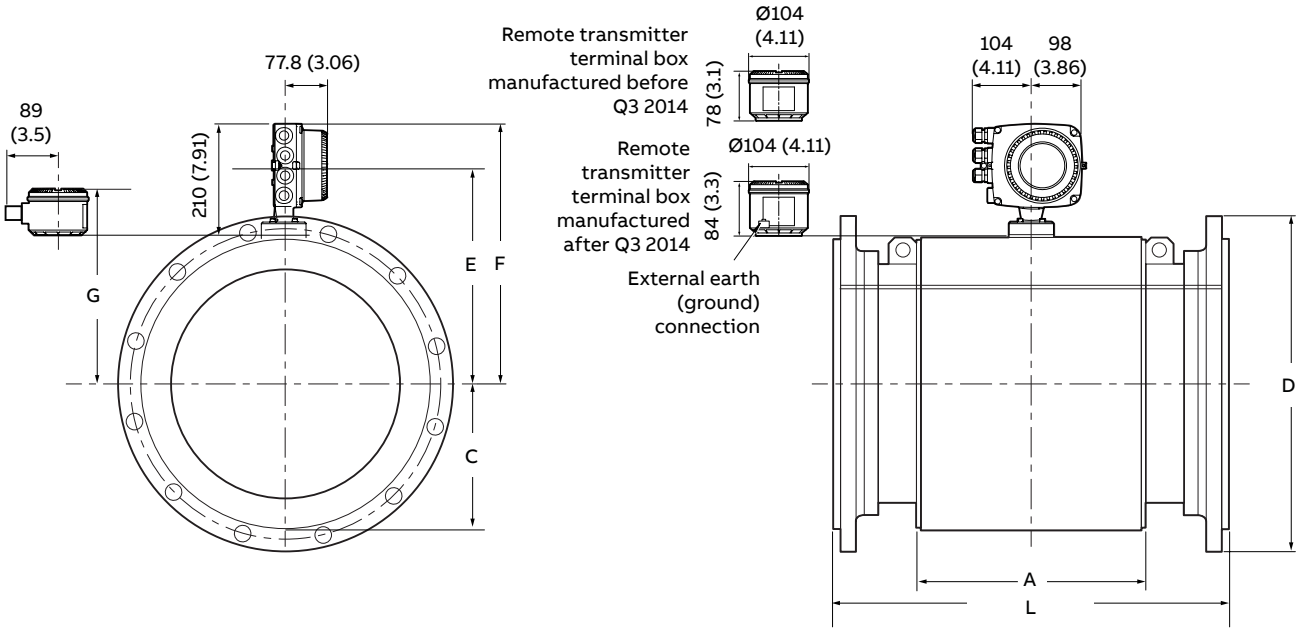
DN	Process connection type	Dimensions in mm (in.)							Approx. weight in kg (lb)	
		D	L (1.3 × DN)	F	C	E	G	A	Integral	Remote
DN1200 (48 in.)	JIS 5K	1420 (55.91)	1560 (61.42)	860 (33.85)	659 (25.94)	784 (30.87)	750 (29.52)	802 (31.57)	745 (1639)	743 (1635)
	JIS 10K	1465 (57.68)							1061 (2335)	1059 (2330)
	PN6	1405 (55.31)							700 (1540)	698 (1536)
	PN10	1455 (57.28)							930 (2046)	928 (2042)
	PN16	1485 (58.46)							1120 (2464)	1118 (2460)
	AWWA C207 CLASS B	1511 (59.49)							872 (1919)	870 (1914)
	AWWA C207 CLASS D	1511 (59.49)							1099 (2418)	1097 (2414)
	AWWA C207 CLASS E	1511 (59.49)							1557 (3426)	1555 (3421)
	AWWA C207 CLASS F	1651 (65.00)							2503 (5507)	2501 (5503)
	AS4087 PN16	1490 (58.66)							1348 (2966)	1346 (2962)
	AS2129 TABLE-D	1490 (58.66)							1118 (2460)	1116 (2456)
	AS2129 TABLE-E	1490 (58.66)							1367 (3008)	1365 (3003)
	PN25	1530 (60.24)							1654 (3639)	1652 (3635)
	PN40	1575 (62.01)							2229 (4904)	2227 (4900)
	AS4087 PN35	1530 (60.24)							2211 (4865)	2209 (4860)
	ASME CL150 SERIES A	1510 (59.45)							1802 (3965)	1800 (3960)
	ASME CL300 SERIES A	1465 (57.68)							2257 (4966)	2255 (4961)
	ASME CL150 SERIES B	1390 (54.72)							1178 (2592)	1176 (2588)
	ASME CL300 SERIES B	1510 (59.45)							2446 (5382)	2444 (5377)
DN1350 (54 in.)	AWWA C207 CLASS B	1683 (66.26)	1755 (69.09)						1119 (2462)	1117 (2458)
	AWWA C207 CLASS D	1683 (66.26)							1350 (2970)	1348 (2966)
	AWWA C207 CLASS E	1683 (66.26)							2079 (4574)	2077 (4570)
DN1400 (56 in.)	PN6	1630 (64.17)	1820 (71.65)	955 (37.59)	754 (29.69)	879 (34.61)	845 (33.27)	902 (35.51	819 (1802)	817 (1798)
	PN10	1675 (65.94)							1210 (2662)	1208 (2658)
	PN16	1685 (66.34)							1760 (3872)	1758 (3868)
	ASME CL150 SERIES B	1600 (62.99)							1706 (3754)	1704 (3749)
	PN25	1755 (69.09)							2483 (5463)	2481 (5459)
	PN40	1795 (70.67)							3202 (7045)	3200 (7040)
	ASME CL150 SERIES A	1745 (68.70)							2672 (5879)	2670 (5874)
	ASME CL300 SERIES A	1710 (67.32)							3490 (7678)	3488 (7674)
	ASME CL300 SERIES B	1765 (69.49)							3873 (8521)	3871 (8517)
DN1500 (60 in.)	JIS 5K	1730 (68.11)	1950 (76.77)	1065 (41.92)	864 (34.02)	989 (38.94)	955 (37.60)	910 (35.83)	1253 (2757)	1251 (2753)
	JIS 10K	1795 (70.67)							1728 (3802)	1726 (3798)
	ASME CL150 SERIES B	1725 (67.91)							2255 (4961)	2253 (4957)
	AWWA C207 CLASS B	1854 (72.99)							1460 (3212)	1458 (3208)
	AWWA C207 CLASS D	1854 (72.99)							1746 (3842)	1744 (3837)
	AWWA C207 CLASS E	1854 (72.99)							2775 (6105)	2773 (6101)
	ASME CL150 SERIES A	1855 (73.03)							3310 (7282)	3308 (7278)
	ASME CL300 SERIES A	1810 (71.26)							4075 (8965)	4073 (8961)
	ASME CL300 SERIES B	1880 (74.02							4384 (9645)	4382 (9641)
DN1600 (64 in.)	PN6	1830 (72.05)	2080 (81.89)	1066 (41.96)	865 (34.06)	990 (38.98)	956 (37.64)	1000 (39.37)	1180 (2596)	1178 (2592)
	PN10	1915 (75.39)							1630 (3586)	1628 (3582)
	PN25	1975 (77.76)							2150 (4730)	2148 (4726)
	PN16	1930 (75.98)							3373 (7421)	3371 (7417)
	PN40	2025 (79.72)							4548 (10006)	4546 (10002)
DN1650 (66 in.)	AWWA C207 CLASS B	2032 (80.00)	2145 (84.45)	1116 (43.94)	915 (36.02)	1040 (40.94)	1006 (39.60)	1000 (39.37)	1704 (3749)	1702 (3745)
	AWWA C207 CLASS D	2032 (80.00)							2225 (4895)	2223 (4891)
DN1800 (72 in.)	PN6	2045 (80.51)	2340 (92.13)	1181 (46.50)	980 (38.58)	1105 (43.50)	1071 (42.17)	1100 (43.31)	1490 (3278)	1488 (3274)
	PN10	2115 (83.27)							2230 (4906)	2228 (4902)
	PN16	2130 (83.86)							2900 (6380)	2898 (6376)
	PN25	2195 (86.42)							4649 (10228)	4647 (10224)
	AWWA C207 CLASS B	2197 (86.50)							2009 (4420)	2007 (4416)
	AWWA C207 CLASS D	2197 (86.50)							2622 (5769)	2620 (5764)
DN1950 (78 in.)	AWWA C207 CLASS B	2362 (92.99)	2535 (99.80)	1291 (50.81)	1090 (42.91)	1215 (47.83)	1181 (46.50)	1180 (46.46)	2615 (5753)	2613 (5749)
	AWWA C207 CLASS D	2362 (92.99)							3343 (7355)	3341 (7351)
DN2000 (80 in.)	PN6	2265 (89.17)	2600 (102.36)						1850 (4070)	1848 (4066)
	PN10	2325 (91.54)							2750 (6050)	2748 (6046)
	PN16	2345 (92.32)							3500 (7700)	3498 (7696)
	PN25	2425 (95.47)							6176 (13588)	6174 (13583)
DN2100 (84 in.)	AWWA C207 CLASS B	2534 (99.76)	2730 (107.48)	1395 (54.91)	1194 (47.01)	1319 (51.93)	1285 (50.60)	1180 (46.46)	3037 (6682)	3035 (6677)
	AWWA C207 CLASS D	2534 (99.76)							3883 (8543)	3881 (8539)
DN2200 (88 in.)	PN6	2475 (97.44)	2860 (112.60)					1330 (52.36)	2655 (5841)	2653 (5837)
	PN10	2550 (100.39)							3763 (8279)	3761 (8275)
DN2400 (96 in.)	PN6	2685 (105.71	3120 (122.83)	1495 (58.85)	1294 (50.94)	1419 (55.87)	1385 (54.53)	1450 (57.09)	3094 (6807)	3092 (6803)
	PN10	2760 (108.66)							4531 (9969)	4529 (9964)

DN1200 to 2400 (48 to 96 in. NB) (FEW) dimensions / weights

…Sensor dimensions

FEW – DN700 to 2400 (28 to 96 in. NB) for standard lay length 1.0 × DN (Ordering code JH)

Dimensions in mm (in.)



DN700 to 2400 (18 to 96 in. NB) (FEW)

DN	Process connection type*	Dimensions in mm (in.)							Approx. weight in kg (lb)	
		D	L (1.0 × DN)	F	C	E	G	A	Integral	Remote
DN700 (28 in.)	JIS 5K	875 (34.45)	700 (27.56)	604 (23.77)	403 (15.87)	528 (20.79)	488 (19.21)	424 (16.69)	213 (469.6)	211 (465.2)
	JIS 7.5K	928 (36.54)							266 (586.5)	264 (582.0)
	JIS 10k	905 (35.63)							251 (553.4)	249 (548.9)
	PN6	860 (33.86)							187 (412.3)	185 (407.9)
	PN10	895 (35.24)							234 (516)	233 (513.7)
	PN16	910 (35.85)							270 (595.3)	268 (590.8)
	AWWA C207 CLASS B	927 (36.50)							247 (544.6)	245 (540.1)
	AWWA C207 CLASS D	927 (36.50)							270 (5953)	268 (590.8)
	AS4087 PN16	910 (35.85)							356 (784.9)	354 (780.4)
	AS2129 TABLE-E	910 (35.85)							274 (604.1)	272 (599.7)
	PN25	960 (37.80)	800 (31.50)						419 (923.8)	417 (919.3)
	AWWA C207 CLASS E	927 (36.50)	762 (30.00)						434 (956.8)	432 (952.4)
	AWWA C207 CLASS F	1035 (40.75)							674 (1486)	672 (1481.5)
	ASME CL150 SERIES A	925 (36.42)	790 (31.10)						454 (1001)	452 (996.5)
	ASME CL300 SERIES A	1035 (40.75)	940 (37.00)						1002 (2209.1)	1000 (2204.6)
DN750 (30 in.)	JIS 5K	945 (37.20)	762 (30.0)	630 (24.79)	429 (16.89)	554 (21.81)	514 (20.23)	424 (16.69)	245 (540.2)	243 (535.7)
	JIS 10k	970 (38.19)							317 (698.9)	315 (694.4)
	AWWA C207 CLASS B	984 (38.74)							268 (590.9)	266 (586.4)
	AWWA C207 CLASS D	984 (38.74)							322 (709.9)	320 (705.5)
	AS4087 PN16	995 (39.17)							410 (903.9)	408 (899.5)
	AS2129 TABLE-E	995 (39.17)							350 (771.6)	348 (767.2)
	AWWA C207 CLASS E	984 (38.74)							472 (1040.6)	470 (1036.2)
	AWWA C207 CLASS F	1092 (43.99)							755 (1664.5)	753 (1660.1)
	ASME CL150 SERIES A	985 (38.78)	830 (32.68)						505 (1113.4)	503 (1108.9)
	ASME CL300 SERIES A	1090 (42.91)	975 (38.39)						1002 (2209.1)	1000 (2204.6)
DN800 (32 in.)	JIS 5K	995 (39.17)	800 (31.49)	654 (25.74)	453 (17.83)	578 (22.76)	538 (21.18)	542 (21.34)	280 (617.3)	278 (612.9)
	JIS 7.5K	1034 (40.71)							350 (771.6)	348 (767.2)
	JIS 10k	1020 (40.16)							328 (723.1)	326 (718.7)
	PN6	975 (38.39)							239 (526.9)	237 (522.5)
	PN10	1015 (39.96)							312 (687.9)	310 (683.4)
	PN16	1025 (40.35)						512 (20.16)	366 (806.9)	364 (802.5)
	AWWA C207 CLASS B	1060 (41.73)						542 (21.34)	334 (736.4)	332 (731.9)
	AWWA C207 CLASS D	1060 (41.73)							394 (868.7)	392 (864.2)
	AS4087 PN16	1060 (41.73)							482 (1062.7)	480 (1058.2)
	AS2129 TABLE-E	1060 (41.73)							410 (903.9)	408 (899.5)
	PN25	1085 (42.72)	950 (37.40)						599 (1320.6)	597 (1316.2)
	AWWA C207 CLASS E	1060 (41.73)	880 (34.65)						591 (1303)	589 (1298.5)
	AWWA C207 CLASS F	1150 (45.28)							886 (1953.4)	884 (1948.9)
	ASME CL150 SERIES A	1060 (41.73)	950 (37.40)						674 (1486)	672 (1481.5)
	ASME CL300 SERIES A	1150 (45.76)	1120 (44.09)						1219 (2687.5)	1217 (2683.0)
DN900 (36 in.)	JIS 5K	1095 (43.11)	900 (35.43)	705 (27.7)	504 (19.84)	629 (24.76)	589 (23.19)	570 (22.44)	347 (765)	345 (760.6)
	JIS 7.5K	1156 (45.51)							457 (1007.5)	455 (1003.1)
	JIS 10k	1120 (44.09)							419 (923.8)	417 (919.3)
	PN6	1075 (42.32)							300 (661.4)	298 (657.0)
	PN10	1115 (43.90)							396 (873.1)	394 (868.6)
	PN16	1125 (44.29)							485 (1069.3)	483 (1064.8)
	AWWA C207 CLASS B	1168 (45.98)							397 (875.3)	395 (870.8)
	AWWA C207 CLASS D	1168 (45.98)							436 (961.2)	434 (956.8)
	AWWA C207 CLASS E	1168 (45.98)							744 (1640.3)	742 (1635.8)
	AWWA C207 CLASS F	1270 (50.00)							1064 (2345.8)	1062 (2341.3)
	AS4087 PN16	1175 (46.26)							686 (1512.4)	684 (1507.9)
	AS2129 TABLE-E	1175 (46.26)							580 (1278.7)	578 (1274.3)
	PN25	1185 (46.65)	1040 (40.94)						757 (1669)	755 (1664.5)
	ASME CL150 SERIES A	1170 (46.06)	1120 (44.09)						933 (2057)	931 (2052.5)
	ASME CL300 SERIES A	1270 (50.00)	1180 (46.46)						1533 (3379.8)	1531 (3375.2)

* For process connection types not specified in the table, please contact ABB Sales

DN700 to 900 (28 to 36 in. NB) (FEW) dimensions / weights

…Sensor dimensions

…FEW – DN700 to 2400 (28 to 96 in. NB) for ABB standard lay length 1.0 × DN (Ordering code JH)

DN	Process connection type*	Dimensions in mm (in.)							Approx. weight in kg (lb)	
		D	L (1.0 × DN)	F	C	E	G	A	Integral	Remote
DN1000 (40 in.).	JIS 5K	1195 (47.05)	1000 (39.37)	755 (29.71)	554 (21.81)	679 (26.73)	639 (25.16)	624 (24.57)	407 (897.3)	405 (892.9)
	JIS 7.5K	1262 (49.69)							559 (1232.4)	557 (1228.0)
	JIS 10k	1235 (48.62)							505 (1113.4)	503 (1108.9)
	PN6	1175 (46.26)							348 (767.2)	346 (762.8)
	PN10	1230 (48.43)							469 (1034)	467 (1029.5)
	PN16	1255 (49.91)							613 (1351.5)	611 (1347.0)
	AWWA C207 CLASS B	1289 (50.75)							474 (1045)	472 (1040.6)
	AWWA C207 CLASS D	1289 (50.75)							618 (1362.5)	616 (1358.0)
	AWWA C207 CLASS E	1289 (50.75)							922 (2032.7)	920 (2028.2)
	AWWA C207 CLASS F	1378 (54.25)							1300 (2866.1)	1298 (2861.6)
	AS4087 PN16	1255 (49.41)							740 (1631.5)	738 (1627.0)
	AS2129 TABLE-E	1255 (49.41)							652 (1437.5)	650 (1433.0)
	PN25	1320 (51.97)	1170 (46.06)						1004 (2213.5)	1002 (2209.0)
	ASME CL150 SERIES A	1290 (48.82)	1090 (42.91)						1034 (2279.7)	1032 (2275.1)
	ASME CL300 SERIES A	1240 (48.82)	1150 (45.28)						1287 (2837.4)	1285 (2832.9)
DN1050 (42 in.)	AWWA C207 CLASS B	1346 (5299)	1067 (42.01)	808 (31.82)	608 (2392)	733 (28.84)	693 (27.28)	624 (24.57)	559 (1232.4)	557 (1228.0)
	AWWA C207 CLASS D	1346 (5299)							614 (1353.7)	612 (1349.2)
	AWWA C207 CLASS E	1346 (5299)							1102 (2429.6)	1100 (2425.1)
	AWWA C207 CLASS F	1448 (57.01)							1522 (3355.6)	1520 (3351.0)
	ASME CL150 SERIES A	1345 (59.25)							1200 (2645.6)	1198 (2641.1)
	ASME CL300 SERIES A	1290 (50.79)	1170 (46.06)						1432 (3157.1)	1430 (3152.6)
DN1100 (44 in.)	JIS 5K	1305 (51.38)	1118 (44.02)						478 (1053.8)	476 (1049.4)
	JIS 10k	1345 (52.95)							679 (1497)	677 (1492.5)
	AWWA C207 CLASS B	1403 (55.24)							605 (1333.8)	603 (1329.4)
	AWWA C207 CLASS D	1403 (55.24)							695 (1532.3)	693 (1527.8)
	AWWA C207 CLASS E	1404 (55.26)							1132 (2495.7)	1130 (2491.2)
	AWWA C207 CLASS F	1505 (53.25)							1640 (3615.7)	1638 (3611.1)

* For process connection types not specified in the table, please contact ABB Sales

DN1000 to 1100 (40 to 44 in. NB) (FEW) dimensions / weights

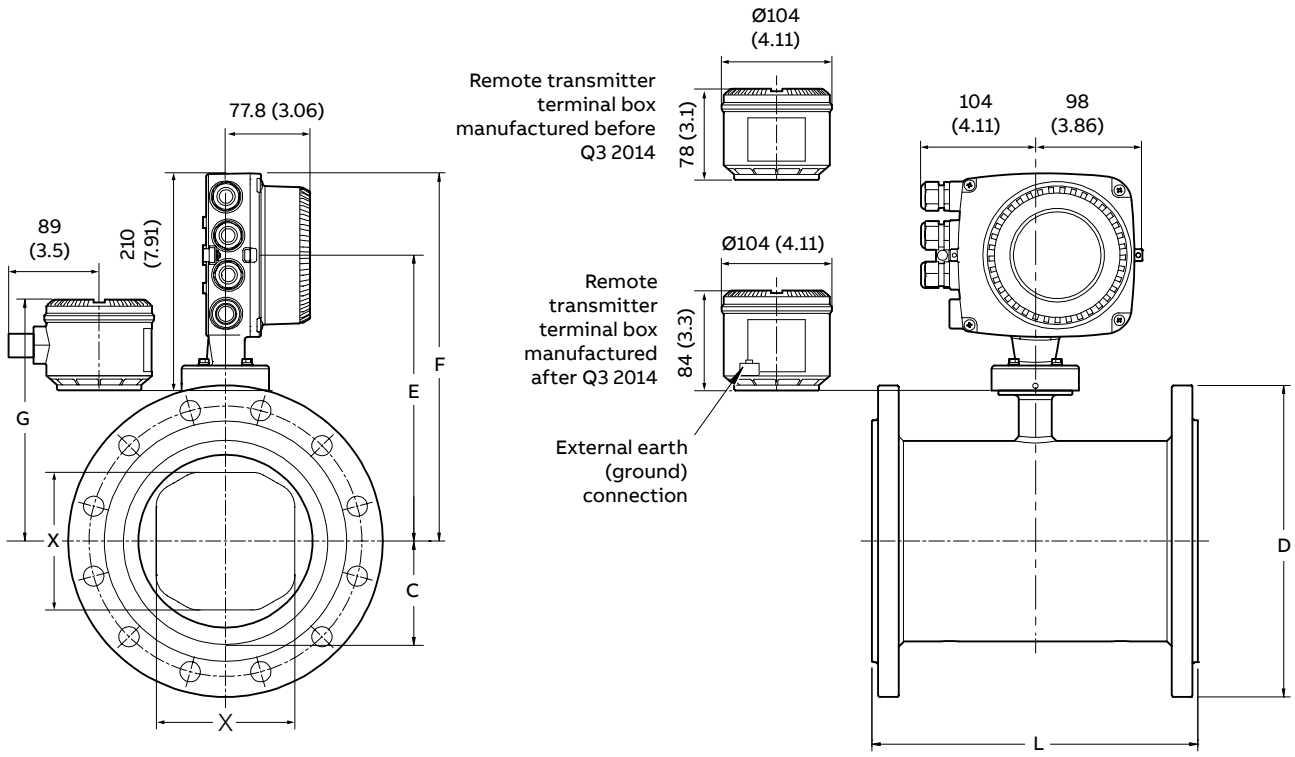
DN	Process connection type*	Dimensions in mm (in.)							Approx. weight in kg (lb)	
		D	L (1.0 × DN)	F	C	E	G	A	Integral	Remote
DN1200 (48 in.)	JIS 5K	1420 (55.91)	1200 (47.24)	860 (33.85)	659 (25.94)	784 (30.87)	744 (29.29)	802 (31.57)	653 (1439.7)	651 (1435.2)
	JIS 7.5K	1470 (57.87)							871 (1920.3)	869 (1915.8)
	JIS 10k	1465. (57.68)							819 (1805.6)	817 (1801.2)
	PN6	1405 (55.31)							538 (1186.1)	536 (1181.7)
	PN10	1455 (57.28)							753 (1660.1)	751 (1655.7)
	PN16	1485 (58.46)							981 (2162.8)	979 (2158.3)
	AWWA C207 CLASS B	1511 (59.49)							746 (1644.7)	744 (1640.2)
	AWWA C207 CLASS D	1511 (59.49)							886 (1953.4)	884 (1948.9)
	AWWA C207 CLASS E	1511 (59.49)							1389 (3062.3)	1387 (3057.8)
	AWWA C207 CLASS F	1651 (65.00)							2300 (5070.8)	2298 (5066.2)
	AS4087 PN16	1490 (58.66)							1207 (2661.1)	1205 (2656.5)
	AS2129 TABLE-E	1490 (58.66)							1085 (2392.1)	1083 (2387.6)
	ASME CL150 SERIES A	1510 (59.45)	1320 (51.97)						1612 (3554)	1610 (3549.4)
	ASME CL300 SERIES A	1465 (57.68)	1400 (55.12)						2051 (4521.8)	2049 (4517.2)
DN1350 (54 in.)	AWWA C207 CLASS B	1683 (66.26)	1350 (53.15)	955 (37.59)	754 (29.69)	879 (34.61)	839 (33.03)	902 (35.51)	942 (2076.8)	940 (2072.3)
	AWWA C207 CLASS D	1684 (66.26)							1026 (2262)	1024 (2257.5)
	AWWA C207 CLASS E	1685 (66.26)							1834 (4043.4)	1832 (4038.8)
DN1400 (56 in.)	PN6	1630 (64.17)	1400 (55.11)						774 (1706.4)	772 (1702.0)
	PN10	1675 (65.94)							1080 (2381.1)	1078 (2376.6)
	PN16	1685 (66.34)							1293 (2850.7)	1291 (2846.1)
	ASME CL150 SERIES A	1745 (68.70)	1500 (59.06)						2365 (5214.1)	2363 (5209.5)
	ASME CL300 SERIES A	1710 (67.32)	1600 (62.99)						3166 (6980.1)	3164 (6975.4)
DN1500 (60 in.)	JIS 5K	1730 (68.11)	1524 (60.00)	1065 (41.92)	864 (34.02)	989 (38.94)	949 (37.36)	910 (35.83)	1137 (2506.7)	1135 (2502.2)
	JIS 10k	1795 (70.67)							1568 (3457)	1566 (3452.4)
	AWWA C207 CLASS B	1854 (72.99)							1290 (2844.1)	1288 (2839.5)
	AWWA C207 CLASS D	1854 (72.99)							1569 (3459.2)	1567 (3454.6)
	AWWA C207 CLASS E	1854 (72.99)							2497 (5505.1)	2495 (5500.5)
	ASME CL150 SERIES A	1855 (73.03)							2847 (6276.8)	2845 (6272.1)
	ASME CL300 SERIES A	1810 (71.26)	1640 (64.57)						3717 (8194.9)	3715 (8190.1)
DN1600 (64 in.)	PN6	1830 (72.05)	1600 (62.99)	1066 (41.96)	865 (34.06)	990 (38.98)	950 (37.4)	1000 (39.37)	1033 (2277.5)	1031 (2272.9)
	PN10	1915 (75.39)							1509 (3327)	1507 (3322.3)
	PN16	1930 (75.98)							1955 (4310.2)	1953 (4305.6)
	JIS7.5K	1915 (75.39)							1771 (3904.5)	1769 (3899.9)
DN1650 (66 in.)	AWWA C207 CLASS B	2032 (80.00)	1650 (64.96)	1116 (43.94)	915 (36.02)	1040 (40.94)	1000 (39.37)	1000 (39.37)	1497 (3300.4)	1495 (3295.9)
	AWWA C207 CLASS D	2033 (80.00)							1763 (3886.9)	1761 (3882.3)
	AWWA C207 CLASS E	2032 (80.00)							3044 (6711.1)	3042 (6706.4)
DN1800 (72 in.)	PN6	2045 (80.51)	1800 (70.87)	1181 (46.50)	980 (38.58)	1105 (43.50)	1605 (41.90)	1100 (39.37)	1356 (2989.6)	1354 (2985.0)
	PN10	2115 (83.27)							1949 (4297)	1947 (4292.4)
	PN16	2130 (83.86)							2524 (5564.7)	2522 (5560.0)
	JIS7.5K	2115 (83.28)							2190 (4828.3)	2188 (4823.7)
	AWWA C207 CLASS B	2197 (86.50)							1833 (4041.2)	1831 (4036.6)
	AWWA C207 CLASS D	2197 (86.50)							2147 (4733.5)	2145 (4728.9)
	AWWA C207 CLASS E	2197 (86.50)							3842 (8470.5)	3840 (8465.7)
DN1950 (78 in.)	AWWA C207 CLASS B	2362 (92.99)	1950 (76.77)						2312 (5097.3)	2310 (5092.6)
	AWWA C207 CLASS D	2362 (92.99)							2684 (5917.4)	2682 (5912.7)
	AWWA C207 CLASS E	2363 (92.99)							4562 (10057.8)	4560 (10053.0)
DN2000 (80 in.)	PN6	2265 (91.54)	2000 (78.74)	1291 (50.81)	1090 (42.91)	1215 (42.91)	1175 (46.26)	1180 (46.46)	1781 (3926.6)	1779 (3922.0)
	PN10	2325 (91.54)							2580 (5688.1)	2578 (5683.5)
	PN16	2345 (92.32)							3230 (7121.2)	3228 (7116.4)
	JIS7.5K	2325 (91.54)							2753 (6069.5)	2751 (6064.9)
DN2100 (84 in.)	AWWA C207 CLASS B	2534 (99.76)	2100 (82.68)	1395 (54.91)	1194 (47.01)	1319 (51.93)	1279 (50.35)	1180 (46.46)	2570 (5666.1)	2568 (5661.4)
	AWWA C207 CLASS D	2534 (99.76)							2942 (6486.2)	2940 (6481.5)
	AWWA C207 CLASS E	2534 (99.76)							5100 (11244)	5098 (11239.1)
DN2200 (88 in.)	PN6	2475 (97.44)	2200 (86.61)	1395 (54.91)	1194 (47.01)	1319 (51.93)	1279 (50.35)	1330 (52.36)	2446 (5392.7)	2444 (5388.0)
	PN10	2550 (100.39)							3202 (7059.4)	3200 (7054.7)
	JIS7.5K	2550 (100.39)							3517 (7754)	3515 (7749.2)
DN2250 (90 in.)	AWWA C207 CLASS B	2705 (106.50)	2250 (88.58)						3102 (6839)	3100 (6834.3)
	AWWA C207 CLASS D	2705 (106.50)							3855 (8499.1)	3853 (8494.3)
	AWWA C207 CLASS E	2705 (106.50)							6669 (14703.1)	6667 (14698.1)
DN2400 (96 in.)	PN6	2685 (105.71)	2400 (94.49)	1495 (58.85)	1294 (50.94)	1419 (55.87)	1379 (54.29)	1450 (57.09)	2846 (6274.6)	2844 (6269.9)
	PN10	2760 (108.66)							4111 (9063.5)	4109 (9058.7)
	JIS7.5K	2761 (108.66)							4293 (9464.8)	4291 (9459.9)
	AWWA C207 CLASS B	2876 (113.23)							3741 (8247.8)	3739 (8243.0)
	AWWA C207 CLASS D	2876 (113.23)							4580 (10097.5)	4578 (10092.7)
	AWWA C207 CLASS E	2876 (113.23)							7841 (17287.1)	7839 (17281.9)

* For process connection types not specified in the table, please contact ABB Sales

DN1200 to 2400 (48 to 96 in. NB) (FEW) dimensions / weights

...Sensor dimensions

FEV – DN40 to 200 (1½ to 8 in. NB)



DN40 to 200 (1½ to 8 in. NB) (FEV)

DN	Process connection type	Dimensions in mm (in.)						Approx. weight in kg (lb)	
		D	L	F	E	G	X	Integral	Remote
DN40 (1 1/2 in.)	EN1092-1 PN10, 16, 25, 40	150 (5.91)	200 (7.87)	260 (10.24)	185 (7.28)	137 (5.39)	30 (1.18)	12.8 (28.16)	11.8 (25.96)
	ASME B16.5 CLASS 150								
	AS2129 TABLE D, E, F								
DN50 (2 in.)	EN1092-1 PN10, 16, 25, 40	165 (6.50)	200 (7.87)	261 (10.28)	186 (7.32)	138 (5.43)	38 (1.5)	13.75 (30.25)	12.75 (28.05)
	ASME B16.5 CLASS 150								
DN80 (3 in.)	EN1092-1 PN10, 16, 25, 40	200 (7.87)	200 (7.87)	280 (11.04)	205.5 (8.09)	157.5 (6.2)	61 (2.4)	17.2 (37.84)	16.2 (35.64)
	ASME B16.5 CLASS 150								
	AS4087 PN16, 21								
	AS2129 TABLE D, E, F								
DN100 (4 in.)	EN1092-1 PN10, 16, 25, 40	225 (8.86)	250 (9.84)	300.5 (11.83)	225.5 (8.88)	177.5 (6.98)	70 (2.76)	19.3 (42.5)	18.3 (40.3)
	ASME B16.5 CLASS 150								
	AS4087 PN16								
DN150 (6 in.)	EN1092-1 PN10, 16, 25, 40	300 (11.81)	300 (11.81)	333.5 (13.13)	258.5 (10.18)	210.5 (8.29)	103 (4.06)	35.1 (77.2)	34.1 (75)
	ASME B16.5 CLASS 150								
	AS4087 PN16								
DN200 (8 in.)	EN1092-1 PN10, 16	375 (11.76)	350 (13.78)	358.7 (14.12)	283.7 (11.17)	235.7 (9.28)	150 (5.91)	67 (147.4)	66 (145.2)
	ASME B16.5 CLASS 150								
	AS2129 TABLE C, D, E, F								
	AS4087 PN14, 16, 21								

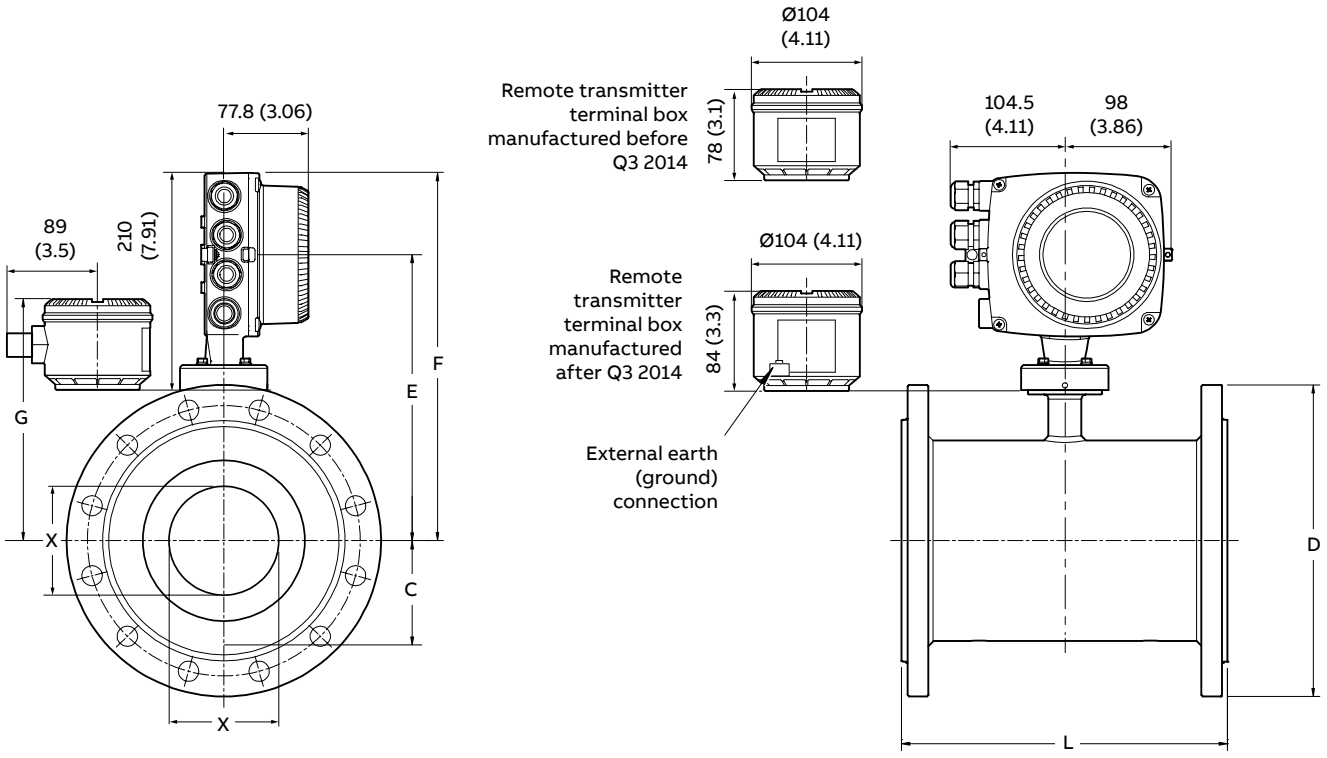
WaterMaster integral / remote FEV – DN40 to 200 (1½ to 8 in.) cast iron sensor dimensions / weights

DN	Process connection type	Dimensions in mm (in.)							Approx. weight in kg (lb)	
		D	L	F	C	E	G	X	Integral	Remote
DN40 (1½ in.)	EN1092-1 PN10, PN40	150 (5.91)	200 (7.87)	260 (10.24)	30.4 (1.20)	185 (7.28)	138 (5.43)	30 (1.18)	12 (27)	11 (24)
	ASME B16.5 CLASS 150	127 (5.00)								
	JIS 10K	140 (5.51)								
	AS2129 TABLE F	140 (5.51)								
	AS2129 TABLE C D E	135 (5.31)								
	AS4087 PN14	135 (5.31)								
DN50 (2 in.)	EN1092-1 PN10, PN16	165 (6.50)	200 (7.87)	270 (10.63)	38.3 (1.51)	195 (7.68)	146 (5.75)	38 (1.50)	13 (29)	12 (27)
	ASME B16.5 CLASS 150	152.4 (6.00)								
	JIS 10K	155 (6.10)								
	AS4087 PN21	165 (6.50)								
	AS2129 TABLE F	165 (6.50)								
	AS2129 TABLE C D E	150 (5.91)								
	AS4087 PN14, PN16	150 (5.91)								
DN65 (2½ in.)	AS4087 PN14, PN16	165 (6.50)	200 (7.87)	275 (10.83)	45.2 (1.78)	200 (7.87)	152 (5.98)	48 (1.89)	15 (33)	14 (31)
	AS2129 TABLE C D E	165 (6.50)								
	EN1092-1 PN10	185 (7.28)								
	EN1092-1 PN16	185 (7.28)								
DN80 (3 in.)	EN1092-1 PN10, PN16	200 (7.87)	200 (7.87)	280 (11.02)	51.5 (2.03)	205 (8.07)	156 (6.14)	61 (2.40)	16 (36)	15 (33)
	ASME B16.5 CLASS 150	190 (7.48)								
	JIS 7.5K	211 (8.31)								
	JIS 10K	185 (7.28)								
	AS2129 TABLE C D E	185 (7.28)								
	AS4087 PN14, PN16	185 (7.28)								
	AS2129 TABLE F	205 (8.07)								
	AS4087 PN21	205 (8.07)								
DN100 (4 in.)	EN1092-1 PN10, PN16	220 (8.66)	250 (9.84)	320 (12.60)	63.75 (2.51)	245 (9.65)	196.8 (7.75)	70 (2.76)	19 (42)	18 (40)
	ASME B16.5 CLASS 150	228.6 (9.00)								
	JIS 7.5K	238 (9.37)								
	JIS 10K	210 (8.27)								
	AS2129 TABLE C D	215 (8.46)								
	AS4087 PN14, PN16	215 (8.46)								
	AS2129 TABLE E	215 (8.46)								
	AS4087 PN21	230 (9.06)								
	AS2129 TABLE F	230 (9.06)								
DN125 (5 in.)	EN1092-1 PN10, PN16	250 (9.84)	250 (9.84)	320 (12.60)	63.75 (2.51)	245 (9.65)	197 (7.76)	70 (2.76)	20 (44)	19 (42)
	ASME B16.5 CLASS 150	254 (10.00)								
	JIS 10K	250 (9.84)								
	AS2129 TABLE C D E	255 (10.04)								
	AS2129 TABLE F	280 (11.02)								
DN150 (6 in.)	EN1092 PN10, PN16	285 (11.22)	300 (11.81)	340 (13.39)	84.4 (3.32)	265 (10.43)	217 (8.54)	103 (4.06)	32 (70)	31 (68)
	ASME B16.5 CLASS 150	279 (10.98)								
	JIS 7.5k	290 (11.42)								
	JIS 10K	280 (11.02)								
	AS2129 TABLE C D	280 (11.02)								
	AS4087 PN14, PN16	280 (11.02)								
	AS2129 TABLE E	280 (11.02)								
	AS2129 TABLE F	305 (12.01)								
	AS4087 PN21	305 (12.01)								
DN200 (8 in.)	EN1092-1 PN10	340 (13.39)	350 (13.78)	365 (14.37)	109.8 (4.32)	290 (11.42)	243 (9.57)	150 (5.91)	49 (108)	48 (105)
	EN1092-1 PN16	340 (13.39)								
	ASME B16.5 CLASS 150	345 (13.58)								
	JIS 7.5K	342 (13.46)								
	JIS 10K	330 (12.99)								
	AS2129 TABLE C D	335 (13.19)								
	AS4087 PN14, PN 16	335 (13.19)								
	AS2129 TABLE E	335 (13.19)								
	AS2129 TABLE F	370 (14.57)								
	AS4087 PN21	370 (14.57)								

DN40 to 200 (1½ to 8 in. NB) (FEV) dimensions / weights

…Sensor dimensions

FER – DN40 to 300 (1½ to 12 in. NB)



DN40 to 300 (1½ to 12 in. NB) (FER)

DN	Process connection type	Dimensions in mm (in.)						Approx. weight in kg (lb)	
		D	L	F	E	G	X	Integral	Remote
DN40 (1½ in.)	EN1092-1 PN10, 16, 25, 40	150 (5.91)	200 (7.87)	260 (10.24)	185 (7.28)	137 (5.39)	23.5 (0.93)	13.4 (29.5)	12.4 (27.3)
	ASME B16.5 CLASS 150								
	AS2129 TABLE D, E, F								
DN50 (2 in.)	EN1092-1 PN10, 16, 25, 40	165 (6.50)	200 (7.87)	261 (10.28)	186 (7.32)	138 (5.43)	29 (1.14)	14.75 (32.45)	13.75 (30.25)
	ASME B16.5 CLASS 150								
DN80 (3 in.)	EN1092-1 PN10, 16, 25, 40	200 (7.87)	200 (7.87)	280 (11.04)	205.5 (8.09)	157.5 (6.2)	47 (1.85)	21.2 (46.64)	20.2 (44.4)
	ASME B16.5 CLASS 150								
	AS4087 PN16, 21								
	AS2129 TABLE D, E, F								
DN100 (4 in.)	EN1092-1 PN10, 16, 25, 40	225 (8.86)	250 (9.84)	300.5 (11.83)	225.5 (8.88)	177.5 (6.98)	64 (2.52)	27.3 (60)	26.3 (58)
	ASME B16.5 CLASS 150								
	AS4087 PN16								
DN150 (6 in.)	EN1092-1 PN10, 16, 25, 40	300 (11.81)	300 (11.81)	333.5 (13.13)	258.5 (10.18)	210.5 (8.29)	100.2 (3.94)	27.3 (60)	26.3 (58)
	ASME B16.5 CLASS 150								
	AS4087 PN16								
DN200 (8 in.)	EN1092-1 PN10, 16	375 (11.76)	350 (13.78)	358.7 (14.12)	283.7 (11.17)	235.7 (9.28)	126.7 (5.00)	68 (150)	67 (147.4)
	ASME B16.5 CLASS 150								
	AS2129 TABLE C, D, E, F								
	AS4087 PN14, 16, 21								

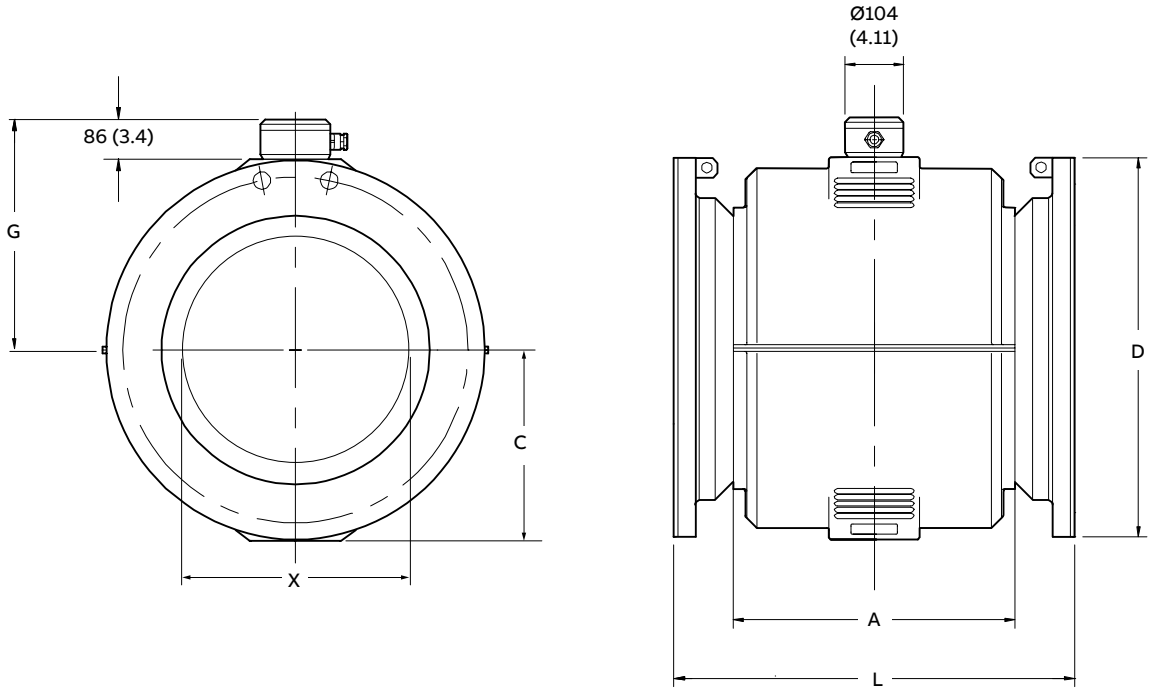
DN40 to 200 (1½ to 8 in. NB) (FER) cast iron sensor dimensions / weights

DN	Process connection type	Dimensions in mm (in.)							Approx. weight in kg (lb)	
		D	L	F	C	E	G	X	Integral	Remote
DN40 (1½ in.)	EN1092-1 PN10, 16, 25, 40	150 (5.91)	200 (7.87)	260 (10.24)	30.4 (1.20)	185 (7.28)	138 (5.43)	23.5 (0.93)	13 (29)	11 (24)
	ASME B16.5 CLASS 150	127 (5.00)								
	JIS 10K	140 (5.51)								
	AS2129 TABLE C D E	135 (5.31)								
	AS2129 TABLE F	140 (5.51)								
	AS4087 PN14	135 (5.31)								
DN50 (2 in.)	EN1092-1 PN10, 16, 25, 40	165 (6.50)	200 (7.87)	270 (10.63)	38.3 (1.51)	195 (7.68)	146 (5.75)	29 (1.14)	14 (31)	12 (27)
	ASME B16.5 CLASS 150	152.4 (6.00)								
	JIS 10K	155 (6.10)								
	AS4087 PN21	165 (6.50)								
	AS2129 TABLE F	165 (6.50)								
	AS2129 TABLE C D E	150 (5.91)								
	AS4087 PN14, PN16	150 (5.91)								
DN65 (2½ in.)	EN1092-1 PN10, 16, 25, 40	185 (7.28)	200 (7.87)	275 (10.83)	45.2 (1.78)	200 (7.87)	152 (5.98)	37 (1.46)	15 (33)	13 (29)
	ASME B16.5 CLASS 150	178 (7.00)								
	JIS10K	175 (6.89)								
	AS2129 TABLE C D E	165 (6.50)								
	AS2129 TABLE F	185 (7.28)								
	AS4087 PN14, 16	165 (6.50)								
	AS4087 PN21	185 (7.28)								
DN80 (3 in.)	EN1092-1 PN10, 16, 25, 40	200 (7.87)	200 (7.87)	280 (11.02)	51.5 (2.03)	205 (8.07)	156 (6.14)	47 (1.85)	20 (44)	18 (40)
	ASME B16.5 CLASS 150	190 (7.48)								
	JIS 10K	185 (7.28)								
	AS2129 TABLE C D E	185 (7.28)								
	AS4087 PN14, 16	185 (7.28)								
	AS2129 TABLE F	205 (8.07)								
	AS4087 PN21	205 (8.07)								
DN100 (4 in.)	EN1092-1 PN10, 16	220 (8.66)	250 (9.84)	320 (12.60)	63.75 (2.51)	245 (9.65)	196.8 (7.75)	64 (2.52)	27 (59)	25 (55)
	EN1092-1 PN25, 40	235 (9.25)								
	ASME B16.5 CLASS 150	228.6 (9.00)								
	JIS 7.5K	238 (9.37)								
	JIS 10K	210 (8.27)								
	AS2129 TABLE C D	215 (8.46)								
	AS4087 PN14, 16	215 (8.46)								
	AS4087 PN21	230 (9.06)								
DN125 (5 in.)	EN1092-1 PN10, 16	250 (9.84)	250 (9.84)	320 (12.60)	63.75 (2.51)	245 (9.65)	197 (7.76)	64 (2.52)	27 (59)	25 (55)
	EN1092-1 PN25, 40	270 (10.63)								
	ASME B16.5 CLASS 150	254 (10.00)								
	JIS 10K	250 (9.84)								
	AS2129 TABLE C D	255 (10.04)								
DN150 (6 in.)	EN1092 PN10, 16	285 (11.22)	300 (11.81)	340 (13.39)	84.4 (3.32)	265 (10.43)	217 (8.54)	100.2 (3.94)	33 (72)	31 (68)
	EN1092 PN25, 40	300 (11.81)								
	ASME B16.5 CLASS 150	279 (10.98)								
	JIS 7.5k	290 (11.42)								
	JIS 10K	280 (11.02)								
	AS2129 TABLE C D	280 (11.02)								
	AS4087 PN14, 16	280 (11.02)								
	AS4087 PN21	305 (12.01)								
DN200 (8 in.)	EN1092-1 PN10, 16	340 (13.39)	350 (13.78)	365 (14.37)	109.8 (4.32)	290 (11.42)	243 (9.57)	126.7 (4.99)	50 (110)	48 (106)
	EN1092-1 PN25, 40	360 (14.17)								
	ASME B16.5 CLASS 150	345 (13.58)								
	JIS 7.5K	342 (13.46)								
	JIS 10K	330 (12.99)								
	AS2129 TABLE C D	335 (13.19)								
	AS4087 PN14, 16	335 (13.19)								
	AS4087 PN21	370 (14.57)								
DN250 (10 in.)	EN1092-1 PN10	395 (15.55)	450 (17.72)	389 (15.31)	136.8 (5.39)	313 (12.33)	268 (10.55)	153.5 (6.04)	77 (169)	75 (165)
	EN1092-1 PN16	405 (15.94)								
	EN1092-1 PN25	425 (16.73)								
	ASME B16.5 CLASS 150	405 (15.94)								
	JIS 7.5K	400 (15.75)								
	JIS 10K	400 (15.75)								
	AS2129 TABLE C D	405 (15.94)								
	AS4087 PN14, 16	405 (15.94)								
	AS4087 PN21	430 (16.93)								
DN300 (12 in.)	EN1092-1 PN10	445 (17.52)	500 (19.69)	414 (16.30)	162.2 (6.39)	338.6 (13.33)	294 (1157)	203.5 (8.01)	114 (251)	112 (247)
	EN1092-1 PN16	460 (18.11)								
	EN1092-1 PN25	485 (19.09)								
	ASME B16.5 CLASS 150	485 (19.09)								
	JIS 10K	445 (17.52)								
	AS2129 TABLE C D	455 (17.91)								
	AS4087 PN14, 16	455 (17.91)								
	AS4087 PN21	490 (19.29)								

DN40 to 300 (1½ to 12 in. NB) (FER) dimensions / weights

… Sensor dimensions

FER – DN350 to 600 (14 to 24 in. NB) remote sensor



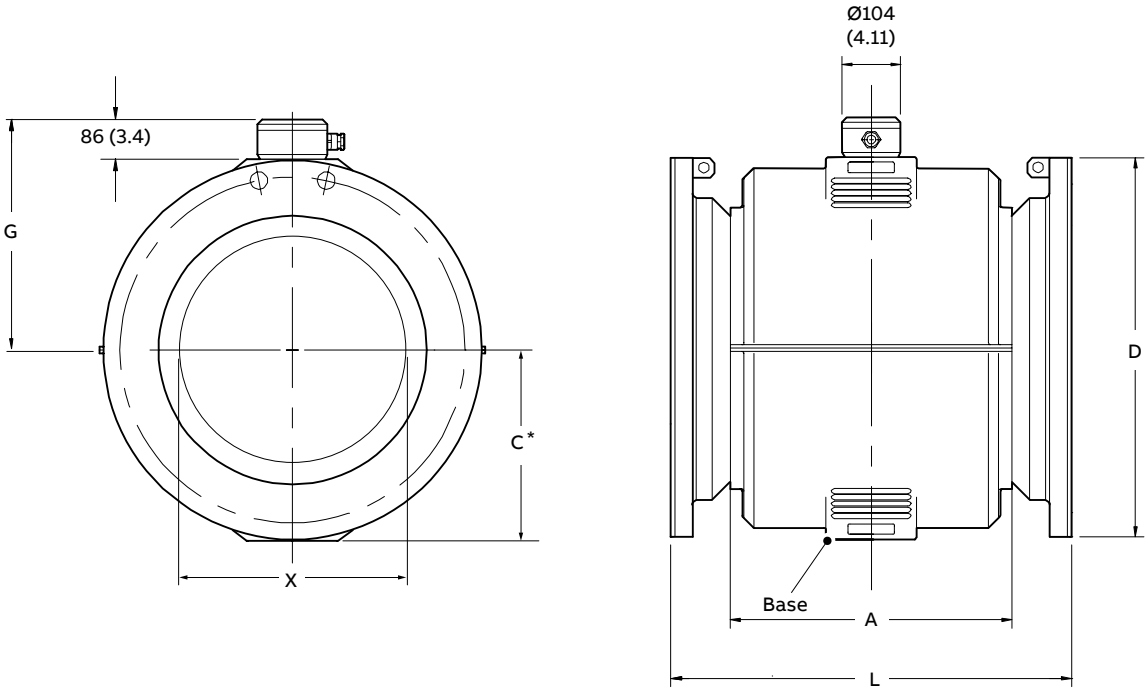
DN350 to 600 (14 to 24 in. NB) (FER) remote sensor

DN	Process connection type	Dimensions in mm (in.)								Approx. weight in kg (lb)
		D	L	F	C	E	G	A	X	Remote
DN350 (14 in.)	EN1092-1 PN10	505 (19.88)	550 (21.65)	472 (18.58)	231 (9.09)	402 (15.83)	325 (12.80)	376 (14.80)	293 (11.53)	100 (220)
	EN1092-1 PN16	520 (20.47)								
	EN1092-1 PN25	555 (21.85)								
	EN1092-1 PN40	580 (22.83)								
	JIS 5K	480 (18.90)								
	JIS 10K	490 (19.29)								
	AS2129 TABLE C D E	525 (20.67)								
	AS2129 TABLE F	550 (21.65)								
	AS4087 PN14, PN16	525 (20.67)								
	AS4087 PN21	550 (21.65)								
DN400 (16 in.)	EN1092-1 PN10	565 (22.24)	600 (23.62)	502 (19.76)	257.5 (10.14)	432 (17.01)	355 (13.98)	420 (16.54)	343 (13.50)	115 (253)
	EN1092-1 PN16	580 (22.83)								
	EN1092-1 PN25	620 (24.41)								
	EN1092-1 PN40	660 (25.98)								
	JIS 5K	540 (21.26)								
	JIS 10K	560 (22.05)								
	AS2129 TABLE C D E	580 (22.83)								
	AS2129 TABLE F	610 (24.02)								
	AS4087 PN14, PN16	580 (22.83)								
	AS4087 PN21	610 (24.02)								
DN450 (18 in.)	EN1092-1 PN10	615 (24.21)	700 (27.56)	537 (21.14)	285 (11.22)	467 (18.39)	390 (15.35)	480 (18.90)	394 (15.52)	160 (352)
	EN1092-1 PN16	640 (25.20)								
	EN1092-1 PN25	670 (26.38)								
	EN1092-1 PN40	685 (26.97)								
	JIS 5K	605 (23.82)								
	JIS 10K	620 (24.41)								
	AS2129 TABLE C D E	640 (25.20)								
	AS2129 TABLE F	675 (26.57)								
	AS4087 PN14, PN16	640 (25.20)								
	AS4087 PN21	675 (26.57)								
DN500 (20 in.)	EN1092-1 PN10	670 (26.38)	770 (30.31)	557 (21.93)	317.5 (12.50)	487 (19.17)	410 (16.14)	520 (20.47)	443 (17.44)	217 (477)
	EN1092-1 PN16	715 (28.15)								
	EN1092-1 PN25	730 (28.74)								
	EN1092-1 PN40	755 (29.72)								
	JIS 5K	655 (25.79)								
	JIS 10K	675 (26.57)								
	AS2129 TABLE C D E	705 (27.76)								
	AS2129 TABLE F	735 (28.94)								
	AS4087 PN14, PN16	705 (27.76)								
	AS4087 PN21	735 (28.94)								
DN600 (24 in.)	EN1092-1 PN10	780 (30.71)	920 (36.22)	602 (23.70)	345 (13.58)	532 (20.94)	455 (17.91)	610 (24.02)	494 (19.45)	315 (693)
	EN1092-1 PN16	840 (33.07)								
	EN1092-1 PN25	845 (33.27)								
	EN1092-1 PN40	890 (35.04)								
	JIS 5K	770 (30.31)								
	JIS 10K	795 (31.30)								
	AS2129 TABLE C D E	825 (32.48)								
	AS2129 TABLE F	850 (33.46)								
	AS4087 PN14, PN16	825 (32.48)								
	AS4087 PN21	850 (33.46)								

DN350 to 600 (14 to 24 in. NB) (FER) remote sensor dimensions / weights

… Sensor dimensions

FEF – DN250 to 600 (10 to 24 in. NB)



*Dimension C = centre line to base of flowmeter body

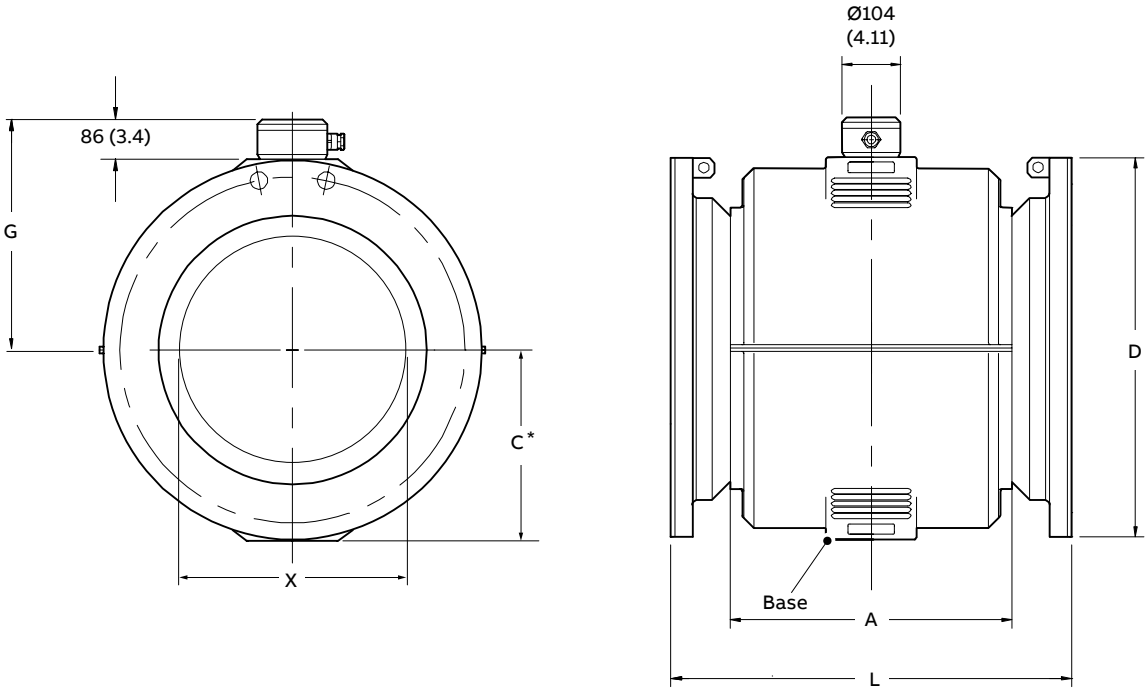
DN250 to 600 (10 to 24 in. NB) (FEF)

DN	Process connection type	Dimensions in mm (in.)						
		D	L	C	G	A	X	Approx. weight in kg (lb)
DN250 (10 in.)	ASME B16.5 CLASS 150	405 (15.94)	450 (17.72)	215 (8.46)	301 (11.85)	300 (11.81)	250 (9.84)	88 (194)
	ASME B16.5 CLASS 300	445 (17.52)	490 (19.29)					
	EN1092 -1 PN10	395 (15.55)	450 (17.72)					
	EN1092 – 1 PN16	405 (15.94)						
	EN1092 – 1 PN25	425 (16.73)	490 (19.29)					
	EN1092 – 1 PN40	450 (17.72)						
	JIS 5K	385 (15.16)	450 (17.72)					
	JIS 10K	400 (15.75)						
	AS4087 PN14, PN16	405 (15.94)						
	AS2129 TABLE C D							
	AS2129 TABLE E							
	AS4087 PN21	430 (16.93)						
	AS2129 TABLE F							
DN300 (12 in.)	ASME B16.5 CLASS 150	485 (19.09)	500 (19.69)	231 (9.09)	317 (12.48)	352 (13.86)	300 (11.81)	128 (282)
	ASME B16.5 CLASS 300	520 (20.47)	540 (21.26)					
	EN1092 – 1 PN10	445 (17.52)	500 (19.69)					
	EN1092 – 1 PN16	460 (18.11)	500 (19.69)					
	EN1092 – 1 PN25	485 (19.09)	540 (21.26)					
	EN1092 – 1 PN40	515 (20.28)	540 (21.26)					
	JIS 5K	430 (16.93)	500 (19.69)					
	JIS 10K	445 (17.52)	500 (19.69)					
	AS4087 PN14, PN16	455 (17.91)	500 (19.69)					
	AS2129 TABLE TABLE C D	455 (17.91)	500 (19.69)					
	AS2129 TABLE E	455 (17.91)	500 (19.69)					
	AS4087 PN21	490 (19.29)	500 (19.69)					
	AS2129 TABLE F	490 (19.29)	500 (19.69)					
DN350 (14 in.)	ASME B16.5 CLASS 150	535 (21.06)	550 (21.65)	257.5 (10.14)	346 (13.62)	376 (14.80)	350 (13.78)	100 (220)
	ASME B16.5 CLASS 300	585 (23.03)	570 (22.44)					
	EN1092 – 1 PN10	505 (19.88)	550 (21.65)					
	EN1092 – 1 PN16	520 (20.47)	550 (21.65)					
	EN1092 – 1 PN25	555 (21.85)	570 (22.44)					
	EN1092 – 1 PN40	580 (22.83)	570 (22.44)					
	JIS 5K	480 (18.90)	550 (21.65)					
	JIS 7.5K	530 (20.87)	550 (21.65)					
	JIS 10K	490 (19.29)	550 (21.65)					
	AS4087 PN14, PN16	525 (20.67)	550 (21.65)					
	AS2129 TABLE C D E	525 (20.67)	550 (21.65)					
	AS4087 PN21	550 (21.65)	550 (21.65)					
	AS2129 TABLE F	550 (21.65)	550 (21.65)					
	AS4087 PN35	550 (21.65)	570 (22.44)					
	AS2129 TABLE H	550 (21.65)	570 (22.44)					
DN375 (15 in.)	AS4087 PN14, PN16	550 (21.65)	550 (21.65)	257.5 (10.14)	346 (13.62)	376 (14.80)	350 (13.78)	115 (253)
	AS2129 TABLE C	550 (21.65)	550 (21.65)					
	AS4087 PN35	580 (22.83)	570 (22.44)					
DN400 (16 in.)	ASME B16.5 CLASS 150	600 (23.62)	600 (23.62)	285 (11.22)	371 (14.61)	420 (16.54)	400 (15.75)	115 (253)
	ASME B16.5 CLASS 300	650 (25.59)	620 (24.41)					
	EN1092 – 1 PN10	565 (22.24)	600 (23.62)					
	EN1092 – 1 PN16	580 (22.83)	600 (23.62)					
	EN1092 – 1 PN25	620 (24.41)	620 (24.41)					
	EN1092 – 1 PN40	660 (25.98)	620 (24.41)					
	JIS 5K	540 (21.26)	600 (23.62)					
	JIS 7.5K	582 (22.91)	600 (23.62)					
	JIS 10K	560 (22.05)	600 (23.62)					
	AS4087 PN14, PN16	580 (22.83)	600 (23.62)					
	AS2129 TABLE C D E	580 (22.83)	600 (23.62)					
	AS4087 PN21	610 (24.02)	600 (23.62)					
	AS2129 TABLE F	610 (24.02)	600 (23.62)					
	AS4087 PN35	610 (24.02)	620 (24.41)					
	AS2129 TABLE H	610 (24.02)	620 (24.41)					

DN250 to 400 (10 to 16 in. NB) (FEF) dimensions / weights

… Sensor dimensions

…FEF – DN250 to 600 (10 to 24 in. NB)



*Dimension C = centre line to base of flowmeter body

DN250 to 600 (10 to 24 in. NB) (FEF)

DN	Process connection type	Dimensions in mm (in.)						
		D	L	C	G	A	X	Approx. weight in kg (lb)
DN450 (18 in.)	ASME B16.5 CLASS 150	635 (25.00)	700 (27.56)	317.5 (12.50)	402 (15.83)	480 (18.90)	450 (17.72)	160 (352)
	ASME B16.5 CLASS 300	710 (27.95)						
	EN1092 – 1 PN10	615 (24.21)						
	EN1092 – 1 PN16	640 (25.20)						
	EN1092 – 1 PN25	670 (26.38)						
	EN1092 – 1 PN40	685 (26.97)						
	JIS 5K	605 (23.82)						
	JIS 7.5K	652 (25.67)						
	JIS 10K	620 (24.41)						
	AS4087 PN14, PN16	640 (25.20)						
	AS2129 TABLE C D	640 (25.20)						
	AS2129 TABLE E	640 (25.20)						
	AS4087 PN21	675 (26.57)						
	AS2129 TABLE F	675 (26.57)						
	AS4087 PN35	675 (26.57)						
	AS2129 TABLE H	675 (26.57)						
DN500 (20 in.)	ASME B16.5 CLASS 150	700 (27.56)	770 (30.31)	345 (13.58)	429 (16.89)	520 (20.47)	500 (19.69)	217 (455)
	ASME B16.5 CLASS 300	775 (30.51)						
	EN1092 – 1 PN10	670 (26.38)						
	EN1092 – 1 PN16	715 (28.15)						
	EN1092 – 1 PN25	730 (28.74)						
	EN1092 – 1 PN40	755 (29.72)						
	JIS 5K	655 (25.79)						
	JIS 7.5K	706 (27.80)						
	JIS 10K	675 (26.57)						
	AS4087 PN 14, PN16	705 (27.76)						
	AS2129 TABLE C D E	705 (27.76)						
	AS4087 PN21	735 (28.94)						
	AS2129 TABLE F	735 (28.94)						
	AS4087 PN35	735 (28.94)						
	AS2129 TABLE H	735 (28.94)						
DN600 (24 in.)	ASME B16.5 CLASS 150	815 (32.09)	920 (36.22)	387.5 (15.25)	472 (18.58)	610 (24.02)	600 (23.62)	315 (693)
	ASME B16.5 CLASS 300	915 (36.02)						
	EN1092 – 1 PN10	780 (30.71)						
	EN1092 – 1 PN16	840 (33.07)						
	EN1092 – 1 PN25	845 (33.27)						
	EN1092 – 1 PN40	890 (35.04)						
	JIS 5K	770 (30.31)						
	JIS 7.5K	810 (31.89)						
	JIS 10K	795 (31.30)						
	AS4087 PN14, PN16	825 (32.48)						
	AS2129 TABLE C D	825 (32.48)						
	AS2129 TABLE E	825 (32.48)						
	AS4087 PN21	850 (33.46)						
	AS2129 TABLE F	850 (33.46)						
	AS4087 PN35	850 (33.46)						
	AS2129 TABLE H	850 (33.46)						

DN450 to 600 (18 to 24 in. NB) (FEF) dimensions / weights

Ordering information

Electromagnetic flowmeter WaterMaster – FEW11, FEW12 and FEW18

Product coding field number	1 … 5	6	7 … 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system – full bore, integral mount (DN10 to DN32 only)	**FEW11**																				
Flowmeter system – full bore, remote mount	**FEW12**	**X**	**XXX**	**X**	**X**	**X**	**X**	**XX**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Full bore sensor only – for use with WaterMaster transmitter / remote	**FEW18**																				
Design																					
Non-hazardous areas		1																			
Hazardous areas		5																			
Bore diameter																					
DN10 (⅜ in.)			010																		
DN15 (½ in.)			015																		
DN20 (¾ in.)			020																		
DN25 (1 in.)			025																		
DN32 (1¼ in.)			032																		
Liner material																					
PTFE – DN10 to 32 (⅜ to 1¼ in. NB)				A																	
Electrode design																					
Standard					1																
Other					9																
Measuring electrodes material																					
Hastelloy® C-4 (2.4610)						D															
Grounding accessories																					
Not required							0														
One potential equalizing ring (stainless steel)							3														
Two potential equalizing rings (stainless steel)							4														
Other							9														
Process connection type (refer to page 23 andpage 24)																					
ASME B16.5 B class 150								A1													
ASME B16.5 B class 300								A3													
ISO / EN PN40								S4													
DIN PN40								D4													
Other								Z9													
Process connection material																					
Carbon steel flanges – DN20 to 32 ($^3/_4$ to $1^1/_4$ in. NB)									B												
Stainless steel flange 1.4571 (316 Ti) – DN10 to 15 ($^3/_8$ to $^1/_2$ in. NB)									D												
Other									Z												
Usage certifications																					
Standard (without PED)										1											
Other										9											
Calibration type																					
Class 2 calibration – standard accuracy 0.4 %											A										
Class 1 calibration – high accuracy 0.2 %											B										
Extended range, class 1 calibration – high accuracy 0.2 %											N										
Extended range, class 2 calibration – standard accuracy 0.4 %											P										
Temperature range installation / ambient temperature range																					
Standard design / –20 to 60 °C (–4 to 140 °F)												1									
Nameplate																					
Adhesive													A								
Signal cable length and type																					
Without signal cable														0							
5 m (15 ft.) cable														1							
10 m (30 ft.) cable														2							
20 m (60 ft.) cable														3							
30 m (100 ft.) cable														4							
50 m (165 ft.) cable														5							
80 m (260 ft.) cable														6							
100 m (325 ft.) cable														7							
150 m (490 ft.) cable														8							
Special length or cable type														9							
Explosion protection certification																					
General purpose (non-Ex design)															A						
FM Class 1 Div. 2															G						
usFMc Class 1 Div. 2															P						
ATEX/UKEX/IECEx Zone 2, 21 & 22															M						

Continued on next page…

Product coding field number	1 … 5	6	7 … 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system – full bore, integral mount (DN10 to DN32 only)	**FEW11**																				
Flowmeter system – full bore, remote mount	**FEW12**	**X**	**XXX**	**X**	**X**	**X**	**X**	**XX**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Full bore sensor only – for use with WaterMaster transmitter / remote	**FEW18**																				
Protection class transmitter / protection class sensor																					
IP67 (NEMA 4X) / IP67 (NEMA 4X) – cable not fitted and potted to sensor																1					
IP67 (NEMA 4X) / IP67 (NEMA 4X) – cable fitted and potted to sensor																7					
Cable conduits*																					
M20 x 1.5 (plastic)																	A				
NPT ½ in. (blanked when cable not fitted)																	B				
M20 SWA (armored)																	D				
M20 SWA sensor, M20 x 1.5 (plastic) power / output																	F				
Without																	Y				
Power supply																					
Without																		0			
100 to 230 V AC, 50 Hz																		1			
24 V AC or 24 V DC, 50 Hz																		2			
100 to 230 V AC, 60 Hz																		3			
24 V AC or 24 V DC, 60 Hz																		4			
Input and output signal type																					
HART + 20 mA (active) + pulse + contact output																			A		
PROFIBUS DP RS485 physical layer + pulse + contact output (general-purpose design only)																			G		
MODBUS RTU RS485 physical layer + pulse + contact output (general-purpose design only)																			M		
Without																			Y		
Configuration type / diagnostics type																					
Not required																				0	
Factory default/ standard																				1	

Options**

Accessories

Configuration lead	AC

Documentation language

German	M1	Chinese	M6
Italian	M2	Swedish	M7
Spanish	M3	Finnish	M8
French	M4	Portuguese	MA
English	M5 (default)	Danish	MF
		Norwegian	MN

Verification type

Without fingerprint	V0
VeriMaster	V3

Potable water approval

WRAS cold water approval	CWA
Without	CWY

Power supply frequency (FEW 18 only)

50 Hz	F5
60 Hz	F6

Number of testpoints (FEW 10 to 32 only)

1 Point	T1
3 Points	T3

* For FM or FMC Approved versions, NPT only permitted.
** Add codes for options.

…Ordering information

…Electromagnetic flowmeter WaterMaster – FEV11, FEV12 and FEV18

Product coding field number	1 … 5	6	7 … 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system, optimized full bore, integral mount	**FEV11**																				
Flowmeter system, optimized full bore, remote mount	**FEV12**	**x**	**xxx**	**x**	**x**	**x**	**x**	**xx**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	
Optimized full bore sensor only, for use with WaterMaster transmitter / remote	**FEV18**																				
Design																					
Non-hazardous areas		1																			
Hazardous areas		5																			
Bore diameter																					
DN40 (1½ in.)			040																		
DN50 (2 in.)			050																		
DN65 (2½ in.)			065																		
DN80 (3 in.)			080																		
DN100 (4 in.)			100																		
DN125 (5 in.)			125																		
DN150 (6 in.)			150																		
DN200 (8 in.)			200																		
Liner material																					
Polypropylene – DN40 to 200 (1½ to 8 in. NB)				V																	
Electrode design																					
Standard					1																
Measuring electrodes material																					
Stainless steel 316						S															
Hastelloy® C-22						C															
Super-austenitic steel						U															
Grounding accessories																					
Standard							1														
One potential equalizing ring (stainless steel)							3														
Two potential equalizing rings (stainless steel)							4														
Process connection type (refer to page 36 and page 37)																					
Flanges ASME B16.5 class 150								A1													
Flanges AS 4087 PN21 (≥ DN50 [2 in. NB])								E0													
Flanges AS 4087 PN16 (≥ DN50 [2 in. NB])								E1													
Flanges AS 4087 PN14								E2													
Flanges AS 2129 Table F								E3													
Flanges AS 2129 Table E								E4													
Flanges AS 2129 Table D								E5													
Flanges AS 2129 Table C								E6													
Flanges JIS G5527 7.5K (≥ DN100 [4 in. NB])								J0													
Flanges JIS B2220 10K								J1													
ISO/EN PN10								S1													
ISO / EN PN16 (≥ DN50 [2 in. NB])								S2													
ISO / EN PN40 (DN40 [1½ in. NB] only) 16 bar rated								S4													
Process connection material																					
Carbon steel flanges									B												
Usage certifications																					
Standard										1											
Calibration type																					
Class 2 Calibration – standard accuracy 0.4 %											A										
Class 1 Calibration – high accuracy 0.2 %											B										
Extended range, class 1 calibration – high accuracy 0.2 %											N										
Extended range, class 2 calibration – standard accuracy 0.4 %											P										

Continued on next page…

Product coding field number	1 ... 5	6	7 ... 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system, optimized full bore, integral mount	**FEV11**																				
Flowmeter system, optimized full bore, remote mount	**FEV12**	**X**	**XXX**	**X**	**X**	**X**	**X**	**XX**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Optimized full bore sensor only, for use with WaterMaster transmitter / remote	**FEV18**																				
Temperature range installation / ambient temperature range																					
Standard design / –20 to 60 °C (–4 to 140 °F)												1									
Nameplate																					
Adhesive													A								
Signal cable length and type*																					
Without signal cable														0							
5 m (15 ft.) cable														1							
10 m (30 ft.) cable														2							
20 m (60 ft.) cable														3							
30 m (100 ft.) cable														4							
50 m (165 ft.) cable														5							
80 m (260 ft.) cable														6							
100 m (325 ft.) cable														7							
150 m (490 ft.) cable														8							
Special length > 150 m (> 490 ft.)														9							
Explosion protection certification																					
General purpose (non-Ex design)															A						
FM Class 1 Div. 2															G						
usFMc Class 1 Div. 2															P						
ATEX/UKEX/IECEx Zone 2, 21 & 22															M						
Protection class transmitter / protection class sensor																					
IP67 (NEMA 4X) / IP67 (NEMA 4X) – integral																1					
IP67 (NEMA 4X) / IP68 (NEMA 6P) – cable not fitted and not potted																2					
IP67 (NEMA 4X) / IP68 (NEMA 6P) – cable fitted and potted																3					
Cable conduits *																					
M20 x 1.5 (plastic)																	A				
NPT ½ in. (blanked when cable not fitted)																	B				
M20 SWA (armored)																	D				
M20 SWA sensor, M20 x 1.5 (plastic) power / output																	F				
Without																	Y				
Power supply																					
Without																		0			
100 to 230 V AC, 50 Hz																		1			
24 V AC or 24 V DC, 50 Hz																		2			
100 to 230 V AC, 60 Hz																		3			
24 V AC or 24 V DC, 60 Hz																		4			
Others																		9			
Input and output signal type																					
HART + 20 mA (active) + pulse + contact output																			A		
PROFIBUS DP RS485 physical layer + pulse + contact output																			G		
MODBUS RTU RS485 physical layer + pulse + contact output																			M		
Without																			Y		
Configuration type / diagnostics type																					
Without																				0	
Factory defaults / standard diagnostics																				1	

Continued on next page…

* The type of signal cable supplied (standard or armored) depends on the type of cable conduit (variant digit number 24) ordered. For FM or FMC Approved versions, NPT only permitted.

…Ordering information

…Electromagnetic flowmeter WaterMaster – FEV11, FEV12 and FEV18

Product coding field number	1 … 5	6	7 … 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system, optimized full bore, integral mount	**FEV11**																				
Flowmeter system, optimized full bore, remote mount	**FEV12**	**X**	**XXX**	**X**	**X**	**X**	**X**	**XX**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Optimized full bore sensor only, for use with WaterMaster transmitter / remote	**FEV18**																				

Options**

Accessories

Configuration lead	AC

Documentation language

German	M1	Chinese	M6
Italian	M2	Swedish	M7
Spanish	M3	Finnish	M8
French	M4	Portuguese	MA
English	M5 (default)	Danish	MF
		Norwegian	MN

Other usage certifications

Measuring Instruments Directive (MID*)	CM1*
OIML R49:2006 Calibration	CM2

Verification type

Without fingerprint	V0
VeriMaster	V3

Potable water approval

WRAS cold water approval	CWA
NSF 61 meter approval	CWC
DVGW	CWD
ACS	CWF
Without	CWY

Power supply frequency (sensor FEV18 only)

50 Hz	F5
60 Hz	F6

Number of testpoints

1 Point	T1
3 Points	T3

* Initial verification to Measurement Instrument Directive (MID) would be done at Q3/Q1 = 80

**Add codes for options.

Electromagnetic flowmeter WaterMaster FEF12 and FEF18

Product coding field number	1 … 5	6	7 … 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system, full bore, remote mount	**FEF12**																				
Full bore sensor only, for use with WaterMaster transmitter / remote	**FEF18**	**X**	**XXX**	**X**	**X**	**X**	**X**	**XX**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Design																					
Non-hazardous areas		1																			
Hazardous areas (DN≥700 [27 in. NB])		5																			
Bore diameter																					
DN250 (10 in.)			250																		
DN300 (12 in.)			300																		
DN350 (14 in.)			350																		
DN375 (15 in.)			375																		
DN400 (16 in.)			400																		
DN450 (18 in.)			450																		
DN500 (20 in.)			500																		
DN600 (24 in.)			600																		
Others			999																		
Liner material																					
Elastomer – DN250 to 600 (10 to 24 in. NB)				K																	
Hard rubber – DN250 to 600 (10 to 24 in. NB)				H																	
Other				Z																	
Electrode design																					
Standard					1																
Others					9																
Measuring electrodes material																					
Stainless steel 316						S															
Hastelloy® C-22						C															
Super-austenitic steel (DN250 to 600 [10 to 24 in. NB])						U															
Others						Z															
Grounding accessories																					
Standard							1														
One potential equalizing ring (stainless steel)							3														
Two potential equalizing rings (stainless steel)							4														
Others							9														
Process connection type (refer to page 43 and 45)																					
Flanges ASME B16.5 class 150								A1													
Flanges ASME B16.5 class 300								A3													
Flanges AWWA C207 class B								C1													
Flanges AWWA C207 class D								C2													
Flanges AS 4087 PN21								E0													
Flanges AS 4087 PN16								E1													
Flanges AS 4087 PN14								E2													
Flanges AS 2129 Table F								E3													
Flanges AS 2129 Table E								E4													
Flanges AS 2129 Table D								E5													
Flanges AS 2129 Table C								E6													
Flanges AS 2129 Table H								E7													
Flanges AS 4087 PN35								E8													
Flanges JIS G5527 7.5K								J0													
Flanges JIS B2220 10K								J1													
Flanges JIS B2220 5K								J2													
Flanges ISO / EN PN6								S0													
Flanges ISO / EN PN10								S1													
Flanges ISO / EN PN16								S2													
Flanges ISO / EN PN25								S3													
Flanges ISO / EN PN40								S4													
Others								Z9													
Note. DN80 to 200 (3 to 10 in. NB) available only with PN16																					
Process connection material																					
Carbon steel flanges									B												
Others									Z												
Usage certifications																					
Standard										1											
Calibration type																					
Class 2 calibration – standard accuracy 0.4 %											A										
Class 1 calibration – high accuracy 0.2 %											B										
Extended range, class 1 calibration – high accuracy 0.2 %											N										
Extended range, class 2 calibration – standard accuracy 0.4 %											P										

Continued on next page …

…Ordering information

…Electromagnetic flowmeter WaterMaster FEF12 and FEF18

Product coding field number	1 … 5	6	7 … 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system, full bore, remote mount	**FEF12**																				
Full bore sensor only, for use with WaterMaster transmitter / remote	**FEF18**	**X**	**XXX**	**X**	**X**	**X**	**X**	**XX**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Temperature range installation / ambient temperature range																					
Standard design / –20 to 60 °C (–4 to 140 °F)												1									
Nameplate																					
Adhesive													A								
Signal cable length and type*																					
Without signal cable														0							
5 m (15 ft.) cable														1							
10 m (30 ft.) cable														2							
20 m (60 ft.) cable														3							
30 m (100 ft.) cable														4							
50 m (165 ft.) cable														5							
80 m (260 ft.) cable														6							
100 m (325 ft.) cable														7							
150 m (490 ft.) cable														8							
Special Length > 150 m (> 490 ft.) (and / or armored cable)														9							
Explosion protection certification																					
General purpose (non-Ex design)															A						
Protection class transmitter / protection class sensor																					
IP67 (NEMA 4X) / IP68 (NEMA 6P) – cable not fitted and not potted																2					
IP67 (NEMA 4X) / IP68 (NEMA 6P) – cable fitted and potted																3					
Cable conduits**																					
M20 x 1.5 (plastic)																	A				
NPT ½ in. (blanked when cable not fitted)																	B				
M20 SWA (armored)																	D				
M20 SWA sensor, M20 x 1.5 (plastic) power / output																	F				
Without																	Y				
Power supply																					
Without																		0			
100 to 230 V AC (50 Hz)																		1			
24 V AC or 24 V DC (50 Hz)																		2			
100 to 230 V AC (60 Hz)																		3			
24 V AC or 24 V DC (60 Hz)																		4			
Input and output signal type																					
HART + 20 mA (active) + pulse + contact output																			A		
PROFIBUS DP RS485 physical layer + pulse + contact output																			G		
MODBUS RTU RS485 physical layer + pulse + contact output																			M		
Without																			Y		
Configuration type / diagnostics type																					
Without																				0	
Factory defaults / standard diagnostics																				1	

Options**

Accessories

Configuration lead	AC

Documentation language

German	M1	Chinese	M6
Italian	M2	Swedish	M7
Spanish	M3	Finnish	M8
French	M4	Portuguese	MA
English	M5 (default)	Danish	MF
		Norwegian	MN

Verification type

Without	
fingerprint	V0
VeriMaster	V3

Potable water approvals

WRAS cold water approval	CWA
NSF 61 meter approval	CWC
DVGW	CWD
ACS	CWF
WRAS 60 °C (140 °F) water approval	CWK
Without	CWY

Power supply frequency (sensor FEF 18 only)

50 Hz	F5
60 Hz	F6

Number of testpoints

1 Point	T1
3 Points	T3

*The type of signal cable supplied (standard or armored) depends on the type of cable conduit (variant digit number 24) ordered – for FM or FMC Approved versions, NPT only permitted.
**Add codes for options.

Electromagnetic flowmeter WaterMaster – FEW31, FEW32 and FEW38

Product coding field number	1 ... 5	6	7 ... 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system – full bore, integral mount	**FEW31**																				
Flowmeter system – full bore, remote mount	**FEW32**	**X**	**XXX**	**X**	**X**	**X**	**X**	**XX**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Full bore sensor only – for use with WaterMaster transmitter / remote	**FEW38**																				
Design																					
Non-hazardous areas		1																			
Hazardous areas		5																			
Bore diameter																					
DN10 (⅜ in.)			010																		
DN15 (½ in.)			015																		
DN20 (¾ in.)			020																		
DN25 (1 in.)			025																		
DN32 (1¼ in.)			032																		
DN40 (1½ in.)			040																		
DN50 (2 in.)			050																		
DN65 (2½ in.)			065																		
DN80 (3 in.)			080																		
DN100 (4 in.)			100																		
DN125 (5 in.)			125																		
DN150 (6 in.)			150																		
DN200 (8 in.)			200																		
DN250 (10 in.)			250																		
DN300 (12 in.)			300																		
DN350 (14 in.)			350																		
DN400 (16 in.)			400																		
DN450 (18 in.)			450																		
DN500 (20 in.)			500																		
DN600 (24 in.)			600																		
DN700 (28 in.)			700																		
DN750 (30 in.)			750																		
DN800 (32 in.)			800																		
DN900 (36 in.)			900																		
DN1000 (40 in.)			001																		
DN1050 (42 in.)			051																		
DN1100 (44 in.)			101																		
DN1200 (48 in.)			201																		
DN1350 (54 in.)			351																		
DN1400 (56 in.)			401																		
DN1500 (60 in.)			501																		
DN1600 (64 in.)			601																		
DN1650 (66 in.)			651																		
DN1800 (72 in.)			801																		
DN1950 (78 in.)			951																		
DN2000 (80 in.)			002																		
DN2100 (84 in.)			102																		
DN2200 (88 in.)			202																		
DN2400 (96 in.)			402																		
Others			999																		
Liner material																					
PTFE – DN10 to 600 (⅜ to 24 in. NB)				A																	
Hard rubber – DN40 to 2400 (1½ to 96 in. NB)				H																	
Elastomer – DN40 to 2400 (1½ to 96 in. NB)				K																	
Electrode design																					
Standard					1																
Other					9																
Measuring electrodes material																					
Hastelloy® C-4 (2.4610)*						D															
Stainless steel 316Ti/316L						S															
Hastelloy C-22						C															
Grounding accessories																					
Not required							0														
Standard							1														
One potential equalizing ring (stainless steel)							3														
Two potential equalizing rings (stainless steel)							4														

Continued on next page...

* Standard option for sizes greater than DN600

...Ordering information

Electromagnetic flowmeter WaterMaster – FEW31, FEW32 and FEW38

Product coding field number	1 ... 5	6	7 ... 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system – full bore, integral mount	FEW31																				
Flowmeter system – full bore, remote mount	FEW32	x	xxx	x	x	x	x	xx	x	x	x	x	x	x	x	x	x	x	x	x	
Full bore sensor only – for use with WaterMaster transmitter / remote	FEW38																				
Process connection type																					
Flanges ASME B16.47 series B /API 605 / B16.5 Class 150								A1													
Flanges ASME B16.47 series B /API 605 / B16.5 Class 300								A3													
Flanges ASME B16.47 series A /MSS SP-44 / B16.5 Class 150								B1													
Flanges ASME B16.47 series A /MSS SP-44 / B16.5 Class 300								B3													
Flanges AWWA C207 Class B								C1													
Flanges AWWA C207 Class D								C2													
Flanges AWWA C207 Class E								C3													
Flanges AWWA C207 Class F								C4													
Flanges JIS 10K								J1													
Flanges JIS 5K								J2													
Flanges AS 4087 PN 16								E1													
Flanges AS 2129 Table E								E4													
Flanges AS 2129 Table D								E5													
Flanges AS 4087 PN 35								E8													
ISO 7005, DIN, EN 1092-1 PN6								S0													
ISO 7005, DIN, EN 1092-1 PN10								S1													
ISO 7005, DIN, EN 1092-1 PN16								S2													
ISO 7005, DIN, EN 1092-1 PN25								S3													
ISO 7005, DIN, EN 1092-1 PN40								S4													
Process connection material																					
Carbon steel flanges									B												
Stainless steel flange									D												
Usage certifications																					
Standard (without PED)										1											
Calibration type																					
Class 2 calibration – standard accuracy 0.4 %											A										
Class 1 calibration – high accuracy 0.2 %											B										
Temperature range installation / ambient temperature range																					
Standard design/ –20 to 60 °C (–4 to 140 °F)												1									
Nameplate																					
Adhesive													A								
Signal cable length and type																					
Without signal cable														0							
5 m (15 ft.) cable														1							
10 m (30 ft.) cable														2							
20 m (60 ft.) cable														3							
30 m (100 ft.) cable														4							
50 m (165 ft.) cable														5							
80 m (260 ft.) cable														6							
100 m (325 ft.) cable														7							
150 m (490 ft.) cable														8							
Special length or cable type														9							
Explosion protection certification*																					
General purpose (non-Ex design)															A						
FM Class 1 Div. 2															G						
usFMc Class 1 Div. 2															P						
ATEX/UKEX/IECEx Zone 2, 21 & 22															M						

Continued on next page...

Product coding field number	1 … 5	6	7 … 9	10	11	12	13	14, 15	16	17	18	19	20	21	22	23	24	25	26	27	Options
Flowmeter system – full bore, integral mount	FEW31																				
Flowmeter system – full bore, remote mount	FEW32	X	XXX	X	X	X	X	XX	X	X	X	X	X	X	X	X	X	X	X	X	
Full bore sensor only – for use with WaterMaster transmitter / remote	FEW38																				

Protection class transmitter / protection class sensor

IP67 (NEMA 4X) / IP67 (NEMA 4X) – cable not fitted and not potted to sensor	1
IP 67 (NEMA 4x) / IP68 (NEMA 6P) – cable not fitted and not potted to sensor	2
IP 67 (NEMA 4x) / IP68 (NEMA 6P) – cable fitted and potted to sensor	3

Cable conduits **

M20 x 1.5 (plastic)	A
NPT ½ in. (blanked when cable not fitted)	B
M20 SWA (armored)	D
M20 SWA sensor, M20 x 1.5 (plastic) power / output	F
Without	Y

Power supply

Without	0
100 to 230 V AC, 50 Hz	1
24 V AC or 24 V DC, 50 Hz	2
100 to 230 V AC, 60 Hz	3
24 V AC or 24 V DC, 60 Hz	4

Input and output signal type

HART + 20 mA (active) + pulse + contact output	A
PROFIBUS DP RS485 physical layer + pulse + contact output	G
MODBUS RTU RS485 physical layer + pulse + contact output	M
Without	Y

Configuration type / diagnostics type

Not required	0
Factory default / Standard	1

Options***

Accessories

Configuration lead	AC

Documentation language

German	M1	Chinese	M6
Italian	M2	Swedish	M7
Spanish	M3	Finnish	M8
French	M4	Portuguese	MA
English	M5 (default)	Danish	MF
		Norwegian	MN

Lay length

ISO length – DN10 to 600 (⅜ to 24 in.) and 1.25D DN1800 to 2400 (72 to 96 in.)	JB
1.3D DN700 to 2400 (28 to 96 in.) – see dimensional pages 28, 29, 30, 31	JK
1.0D DN700 to 1600 (28 to 64 in.) – see dimensional pages 32, 33, 34, 35	JH

Verification type

Without	
fingerprint	V0
VeriMaster	V3

Potable water approval

WRAS cold water approval	CWA
WRAS 60 °C (140 °F) water approval	CWK
NSF61 meter approval	CWC
Without	CWY

Power supply frequency (sensor FEW38 only)

50 Hz	F5
60 Hz	F6

Number of testpoints

1 Point	T1
3 Points	T3
5 Points	T5

* FM approval in process. FEF product still available with full FM approval
** The type of signal cable supplied (standard or armored) depends on the type of cable conduit (variant digit number 24) ordered. For FM or FMC Approved versions, NPT only permitted.
*** Add codes for options.

...Ordering information

WaterMaster FER reduced-bore sensor flowmeter series

Product coding field number	1 ... 6	7 ... 9	10	11	12	13	14,15	16	17	18	19	20	21	22	23	24	25	26	27	Options
WaterMaster system. Reduced-bore sensor with remote mounted transmitter	**FER121**																			
WaterMaster system. Reduced-bore sensor with integral transmitter	**FER111**	**XXX**	**X**	**X**	**X**	**X**	**XX**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
WaterMaster reduced-bore sensor only, remote mount, without transmitter	**FER181**																			
Bore diameter																				
DN 40 (1½ in.)		040																		
DN 50 (2 in.)		050																		
DN 65 (2½ in.)		065																		
DN 80 (3 in.)		080																		
DN 100 (4 in.)		100																		
DN 125 (5 in.)		125																		
DN 150 (6 in.)		150																		
DN 200 (8 in.)		200																		
DN 250 (10 in.)		250																		
DN 300 (12 in.)		300																		
DN 350 (14 in.)		350																		
DN 375 (15 in.)		375																		
DN 400 (16 in.)		400																		
DN 450 (18 in.)		450																		
DN 500 (20 in.)		500																		
DN 600 (24 in.)		600																		
Liner material																				
Elastomer – DN40 to 600 (1½ to 24 in. NB)			K																	
Electrode design																				
Standard				1																
Measuring electrodes material																				
Stainless steel 316					S															
Super austenitic steel (1.4529)					U															
Grounding accessories																				
1 x Stainless steel equalizing ring						3														
2 x Stainless steel equalizing rings						4														
Process connection type (refer to page 40 and 41)																				
Flanges ANSI / ASME B16.5 / 16.47 series B Class 150	(40 / 50 / 80 / 100 / 150 to 300)						A1													
Flanges AWWA C207 Class E	(40 / 50 / 80)						C3													
Flanges JIS 7.5K	(100 / 150 to 300)						J0													
Flanges JIS 10K	(40 / 50 / 80 / 100 / 150 to 300)						J1													
Flanges AS 4087 PN 21	(50 / 80 / 100 / 150 to 600)						E0													
Flanges AS 4087 PN 16	(50 / 80 / 100 / 150 to 350 / 450 to 600)						E1													
Flanges AS 4087 PN 14	(40 / 50 / 80 / 100 / 150 to 600)						E2													
Flanges AS 2129 Table F	(40 / 50 / 80 / 100 / 150 to 600)						E3													
Flanges AS 2129 Table E	(40 / 50 / 80 / 100 / 125 / 150 to 600)						E4													
Flanges AS 2129 Table D	(40 / 50 / 80 / 100 / 150 to 300)						E5													
Flanges AS 2129 Table C	(40 / 50 / 80 / 100 / 150 to 300)						E6													
ISO 7005 PN 10 EN 1092-1	(40 to 600)						S1													
ISO 7005 PN 16 EN 1092-1	(40 to 600)						S2													
ISO 7005 PN 40 EN 1092-1	(40)						S4													
Process connection material																				
Carbon steel								B												
Usage certifications																				
Standard									1											

Continued on next page...

Product coding field number	1 ... 6	7 ... 9	10	11	12	13	14,15	16	17	18	19	20	21	22	23	24	25	26	27	Options
WaterMaster system. Reduced-bore sensor with remote mounted transmitter	**FER121**																			
WaterMaster system. Reduced-bore sensor with integral transmitter	**FER111**	**XXX**	**X**	**X**	**X**	**X**	**XX**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
WaterMaster reduced-bore sensor only, remote mount, without transmitter	**FER181**																			
Calibration type																				
Class 2 calibration – standard accuracy 0.4 %										A										
Class 1 calibration – high accuracy 0.2										B										
Extended range, class 1 calibration – high accuracy 0.2 %										N										
Extended range, class 2 calibration – standard accuracy 0.4 %										P										
Installation temperature range / ambient temperature range																				
Standard design –20 to 60 °C (–4 to 140 °F)											1									
Name plate																				
Adhesive label												A								
Signal cable length and type																				
Without signal cable													0							
5 m (16.4 ft)													1							
10 m (32.8 ft)													2							
20 m (65.6 ft)													3							
30 m (98.4 ft)													4							
50 m (164.0 ft)													5							
80 m (262.5 ft)													6							
100 m (325 ft)													7							
150 m (490 ft)													8							
Others													9							
Explosion protection certification																				
General purpose (non-Ex design)														A						
Protection class transmitter / protection class sensor																				
IP67 (NEMA 4X) / IP68 (NEMA 6P) – cable not fitted and not potted															2					
IP67 (NEMA 4X) / IP68 (NEMA 6P) – cable fitted and potted															3					
Cable conduits*																				
M20 x 1.5																A				
NPT ½ in (blanked when cable not fitted)																B				
M20 SWA armored (FEV121 and FEV181 only)																D				
M20 SWA sensor, output and power connector (FEV121 and FEV181 only)																F				
Power supply																				
Without (FEV18 only)																	0			
100... 230 V AC, 50 Hz																	1			
24 V AC or 24 V DC, 50 Hz																	2			
100... 230 V AC, 60 Hz																	3			
24 V AC or 24 V DC, 60 Hz																	4			
Input and output signal type																				
HART + 20 mA (active) + pulse + contact output																		A		
PROFIBUS DP RS485 physical layer + pulse + contact output (FEV111 and FEV121 only)																		G		
MODBUS RTU RS485 physical layer + pulse + contact output (FEV111 and FEV121 only)																		M		
Without (FEV181 only)																		Y		
Configuration type / diagnostics type																				
Without (FEV18 only)																			0	
Factory defaults / standard diagnostics (FEV11 and FEV12 only)																			1	

Options**

Documentation language					
German	M1	French	M4	Portuguese	MA
Italian	M2	English (default)	M5	Russian	MB
Spanish	M3	Chinese	M6	Danish	MF

Verification type	
Without fingerprint	V0
VeriMaster	V3
Potable water approval	
WRAS cold water approval	CWA
DVGW	CWD
ACS	CWF
NSF61 meter approval	CWC
Power supply frequency (sensor FER18 only)	
50 Hz	F5
60 Hz	F6

* The type of signal cable supplied (standard or armored) depends on the type of cable conduit (variant digit number 24) ordered. For FM or FMC Approved versions, NPT only permitted.

**Add codes for options.

…Ordering information

Electromagnetic flowmeter transmitter for WaterMaster FET10 and FET12

Product coding field number	1 … 5	6	7	8	9	10	11	12	13	14	15	Options
Transmitter module	**FET10**		**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	
Remote transmitter	**FET12**											
Design												
Non-hazardous area		1										
Hazardous area		5										
Temperature range installation / ambient temperature range												
Standard design / –20 to 60 °C (–4 to 140 °F)			1									
Nameplate												
Adhesive				A								
Signal cable length and type												
Without signal cable					0							
Explosion protection certification												
Without (transmitter only)						Y						
FM Class 1 Div. 2						G						
usFMc Class 1 Div. 2						P						
ATEX/UKEX/IECEx Zone 2, 21 & 22						M						
Protection class transmitter / protection class sensor												
IP67 (NEMA 4X) / IP67 (NEMA 4X)							1					
Cable conduits												
M20 x 1.5 (plastic)								A				
NPT ½ in. (blanked when cable not fitted)								B				
M20 SWA (armored)								D				
M20 SWA sensor, M20 x 1.5 (plastic) power / output								F				
Without								Y				
Power supply												
100 to 230 V AC									1			
24 V AC or 24 V DC									2			
100… 230 V AC, 60 Hz									3			
24 V AC or 24 V DC, 60 Hz									4			
Input and output signal type*												
HART + 20 mA (active) + pulse + contact output										A		
PROFIBUS DP RS485 physical layer + pulse + contact output										G		
MODBUS RTU RS485 physical layer + pulse + contact output										M		
Configuration type / diagnostics type												
Factory defaults / standard diagnostics											1	

Options**

Accessories

Configuration lead	AC

Documentation language

German	M1	Chinese	M6
Italian	M2	Swedish	M7
Spanish	M3	Finnish	M8
French	M4	Portuguese	MA
English	M5 (default)	Danish	MF
		Norwegian	MN

Other usage

Measuring Instruments Directive (MID)	CM1

*The transmitter converter module Input and Output Signal Type must match the transmitter backplane output configuration (HART or PROFIBUS) – see OI/FET100-EN.
**Add codes for options.

Common accessories

Accessory	Item number
WaterMaster AC Fuse F1 Type T 250 mA A/S TR5	B20411
WaterMaster DC Fuse F2 Type T 2 A A/S TR5	B20412
WaterMaster Infra Red Comms Pack	MJBX9932
WaterMaster Backplane PCB Board (STD)	WATX2505
WaterMaster Sensor PCB Board	WATX2506
WaterMaster Comms Cable	WEBC2500
Signal cable for remote WaterMaster transmitter	
5 m (15 ft.)	STT4500/05
10 m (30 ft.)	STT4500/10
20 m (60 ft.)	STT4500/20
30 m (100 ft.)	STT4500/30
50 m (165 ft.)	STT4500/50
80 m (260 ft.)	STT4500/80
100 m (325 ft.)	STT4500/100
150 m (490 ft.)	STT4500/150
500 m (1650 ft.)	STT4500/500
Armored signal cable for remote WaterMaster transmitter	
5 m (15 ft.)	STT4501/05
10 m (30 ft.)	STT4501/10
20 m (60 ft.)	STT4501/20
30 m (100 ft.)	STT4501/30
50 m (165 ft.)	STT4501/50
80 m (260 ft.)	STT4501/80
100 m (325 ft.)	STT4501/100
150 m (490 ft.)	STT4501/150
500 m (1650 ft.)	STT4501/500

Acknowledgements

- Microsoft is a registered trademark of Microsoft Corporation in the United States and/or other countries
- Modbus is a registered trademark of the Modbus-IDA organization
- HART is a registered trademark of the HART Communication Foundation

Notes

Notes

ABB Measurement & Analytics

For your local ABB contact, visit:
www.abb.com/contacts

For more product information, visit:
www.abb.com/measurement

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DS/WM-EN Rev. AC 08.2022

Xylem |'zīləm|

1) The tissue in plants that brings water upward from the roots;
2) a leading global water technology company.

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TAKING INTELLIGENT PUMP STATION MANAGER CONTROL TO NEW LEVELS

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Flygt MultiSmart®

Empowered performance. Intuitive control.

With Flygt MultiSmart, it's now easier than ever to manage your pump stations. Capable of handling up to six pumps, it's enabled with preconfigured functions to maximize efficiency, save time and reduce costs by preventing clogging and nuisance call-outs. MultiSmart's intuitive, customizable interface, equipped with proven features designed specifically for water and wastewater, empowers your operational staff.

Control at your fingertips
Thanks to a new powerful touchscreen interface and the MultiSmart configurator, commissioning a new station or maximizing the efficiency of an existing station could not be simpler. A setup wizard guides your staff through installation using defaults that have been thoughtfully designed to get you up and running exactly as you need. You can also easily change any parameter to gain full control over all the details. Whether it's something as simple as changing set points or creating complex alternation schemes for large pump stations, MultiSmart gives your staff all the features your operations demand.

The intelligent pump station
Why follow a fixed alteration when your station can automatically run its most energy efficient pump? Why waste time on manually cleaning when it can regulary automatically cleanse the sump for you? And what if your system could give you all the information needed to carry out preventative maintenance?

These are just a few of the performance-enhancing features you can expect from MultiSmart. Along with multiple set point profiles allowing remote or timed switching for operations such as spill management, automatic changing of set points and pre-set limits to the number of running pumps when switching to a generator. With countless more options to choose from, MultiSmart dramatically reduces the complexity and hassle of controlling your pump station.

Less time, lower costs
Thanks to built-in features like pump reversal, which prevents clogging and issues alarm signals to prompt preventive maintenance, nuisance call-outs can be eliminated. Pump voltage and amperage are also monitored to calculate real power consumption, ensuring long-term power savings by continuously leveraging the use of the most efficient pump. MultiSmart will automatically reset tripped pumps.

MultiSmart combine 3-phase current monitoring and remote control to reduce both control panel costs and unnecessary site visits. A built-in local webserver can eliminate the costs of additional HMI software. Either way, your deployment and commissioning costs are reduced to a bare minimum.

All the storage and connectivity you need
The MultiSmart pumpstation manager connects to any modern SCADA platform over DNP3, Modbus or Aquacom. It includes a data logger for 50,000 events (10,000,000 direct to CF card) and local storage of up to 20 GB of historical data, including historical data filtering.

Firmware and feature upgrades are easily accessible via the web, while the IEC 61131-3 compliant PLC engine allows you to further extend functionality to create new features using your own custom compliant PLC engine.

Taking intelligent pump station control to new levels.

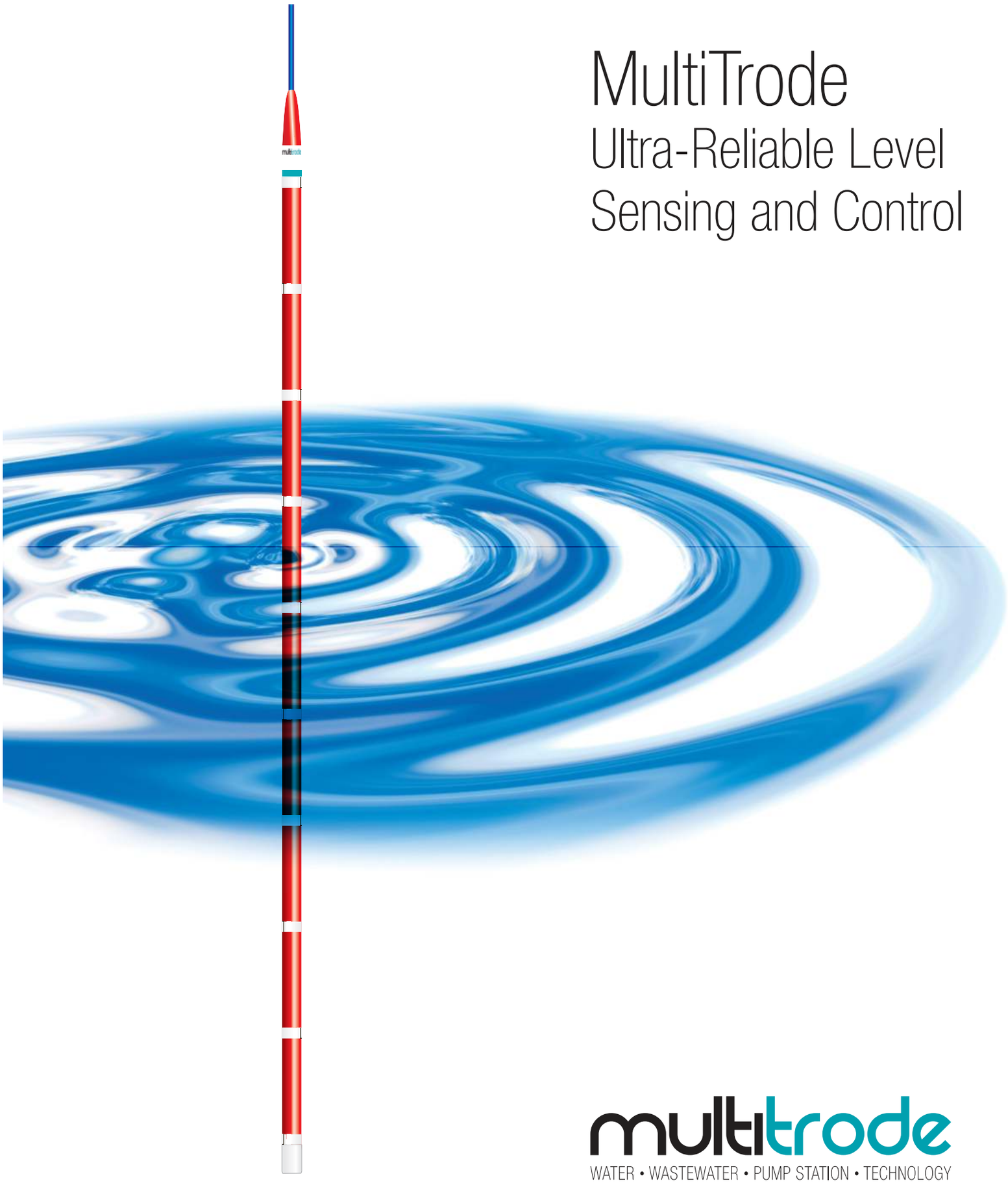
Technical data

Power supply	• 11–25 VDC
Ports	• 2xRS232 • 2xRS485 • 2x Ethernet • USB and SD port
Communication	• DNP3 level 2, Modbus, AquaCom, WITS certified
Standard I/O	• 20 Digital inputs, 7 Digital outputs, 2 analogue input, 1 analogue output, 3 Voltage inputs
Motor protection I/O	• 9 current inputs, 3 insulation resistance testing, 5 digital outputs, 3 analogue outputs
Data logging	• 50.000 date, time and quality stamped events stored
Unique functions	• Energy data • Set point profiles • Energy efficiency alternation • 3-phase voltage monitoring per station • 3-phase current monitoring per pump • Insulation resistance testing • Pump cleaning • Automatically reset tripped pumps
IP class	• Controller IP20 and Display IP65 • Or Rugged Display IP67
Approvals	• CE, UL, cUL

Total solutions for the world's toughest water challenges

In the water and wastewater business, conditions change fast. And the more your equipment can tell you, the better you can perform. This is why at Xylem, we take a more complete approach to water management. With Flygt products and solutions that are designed to meet your demands for reliable pumps, matched with seamless monitoring and control solutions. It's a unique combination of innovative expertise and extensive application knowledge that helps to reduce energy consumption, eliminate call-outs and drive better performance.

Take MultiSmart as a case in point. The world's first intelligent pump station manager, it turns any set-up of pumps, level devices and SCADA systems into a powerful network for preventive maintenance and energy-efficient operations. It's just one of a range of advanced solutions that make **Flygt monitoring & control and pumps even better together.**



MultiTrode

Ultra-Reliable Level Sensing and Control

multitrode

WATER • WASTEWATER • PUMP STATION • TECHNOLOGY

The Probe... Dip it. Set it. Leave it.

Why is it easier to install than other level devices?

All you do is hang the Probe on its own cable into your wet well, using the bracket we supply. Installation is simple - any one of your technicians could do it in an hour or so. What's more, you install the Probe relatively low down in the wet well, so compared to ball floats it allows the well to be cleaned out more thoroughly. That means less debris build-up, odors and pump clogs.

MTISB Intrinsically Safe Barrier

The MTISB is used between MultiTrode Probes and control equipment. It eliminates the risk of dangerous energy entering the potentially explosive environment where the Probe is located. 5-channel (MTISB5) and 10-channel (MTISB10) barriers available.

MultiTrode's Probe is the most reliable and cost-effective level sensor available in the water and wastewater industry today.

- 10+ year lifetime
- Cost effective and virtually maintenance free
- Very low and reliable pump cut-out
- Unaffected by build up (fat, grease, sludge and foam)
- Reduces maintenance cost
- Intrinsically safe when installed with MTISB barrier
- Eliminates false readings
- Simple to install and maintain
- Cuts the risk of spills
- UL, ULC, CTick, and CE Approved

Why is it so Reliable?

There are no electronics and no moving parts - which results in a long lifetime. **That's why it gets a 10-year warranty!**

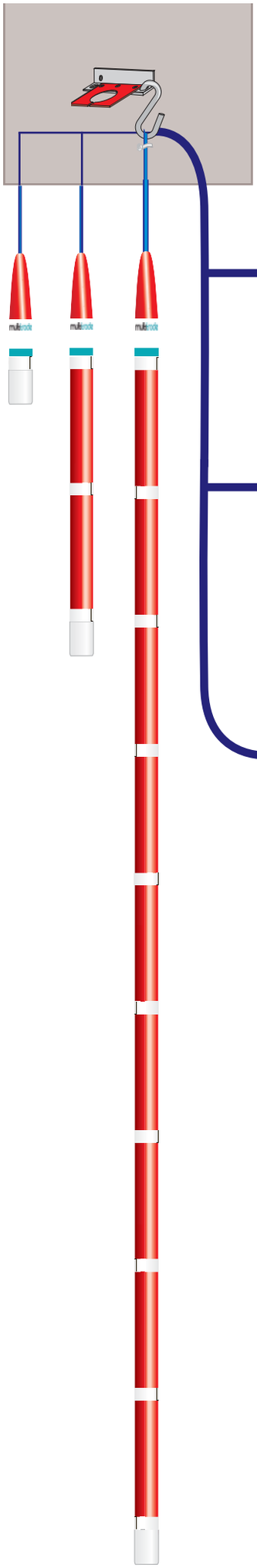
How would your Ultrasonic hold up to this application?

The MultiTrode Probe is unaffected by fat, foam, grease and sludge.

How does it work?

The Probe works by using the conductive properties of the water itself to complete a circuit with a controller. It's mounted near the inflow, allowing the turbulence to keep it clean. Even if a build-up does occur it's usually conductive (in wastewater) and so the Probe keeps right on working.

If cleaning is required the Probe is simply pulled through a squeegee that is part of the mounting bracket.



The Probe Connects To:

SCADA System

MultiSmart Pump Station Manager

Full control and monitoring with SCADA connectivity – please see the MultiSmart brochure for details.

MTIC with
10 Probe Inputs

MTDPC with
10 Probe Inputs

MTR with
2 Probe Inputs

MTRA with
3 Probe Inputs

Safe-TL or Safe-FS with
3 Probe Inputs
Includes thermal/seal motor protection

Ordering Information and Examples

Model Code	Probe Length	Number of Sensors	Sensor Separation
0.2 / 1-xx	8in / 0.2m	1	N/A
0.5 / 3-xx	16in / 0.5m	3	6in / 150mm
1.0 / 10-xx	40in / 1.0m	10	4in / 100mm
1.5 / 10-xx	60in / 1.5m	10	6in / 150mm
2.0 / 10-xx	80in / 2.0m	10	8in / 200mm
2.5 / 10-xx	96in / 2.5m	10	10in / 250mm
3.0 / 10-xx	115in / 3.0m	10	12in / 300mm
6.0 / 10-xx	224in / 6.0m	10	24in / 600mm
9.0 / 10-xx	368in / 9.0m	10	35in / 900mm

xx = 10 (for 33ft or 10m of cable); or 30 (for 100ft or 30m of cable)

Probes are supplied with a standard length of cable in either 33ft / 10m or in 100ft / 30m lengths. The Probe comes in sizes ranging from 8 inches to 30 feet. It is available with 1-sensor, 3-sensors or 10-sensors.

2.5 / 10 -10

Probe Length (meters)	Sensor Points	Cable Length (meters)
2.5	10	10

In the complicated world of water and wasterwater management, there is good reason why MultiTrode stands unrivalled amongst its peers: We are committed to a singular vision of developing the latest technological advancements to provide sophisticated solutions to every day challenges in the water and wastewater industries.

Key to our success is the importance we place on customer satisfaction and solution-based products to save you time and money. From pump station management systems to engineering support, MultiTrode encompasses it all. By investing heavily in R&D, we remain on the cutting edge of technology and always ahead of our competitors.

Our products are proven. Our results are tangible. MultiTrode is unrivalled.

MTCAT 7.3

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We Provide Environmentally Responsible Solutions

multitrode
WATER • WASTEWATER • PUMP STATION • TECHNOLOGY
Visit our website at www.multitrode.com

MTISB - Instrinsically Safe Barrier

The MTISB Intrinsically Safe Barrier is certified intrinsically safe for operation in hazardous applications.

Use with all MultiTrode equipment installations up to and including Class 1 Zone 0.

- Makes specified MultiTrode products intrinsically safe
- Compatible with all MultiTrode products
- Easily installed as an aftermarket upgrade

The MTISB is a 5 or 10 channel Barrier unit for use with the MultiTrode probes and control equipment. It will eliminate any risk of dangerous energy entering the explosive environment where the level probe is located. It is approved for use in sewerage pump stations, digesters, mining and most other hazardous installations.

Connection is made from the controller through the barrier to the MultiTrode probe located in the hazardous area. It is used to prevent any flash or spark-inducing energy from entering a hazardous area, that could lead to an explosion.

The MTISB is a certified Intrinsically Safe Barrier for use with MultiTrode equipment in installations up to and including Class 1, Zone 0.

Available Models	Ordering Imformation & Examples
MTISB5 5 Channel MTISB10 10 Channel	Model **MTISB** **10** *This order code is for a 10 sensor MTISB*

Specifications

Protection Certifications:

Australian & New Zealand	Ex ia IIC T6 IP20B Ex 2018X to AS 2380.1 & AS 2380.7
USA & Canadian UL913	UL Listing 1P95 Class I Groups A, B, C & D. Class II Groups E, F & G. Class III

Installation & Apparatus Entity Values:

Australia & New Zealand	*MTISB-5*	*MTISB-10*
Allowed capacitance	0.7uF	0.7uF
Allowed inductance	12mH	3.3mH
Allowed resistance per inductance	101uH/R	48uH/R
USA/Canada	***MTISB-5***	***MTISB-10***
Allowed System Voltage [VT]	15.2v	15.2v
Max Short circuit current [IT]	10.7mA	10.7mA
Allowed capacitance	0.6uF	0.6uF
Allowed inductance	20mH	5mH
Internal resistance	1500 Ohms . nom per/ch	
Barrier clamp voltage	22.8V.	

Other Connections:

Intrinsically Safe Earth	2x Brass studs Thread M4
Terminal size	4mm2, #12 Wire

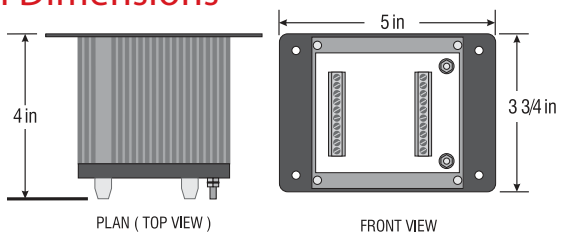
Physical Product:

Dimensions mm	95H x 130W x 102D
Mounting	4 x M4 Screws #6
Enclosure	Extruded aluminium

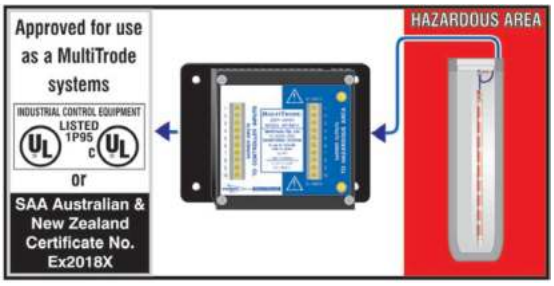
Environmental Range:

- 10 to +60C	+14 to +140F

Physical Dimensions



Sample Application



MULTITRODE

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FLYGT
a xylem brand

DATA SHEET

Surge Protection

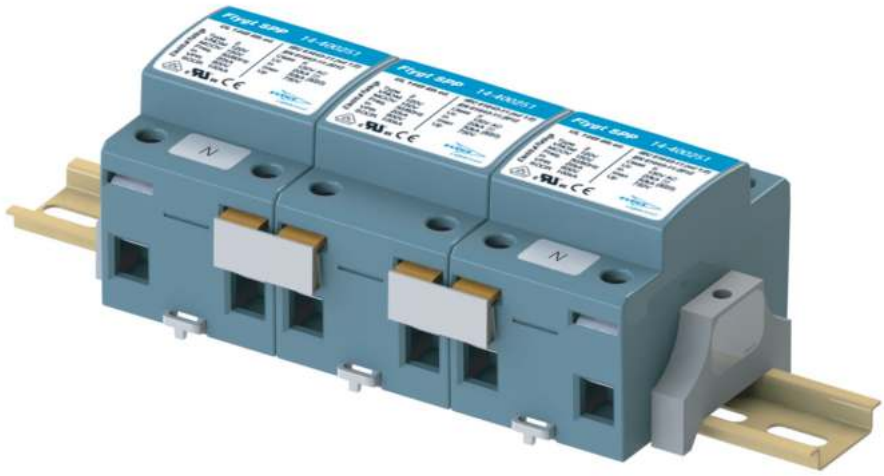
Xylem Flygt SPP Assembly Series

Flygt SPP 14-400254 • Flygt SPP 14-400255 • Flygt SPP 14-400256

Description

Flygt SPP incorporates heavy duty, distribution grade Metal Oxide Varistor (MOV) disks, assembled under pressure in an environmentally sealed aluminum casing. This unique design provides very low internal contact resistance, excellent thermal management of the MOV and uniform distribution of the surge current over the total area of the protection element, thus resulting in an extremely high energy handling capability combined with very low let through voltages. This patented design minimizes the effects of ageing and completely eliminates the risk of catastrophic failure, explosion or fire, which are common in conventional surge protection devices.

The module has been designed to withstand repeated surges providing a cost-effective and maintenance free operation in harsh environments..It is one of the most reliable surge protection devices known and insures that critical electronic equipment will remain protected at all times.



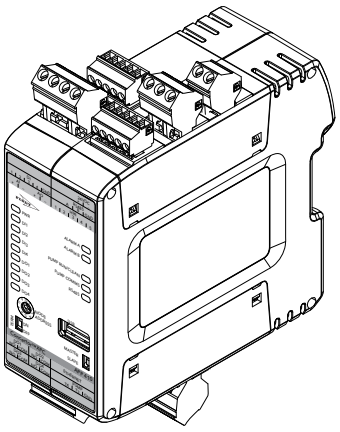
Specifications		Flygt SPP 14-400256	Flygt SPP 14-400254	Flygt SPP 14-400255
Operating Temp:		-40°C to 85°C	-40°C to 85°C	-40°C to 85°C
Rated Operating Voltage:		120/240 1Ø	240 3Ø	460 3Ø
VPR:				
	L-L	1200	1800	2500
	L-G	1200	1000	1500
	L-N	600	-	-

Issued: 0/00 Supersedes:0/00

FLYGT
a xylem brand

TECHNICAL SPECIFICATION

90004001_2.0



FPG 414

Concertor™

1 Product Description

1.1 Product design

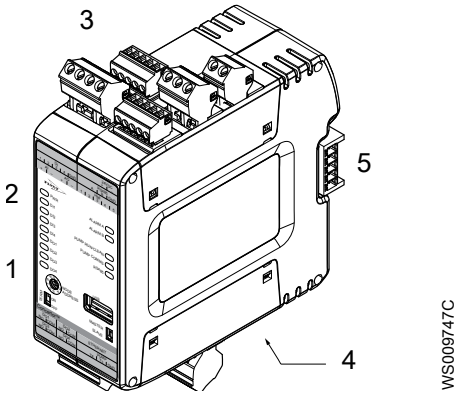
FPG 414 is a gateway that is part of the Concertor™ system. The gateway is connected to Flygt pumps 6020.180/090 or 6020.181/091. The gateway starts and stops the pump based on the input signal from the APP 411 controller, or from the external control system. All the alarms are sent back to the external control system. Data is logged by and stored in the gateway or in the APP 411 controller.

Product name	Part number	Description
FPG 414	8164700	Gateway for Concertor™ DP or Concertor™ XPC. Dynamic pump performance change, through 4–20 mA or Modbus, or pump control through APP 411.

1.2 Approvals

- CE
- UL
- CSA
- RCM

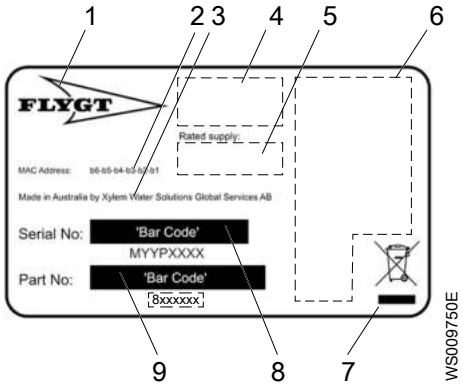
1.3 Parts



WS009747C

1. Front connections
2. Status LEDs
3. Top connections
4. Bottom connections
5. Backplane connector

1.4 The data plate

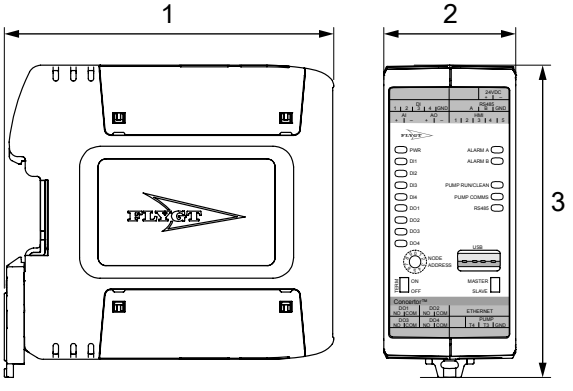


WS009750E

1. Brand
2. MAC address
3. Country of origin. Manufacturer.
4. Product
5. Rated supply
6. Approvals
7. Waste disposal symbol
8. Serial number
9. Part number

2 Technical Reference

2.1 Dimensions



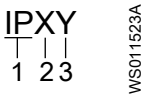
WS009746B

1. 112 mm (4.4 in)
2. 45 mm (1.8 in)
3. 106 mm (4.2 in)

2.2 Environmental requirements

Parameter	Value
Operating temperature	-20°C – +65°C (-4°F – 149°F)
Storage temperature	-20°C – +70°C (-4°F – 158°F)
Operating humidity	Relative humidity, maximum 90%
Sunlight exposure	UV-resistant
Maximum altitude	• With UL approval: Maximum 2000 m (6562 ft) • Without UL approval: 4000 m (13 123 ft)
Pollution degree	2
Installation location	Indoors

2.3 IP rating



1. Degree of protection of enclosure
2. Degree of protection against foreign objects
3. Degree of protection against water

IP20

Table 1: Degree of protection against foreign objects

Description	Definition
Protected against solid objects greater than 12 mm	Finger or similar objects not exceeding 80 mm in length Solid objects exceeding 12 mm in diameter

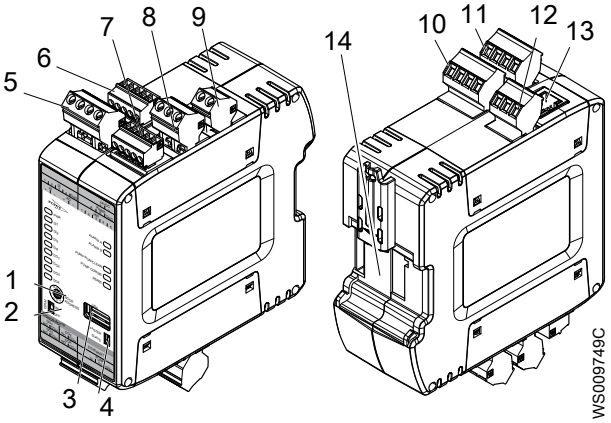
Table 2: Degree of protection against water

Description	Definition
Non-protected	–

2.4 Electrical data

Parameter	Value
Supply voltage	+ 24 VDC
Supply voltage tolerance	21.5–28.5 VDC
Current consumption	< 700 mA. Typical: 150 mA

2.5 Terminals



Section	Terminal	Description
1	NODE ADDRESS	Node address 0–9, rotary switch. 0 is not used.
2	TERM	Backplane termination switch
3	USB	Standard type A USB socket
4	MASTER, SLAVE	MASTER/SLAVE switch
5	AI +	Isolated analog input, 4–20 mA Maximum 24 VDC Scaling: 0–100% Offset: 0–16 mA with 0.1 mA resolution
	AI –	
	AO +	Analog output, 4–20 mA Maximum 24 VDC
	AO –	
6	DI 1	Digital inputs Maximum 24 VDC
	DI 2	
	DI 3	
	DI 4	
	GND	Common ground (earth)
7	HMI • Flygt FOP 315 1	Ground
	HMI • Flygt FOP 315 2	CAN low
	HMI • Flygt FOP 315 3	Shield
	HMI • Flygt FOP 315 4	CAN high
	HMI • Flygt FOP 315 5	+ 24 VDC output
8	RS-485 A	Modbus RTU
	RS-485 B	
	RS-485 GND	
9	24 VDC +	24 VDC Tolerance: 21.5–28.5 VDC The power supply unit must fulfill isolation class II. < 700 mA. Typical: 150 mA Fuse: 1 A
	24 VDC –	
10	DO3 NO	Digital outputs Potential free relay output Maximum 250 VAC, or 30 VDC, 5 A External fuse required, 5 A
	DO3 COM	
	DO4 NO	
	DO4 COM	
11	DO1 NO	
	DO1 COM	
	DO2 NO	
	DO2 COM	
12	PUMP T4	Pump communication
	PUMP T3	
	PUMP GND	Not used
13	Ethernet	• Modbus TCP • Web server
14	Backplane	The Flygt controller communicates with the Flygt gateways through the backplane.

TECHNICAL SPECIFICATION

90009801_3.0

FOP 315

www.xylem.com

1 Product Description

1.1 Product design

The FOP 300 series are HMI units that are connected to a Flygt gateway or controller to provide a user-friendly interface. For information on how to use the HMI, see the Installation, Operation, and Maintenance manuals for the related products or the System Installation and Operation manual.

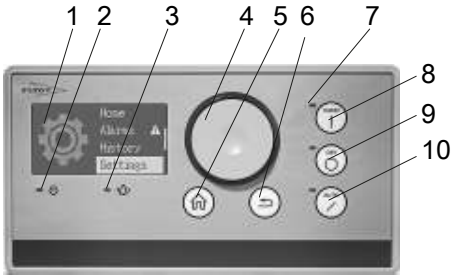
The HMI is handheld, or mounted in or on a cabinet door, or inside a cabinet.

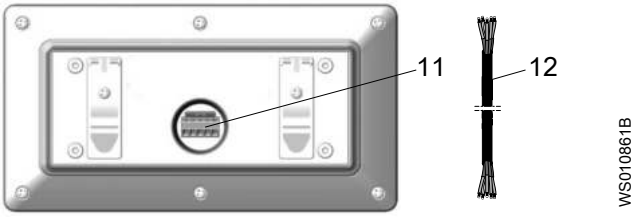
Product name	Article number	Description
FOP 315	823 88 00	• Hand/Off/Auto for between one and four mixers or pumps, depending on the system • One set of Hand, Off, Auto buttons

1.2 Approvals

- CE
- CSA
- UL
- UKCA

1.3 Parts

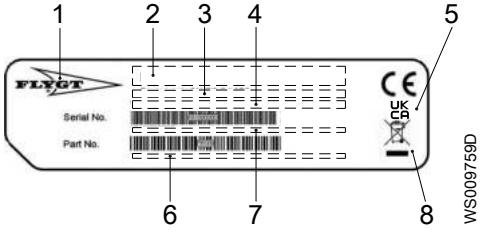




WS010861B

Number	Part	Description
1	Screen	The screen shows the menu system.
2	Power on LED	The blue color shows that the unit is in operating mode.
3	Alarm LED	The light blinks red when there is an alarm.
4	Jog wheel	The jog wheel is used for navigation and selection in the menus. • Rotate it to navigate. • Press it to select.
5	Home button	The home button is used to return to the Home menu.
6	Back button	The back button is used to return to the previous menu.
7	Status LEDs	• Hand button: Orange when active • Off button: Red when stopped • Auto button: Green when active
8	Hand button	The hand button is used to change from auto mode to manual mode.
9	Off button	The off button is used to stop the unit or units, when manual mode is used.
10	Auto button	The auto button is used to change from manual to auto mode.
11	Terminals	See *Terminals* on page 2.
12	Cable	5–lead DeviceNet cable for connection to gateway or controller.

1.4 The data plate

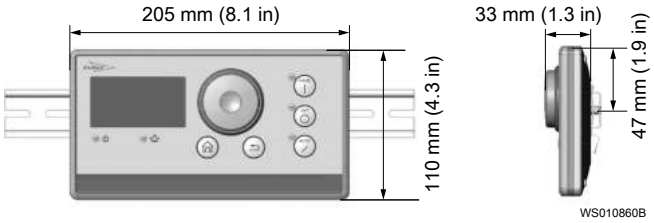


WS009759D

1. Brand
2. Product
3. Power supply
4. Country of origin, manufacturer
5. Approvals
6. Part number
7. Serial number
8. Waste disposal symbol

2 Technical Reference

2.1 Dimensions



2.2 Environmental requirements

Parameter	Value
Operating temperature	-20°C – +70°C (-4°F – 158°F)
Storage temperature	-20°C – +85°C (-4°F – 185°F)
Operating humidity	Relative humidity, non-condensing: 90%
Sunlight exposure	UV resistant, avoid direct sunlight

2.3 IP rating

IPXY
1 2 3

1. Ingress Protection Code (IP)
2. Degree of protection against foreign objects
3. Degree of protection against water

Installations

Installation	IP-rating
On a cabinet door	• Front: IP54 • Back: IP21
In a cabinet door	• Front: IP54 • Back: IP21
• DIN rail • Hand-held	IP20

Degree of protection, IP20

Code	Description
2	The enclosure is protected against: • Fingers or objects that are less than 80 mm (3.15 in) in length • Objects that are larger than 12.5 mm (0.49 in) in diameter
0	The enclosure is not protected against water.

Degree of protection, IP21

Code	Description
2	The enclosure is protected against: • Fingers or objects that are less than 80 mm (3.15 in) in length • Objects that are larger than 12.5 mm (0.49 in) in diameter
1	The enclosure is protected against water drops that fall vertically.

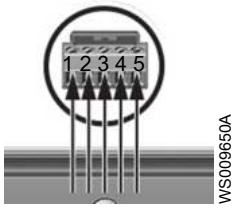
Degree of protection, IP54

Code	Description
5	The enclosure is protected against the ingress of dust in quantities that are harmful to the equipment.
4	The enclosure is protected against splashes of water.

2.4 Electrical data

Parameter	Value
Supply voltage	24 VDC
Supply voltage tolerance	± 10%
Current consumption	< 100 mA

2.5 Terminals



Number	Terminal	Description	Cable color
1	GND	Ground (earth), 0 V	Black
2	L	CAN low	Blue
3	—	Screen. Not used.	Transparent
4	H	CAN high	White
5	+24 V	Power supply, +24 V	Red

The power supply unit must fulfill isolation class II.

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http://tpi.xyleminc.com
www.xylemwatersolutions.com/contacts/

90009801_3.0_en-US_2023-02_TS_FOP 315

xylem
Let's Solve Water

GE
Grid Solutions

MDS Orbit Platform

The Next Generation Industrial Wireless Networks

As industrial SCADA and automation applications have evolved, corresponding requirements for security, reliability and performance of the underlying communication network have become more demanding. Furthermore, the diversity of topography and wireless spectrum conditions across regions is often difficult to address with any single wireless technology.

The GE MDS™ Orbit industrial wireless router platform offers the security, reliability, performance, and wireless flexibility required for next-generation industrial networks. Orbit enables customers to deploy advanced communications using diverse options of wireless technologies and frequencies.

Orbit allows for communication over licensed spectrum, unlicensed spectrum, cellular technologies, and Wi-Fi in various form factors with single or dual radio options. Its advanced cyber security capabilities enable customers the power needed to secure and protect their networks and assets.

Unifying network deployments on the Orbit platform with a common user experience, networking and security capabilities across various RF technologies helps customers simplify operations, reduce learning curves and save on cost.

Key Benefits

- Simplify operations, reduce learning curves and reduce cost by unifying the deployment of multiple wireless technologies on a single platform
- Repurpose narrowband spectrum for more bandwidth demanding applications using QAM modulation
- Deploy latency sensitive applications on high speed unlicensed 900MHz ISM
- Expand network coverage reliably across multiple cellular carriers and countries
- Minimize network downtime and maximize application availability with redundant radio uplinks
- Protect network and assets with powerful cyber security capabilities

Applications

Oil & Gas
- Well Head and Production Pad Controllers & Metering Automation
- Remote Field Office Connectivity

Electric Utilities
- Field Area Network
- AMI Backhaul
- Workforce Mobility

Water & Wastewater
- Monitoring and Control
- Maintenance Workforce Mobility

Smart Cities & Municipalities
- Traffic Signals Control
- Video Security
- Weather Monitoring Stations

Emergency & Utility Vehicles
- Law enforcement connectivity
- Utility Workforce Mobility

Heavy Industrial
- Train Control and Machinery Monitoring
- Excavation Machine Control

imagination at work

Diverse Radio Configurations

- A single platform enables networks with various radio technologies as well as dual-radio capabilities
- Licensed technology with QAM, Bi-directional adaptive modulation, FEC and advanced compression maximizes efficiency on narrowband spectrum
- High-performance 900 MHz FHSS enables low-latency and high-throughput unlicensed networks with multipoint and store-and-forward
- A diversity of 2G/3G and 4G LTE and private cellular options for global coverage with GPS

Advanced Networking & Security

- Enterprise-class cyber security capabilities including VPNs, firewalling and centralized authentication ensure advanced network protection
- Integrated routing and bridging support a variety of network designs
- Flexible Quality of Service allows for application-based prioritization and bandwidth allocation for deterministic network performance

Industry Leading Reliability

- 30 years of experience in building rugged radios with over 1.5 million sites connected
- Certified for IEEE1613, IEC61850-3, ATEX and CSA Class 1 Div 2 standards for deployment in harsh environments
- Fanless, no moving parts with extended temperature range (-40C to +70C)
- 5-year standard manufacturer warranty

MDS Orbit Platform Key Capabilities

Flexible Networking

MDS Orbit's support for dynamic and static routing as well as managed switch capabilities facilitate the deployment in a multitude of network architectures. To achieve maximum uplink and application uptime, Orbit supports a variety of High Availability mechanisms such as interface bonding, Spanning Tree, Layer 3 failover, VRRP as well as latency and packet-loss based failover. GRE tunneling coupled with IPSec VPNs and DMVPN further enable the establishment of secure Virtual Private Networks (VPN) across any wireless technology.

Enterprise-Class Security

The MDS Orbit platform is built on a comprehensive cyber security framework to enable the deployment of highly secure environments. It offers standards-based IPSec VPN and DMVPN capabilities with X.509 certificate management to allow the encryption of network paths and interop with non-GE devices. As an added layer of security, Orbit supports the encryption of private radio links at the RF layer. RBAC and RADIUS enable local and centralized user authentication into the network. MDS Orbit's stateful firewall as well as MAC-filtering capabilities ensure that only valid traffic is permitted through the network. Its secure boot and secure firmware protect against meddling with the hardware and software, and its magnetometer provides tamper-detection to secure against theft.

Advanced QoS (Quality of Service)

Orbit supports advanced QoS functionality with fair and priority queuing to enable deterministic latency and throughput performance with up to 16 application priority queues. Orbit's Traffic Shaping allows applications such as SCADA to have a dedicated throughput on the uplink for predictable performance. Orbit further supports classification based on DSCP, 802.1p, and other Layer 2-4 header information.

Network Management and User Interface

The MDS Orbit platform supports standards-based SNMP and Netconf network and device management protocols for easy integration into MDS PulseNet as well as 3rd party network management software. It supports Command-Line Interface (CLI, an intuitive web-based Graphical User Interface (GUI) as well as wizards to simplify and speed the configuration of complex tasks. Orbit's user experience is identical regardless of radio technology or form factor.

Diverse Radio Technology Options

Licensed Spectrum

MDS Orbit's Licensed radio technology offers multiple narrowband spectrum options with QAM modulation that maximize available throughput for modern IP-based applications. It allows for raw data rates of up to 120Kbps in a 25KHz channel, which expands the ability to handle higher performance IP-based applications. IP header and payload compression as well as per-packet, per-remote, bi-directional adaptive modulation further optimize throughput on a per-remote basis to ensure the network isn't penalized for its lowest common denominator remote.

For customers looking to upgrade legacy licensed networks, the Orbit Licensed radio technology supports 3-FSK modulation mode, which provides backwards compatibility with legacy x710 as well as SD base stations on the A Modem. Furthermore, the MDS Master Station with Evolution Technology* supports seamless at-your-own-pace migration of any legacy licensed modems.

Unlicensed Spectrum

MDS Orbit's unlicensed radio offers cutting edge performance in the 900MHz ISM spectrum with its advanced Media Access Control (MAC) technology. Orbit's patented MAC prevents ingress collision at the access point by synchronizing the network and allocating time slots for one remote to transmit at a time. It enables communication at 1.25Mbps with a latency as low as 5msec for latency-sensitive automation and protection applications. Orbit's unlicensed 900Mhz radio can be deployed in various topologies including point to point, point to multipoint, and a self-healing store-and-forward network.

Cellular

A variety of cellular modems are supported on Orbit covering 2G, 3G and 4G LTE technologies on most carriers and continents. Furthermore, Orbit supports communication over private LTE bands in the US and overseas**. Orbit's cellular modem can be used as a primary uplink, as backup for a primary licensed or unlicensed radio, or in tandem with the primary radio. GPS is supported on select cellular modem options.

WiFi

A Wi-Fi radio option can be selected as a standalone, or as a secondary radio for licensed, unlicensed or cellular WAN-radios. Orbit's Wi-Fi is based on 802.11 b/g/n and supports speeds of up to 54 Mbps, and up to 7 clients/hosts per AP.

MDS Orbit MCR
with Cellular and 900 MHz

MDS Orbit ECR
with 4G LTE Cellular and WiFi

MDS Orbit ECR
with 4G LTE Cellular

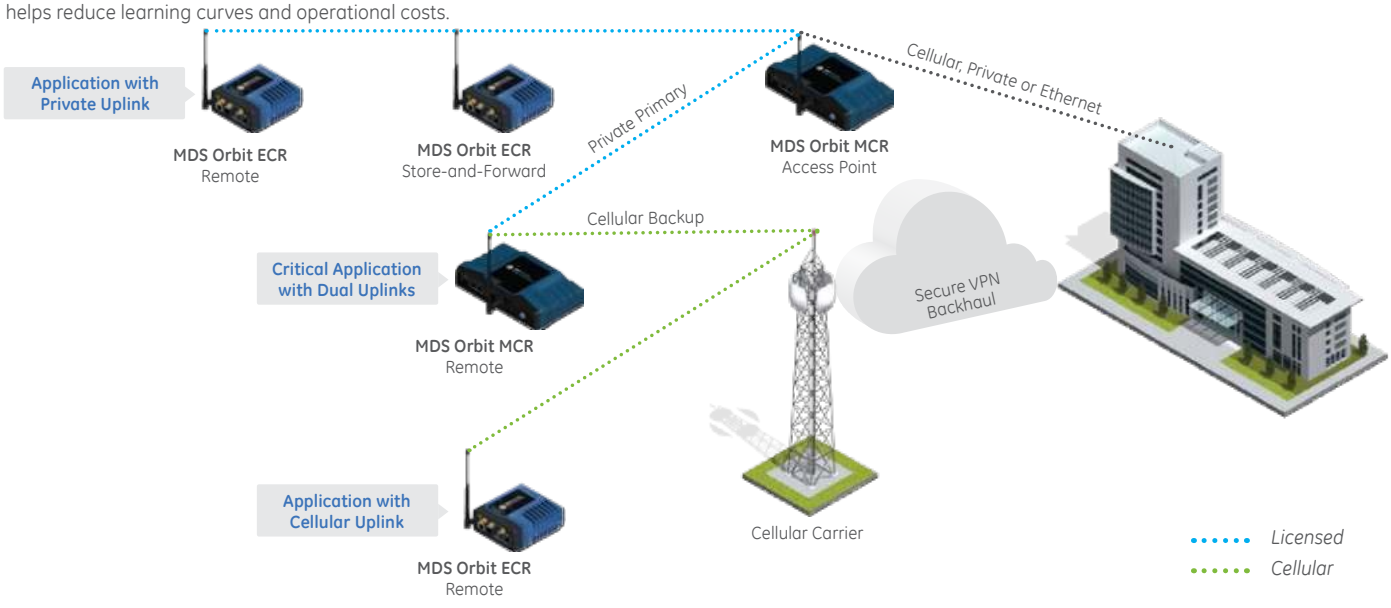
Orbit ECR LN4 Series Licensed Narrowband 406-470MHz

The MDS Orbit Platform Models & Radio Support

MDS Orbit Models	MCR Standard 	MCR High Port Density 	ECR 
PORT DENSITY			
Port Combination & Density Options (Factory-configured)	• 2 Ethernet, 1 Serial, 1 USB • 1 Ethernet, 2 Serial, 1 USB	• 4 Ethernet, 2 Serial, 1 USB	• 1 Ethernet, 1 Serial, 1 USB
RADIO COMBINATIONS			
Radio Count	• 2 Radios Max	• 2 Radios Max	• 2 Radios Max
Radio Combinations (Factory-configured)	• 1 WAN-Radio • 1 WAN-Radio + Wi-Fi • 2 WAN-Radios (limited options)	• 1 WAN-Radio • 1 WAN-Radio + Wi-Fi	• 1 WAN-Radio • 1 WAN-Radio + Wi-Fi
WAN-RADIO Technologies			
Unlicensed Radio Options	• 902-928 MHz FHSS	• 902-928 MHz FHSS	• 902-928 MHz FHSS
Licensed Radio Band Options	• 330-406 MHz • 406.1-470 MHz • 450-520 MHz** • 757-758, 787-788 MHz • 896-960 MHz	• 330-406 MHz • 406.1-470 MHz • 450-520 MHz** • 757-758, 787-788 MHz • 896-960 MHz	• 330-406 MHz • 406.1-470 MHz • 450-520 MHz** • 757-758, 787-788 MHz • 896-960 MHz
Cellular Radio Options	• 2G/3G GSM World • 2G/3G/4G LTE North America • 2G/3G/4G EMEA & APAC • 2G/3G/4G Australia Telstra • Private LTE Band 26	• 2G/3G GSM World • 2G/3G/4G LTE North America • 2G/3G/4G EMEA & APAC • 2G/3G/4G Australia Telstra • Private LTE Band 26	• 2G/3G GSM World • 2G/3G/4G LTE North America • 2G/3G/4G EMEA & APAC • 2G/3G/4G Australia Telstra • Private LTE Band 26
Wi-Fi RADIOS			
Wi-Fi	• 2.4 GHz 802.11b/g/n 54Mbps	• 2.4 GHz 802.11b/g/n 54Mbps	• 2.4 GHz 802.11b/g/n 54Mbps

MDS Orbit Hybrid Network Example

Industrial customers depend on more than one wireless technology to extend connectivity to their field assets. The Orbit platform offers a rich portfolio of wireless technologies in various form factors, as well as single or dual radio options to facilitate the deployment in various applications and scenarios. The common platform offers a seamless and unified user experience regardless of the wireless technology used. It simplifies radio operation and management, and helps reduce learning curves and operational costs.



GE MDS™ Orbit Platform Data Sheet

Unless otherwise noted, specifications listed apply to all Orbit models

NETWORKING

- IPv4 Routing OSPF, EBGP, RIPv2 with performance-based route failover
- IPv6 Routing
- Full managed switch capability, IEEE 802.3, 802.1Q/VLANs, 64 VLANs, STP
- Concurrent Bridging & Routing
- GRE Tunneling with Layer 2 (Ethernet) and Layer 3 support
- Route/path failover between any two wireless/Ethernet interfaces based on link loss, latency degradation or packet loss thresholds
- Quality of Service 16 egress queues, Priority Queuing, Fair Queuing, Traffic Shaping, Classification based on DSCP, 802.1p and Layer 2-4 classifiers
- IP Protocols TCP, UDP, ARP, DHCP, ICMP, NTP, FTP, SFTP, TFTP, DNS, configurable HTPP and HTTPS, SSH
- Serial TCP server, Modbus/TCP, Modbus RTU, TCP client, UDP Unicast and Multicast, BSAP, and DNP3

SECURITY

- IPSec VPN Server (responder) and Client (initiator) with DMVPN
- Authentication Public Key, EAPTLS, Pre-Shared, Ike 1-2
- Encryption : 3DES, AES 128/192/256, CBC, CTR, CCM, GCM, SHA 256/384/512 HMAC
- Firewalling: Stateful Layer 3-4 Firewall with MAC Filtering, NAT, Source NAT (Masquerading), Static NAT, Port Forwarding
- Device Security : Secure Boot, Secure Firmware, Digitally Signed Hardware and Software, Magnetometer Tamper Detection
- Certificate Management: X.509, SCEP, PEM, DER, RSA
- User Authentication: Local RBAC, AAA/RADIUS, 802.1x
- FIPS 140-2 (Level 2) certification in progress

LICENSED RADIO SUMMARY

- Narrowband Frequency Bands:
  - 330-406 MHz
  - 406.1-470 MHz
  - 450-520 MHz**
  - 757-758, 787-788 MHz
  - 896-960 MHz
- Channel Size: 6.25 KHz, 12.5 KHz, 25 KHz, 50 KHz**
- Operation Modes: Access Point, Remote, Store & Forward
- Duplex Mode: Simplex, Half-Duplex
- Modulation: CPFSK, QPSK, 16QAM, 64QAM, Bi-Directional Adaptive Modulation
- Backward compatibility with MDS SD Series and x710 Master Stations using QPFSK
- Raw Data Rate: Up to 120 Kbps in 25KHz
- Compression: IP Header and Payload
- FEC: Dynamic, per packet
- TX Power: up to 13 watts on select frequencies

UNLICENSED RADIO SUMMARY

- Frequency Bands: 902-928 MHz FHSS
- Occupied Bandwidth 152 to 1320 kHz, up to 80 channels
- Modulation: 2, 4-level GFSK, Adaptive
- Raw Data Rates: 125Kbps, 250Kbps, 500 Kbps, 1000 Kbps, 1250 Kbps
- Latency of < 5 msec
- Operation Modes: Access Point, Remote, Store & Forward
- Duplex Mode: Half-Duplex
- Compression: IP Header and Payload
- TX Power: 1 watt, configurable

CELLULAR RADIO SUMMARY

Available Cellular Options:

- 2G/3G GSM World (AT&T, GSM, world coverage)
- 2G/3G/4G LTE North America with GPS:. Verizon, AT&T, T-Mobile, Bell Canada, Rogers, Telus. Modem allows switching between carriers by upgrading to corresponding carrier profile firmware.
- 2G/3G/4G LTE EMEA & APAC with GPS
- 2G/3G/4G LTE Australia Telstra with GPS
- LTE Private Band 26

WI-FI RADIO SUMMARY

- Frequency 2.4GHz
- Standard IEEE 802.11 b/g/n
- Data Rate up to 54Mbps
- Operating Modes Access Point, Station
- Scalability Up to 2 SSIDs, up to 7 clients
- SSID hiding Yes
- VLAN mapping Yes
- Security WPA/WPA2 PSK, Enterprise
- Carrier Power 20dBm adjustable

MANAGEMENT

- GE MDS PulseNET NMS Support with device management and auto-provisioning
- GUI configuration Wizards to simplify operation
- Secure device management via an intuitive web-based GUI and/or CLI
- Event logging, Syslog-over-TSL, SSH, Console
- Iperf throughput diagnostic, NETCONF
- SNMPv1/v2c/v3, MIB-II, Enterprise MIB

ORBIT MODEL INTERFACES

- MCR Standard Option A
  (2) 10/100 Ethernet, RJ45
  (1) RS232/485 Serial, RJ45
  (1) mini USB 2.0
- MCR Standard Option B
  (1) 10/100 Ethernet, RJ45
  (2) RS232/485 Serial, RJ45
  (1) mini USB 2.0
- MCR High Density Option
  (4) 10/100 Ethernet, RJ45
  (2) RS232/485 Serial, RJ45
  (1) mini USB 2.0
- ECR
  (1) 10/100 Ethernet, RJ45
  (1) RS232/485 Serial, RJ45
  (1) mini USB 2.0
- Antenna Connectors
  Licensed NB:TNC
  900Mhz Unlic: TNC
  Wi-Fi: RP-SMA
  Cellular: SMA
  GPS: SMA female

MECHANICAL

Case	Rugged die-cast aluminum
Dimensions MCR	1.75 H x 8.0 W x 4.8 D in. 4.45 H x 20.32 W x 12.19 D cm
Weight MCR	2 lbs, 0.91 kg
Dimensions ECR	2.1 H x 4.3 W x 4.6 D in. 5.33 H x 10.92 W x 11.68 D cm
Weight ECR	1.45 lbs, 0.65 kg

- Mounting Options Integrated DIN Rail mount and Standard Mounting bracket
- No Fans, No Moving Parts
- HALT& HASS Testing
- Case Die Cast Aluminum

ENVIRONMENTAL

- Operating Temp -40º to +70º C (-40º 158ºF)
- Storage Temp -40º to +85º C (-40º 185ºF)
- Humidity 95% at 60º C (140º F) non-condensing

ELECTRICAL & POWER CONSUMPTION

- Input Voltage 10 to 60 VDC
- Power Consumption Calculations with nominal 25C at 13.8V

WITH 3G GSM WORLD	POWER	13.8V
Connected (Idle)	2.5W	182mA
Typical download	3.2W	235mA
WITH 4G LTE	**POWER**	**13.8V**
Connected (Idle)	4.0W	292mA
Typical download	4.3W	310mA
WITH 4G LTE + WI-FI	**POWER**	**13.8V**
Connected (Idle)	4.8W	350mA
Typical download	5.5W	400mA
WITH 900MHZ ISM	**POWER**	**13.8V**
Typical	3.2W	232mA
Maximum	5.3W	385mA
WITH LICENSED NB	**AP**	**REMOTE**
Idle	910mA	350mA
50% Duty Cycle	950mA	780mA

AGENCY APPROVALS / STANDARDS

- FCC Part 15 and IC
- ETSI / CE
- PTCRB, GCF
- IEEE 1613*, IEC61850-3
- CSA Class 1, Div. 2, UL 508, UL 1604
- ATEX approval for EU on MCR
- EN 60079-0:2012, EN60079-15:2010
- Shock: MIL-STD-810F Method 516.5
- Vibration: MIL-STD-810F Method 514.5
- Shock and Vibration: EIA RS374A
- Storage Temp: Mil-Std 810F Section 501.4 with 1 week soak test
- IP 40/41 per IEC 60529 for Vertical Falling Water and Pollution 3 for Dust
- *Requires an external DC to DC converter having floating DC inputs (neither side grounded)

WARRANTY

5-year standard manufacturer warranty on all Orbit MCR/ECR models

** check with sales for availability.

imagination at work

GE Grid Solutions

175 Science Parkway
Rochester, NY 14620
+1 877-605-6777 (toll free in North America)
+1 678-844-6777 (direct number)

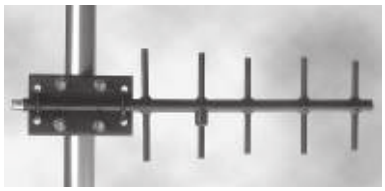
GEGridSolutions.com

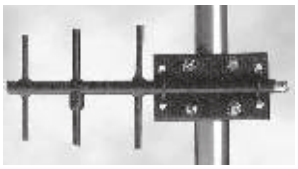
GEA-12781E(E)
English
161012

Black Optimized Yagi Antennas, No Tune

PCTEL's BMOY yagis have been optimized using a genetic algorithm to achieve superior performance over the entire 800/900 MHz and UHF frequency bands. These antennas feature solid 3/8" elements attached to a seamless aluminum boom with 360° welds, and are finished with a black polyester powder coating. Each antenna has a type N termination located at the end of the boom, with a fully sealed driven element for complete protection against humidity, acid rain, or salt spray. A solid aluminum mounting bracket allows for either vertical or horizontal polarization. The BMOY's sturdy construction and advanced engineering design provides outstanding durability and superior performance in all weather conditions.


BMOY4065


BMOY8905


BMOY8903


BWC1001 mount

Features

- Broadband performance covering all 800/900 MHz frequencies and no tuning required. Provides optimal performance, minimizes inventory requirements, and reduces installation time.
- 360° welds at element and boom interface provide complete protection of the antenna's internal mechanism against moisture.
- Solid aluminum mounting clamps with stainless steel hardware. Ensures a robust installation and allows the antenna to be mounted for horizontal or vertical polarization.
- End-fed type N connector. Makes connector accessible for easier installations and protects the electrical connection from moisture and other extreme weather influences.
- Fully enclosed low loss feed system. No exposed gamma match to corrode or deteriorate.
- Black polyester powder-coated finish. Provides an added layer of protection, maximizing performance and durability under the toughest weather conditions.
- DC grounded

STANDARD CONFIGURATION

Model	Cable	Connector	Elements	Mount
BMOY4065	Mating cable assembly sold separately (all models)	N Female	5	BWC1001 Clamp bracket for 1/2"-7/8" diameter yagis. Mounts to masts 1.25"-2.4" OD (included with all models)
BMOY4405		N Female	5	
BMOY4705		N Female	5	
BMOY8905		N Female	5	
BMOY8903		N Female	3	

ELECTRICAL SPECIFICATIONS - RF ANTENNA

Model	Frequency Range	Gain	Bandwidth @ 1.5:1 VSWR	Azimuth Half Power Beamwidth	Elevation Half Power Beamwidth	Front to Back Ratio	Maximum Power	Nominal Impedance
BMOY4065	406-440 MHz	9.0 dBd	34 MHz	52°	45°	> 15 dB	150 watts	50 ohms
BMOY4405	440-480 MHz	9.0 dBd	40 MHz	52°	45°	> 15 dB	150 watts	50 ohms
BMOY4705	470-512 MHz	9.0 dBd	42 MHz	52°	45°	> 15 dB	150 watts	50 ohms
BMOY8905	890-960 MHz	9.0 dBd	70 MHz	52°	45°	> 15 dB	150 watts	50 ohms
BMOY8903	890-960 MHz	6.4 dBd	70 MHz	100°	54°	> 20 dB	150 watts	50 ohms

Black Optimized Yagi Antennas, No Tune

MECHANICAL SPECIFICATIONS

Model	Dimensions	Weight	Radiator Material
BMOY4065	Boom Length: 34", Boom Diameter: .75"	2 lbs (0.91 kg)	3/8" solid 6061-T6 aluminum
BMOY4405	Boom Length: 34", Boom Diameter: .75"	2 lbs (0.91 kg)	3/8" solid 6061-T6 aluminum
BMOY4705	Boom Length: 34", Boom Diameter: .75"	2 lbs (0.91 kg)	3/8" solid 6061-T6 aluminum
BMOY8905	Boom Length: 20.5", Boom Diameter: .75"	0.9 lbs (0.41 kg)	3/8" solid 6061-T6 aluminum
BMOY8903	Boom Length: 14", Boom Diameter: .75"	0.7 lbs (0.32 kg)	3/8" solid 6061-T6 aluminum

MECHANICAL SPECIFICATIONS

Model	Bending Moment @ 125 mph Wind	Lateral Thrust @ 125 mph Wind	Equivalent Flat Plate Area	Boom Length	Boom Diameter
BMOY4065	32.4 ft-lbs	24.2 lbs	.31 sq ft	34"	.75"
BMOY4405	32.4 ft-lbs	24.2 lbs	.31 sq ft	34"	.75"
BMOY4705	32.4 ft-lbs	24.2 lbs	.31 sq ft	34"	.75"
BMOY8905	9.5 ft-lbs	12.6 lbs	.16 sq ft	20.5"	.75"
BMOY8903	3.9 ft-lbs	7.9 lbs	.10 sq ft	14"	.75"

ENVIRONMENTAL SPECIFICATIONS

Model	Wind Load Rating	ESD Protection
BMOY4065	wind survival: 200 mph with no ice. It will survive up to 110 mph with 0.5" radial ice build-up.	DC grounded
BMOY4405	wind survival: 200 mph with no ice. It will survive up to 110 mph with 0.5" radial ice build-up.	DC grounded
BMOY4705	wind survival: 200 mph with no ice. It will survive up to 110 mph with 0.5" radial ice build-up.	DC grounded
BMOY8905	wind survival: 200 mph with no ice. It will survive up to 110 mph with 0.5" radial ice build-up.	DC grounded
BMOY8903	wind survival: 200 mph with no ice. It will survive up to 110 mph with 0.5" radial ice build-up.	DC grounded

Series PBLT2 & PBLTX Submersible Level Transmitter

Perfect for Sludge and Slurries, Lightning Protected, Intrinsically Safe

View All Product Images

SHARE

PBLT2 and PBLTX Submersible Level Transmitters are manufactured for years of trouble free service in the harshest applications. Both measure the height of liquid above the position in the tank referenced to atmospheric pressure. The transmitter consists of a piezoresistive sensing element, encased in a 316 SS housing. Perfect for wastewater and slurry applications with features to protect the unit from these demanding applications. Large diameter 316 SS diaphragm seal is non-clogging and damage resistant to floating solids.

The PBLT2 incorporates lightning and surge protection utilizing dual arrestor technology, grounded to case, eliminating both power supply surges and lightning ground strike transients (surge protection is not guaranteed and is not covered by warranty). The PBLTX is UL approved intrinsically safe for use in hazardous locations when used with proper barrier.

Units come equipped with a 270-pound tensile strength shielded and vented cable. Ventilation tube in the cable automatically compensates for changes in atmospheric pressure above the tank. The vent is protected with a maintenance free filter eliminating particulate or water droplets from entering the transducer.

DID YOU KNOW that you can add YOUR logo to our PBLT2/PBLTX Transmitter, call customer service for details.

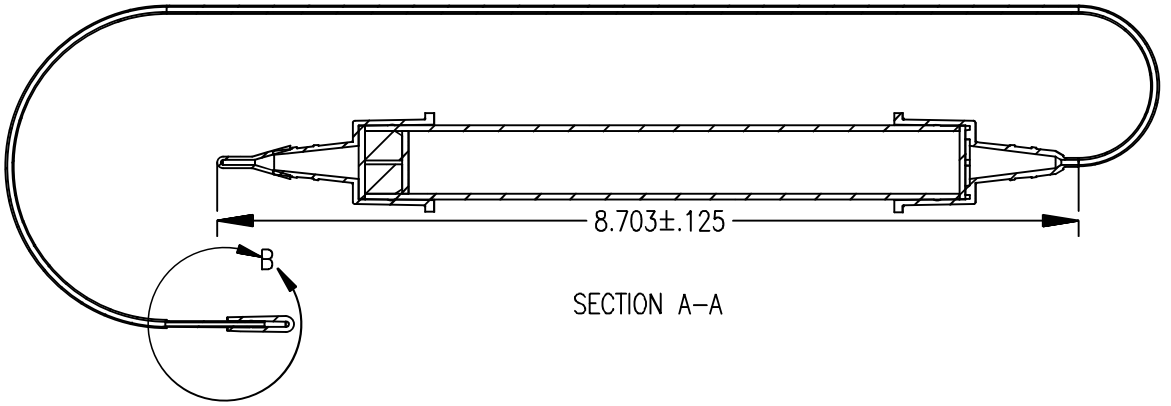
Product Applications

- Wastewater
- Sludge pits, clarifiers, digesters
- Alum tanks
- Chemical storage tanks
- Oil tanks
- Lime slurry
- Sumps
- Reservoirs

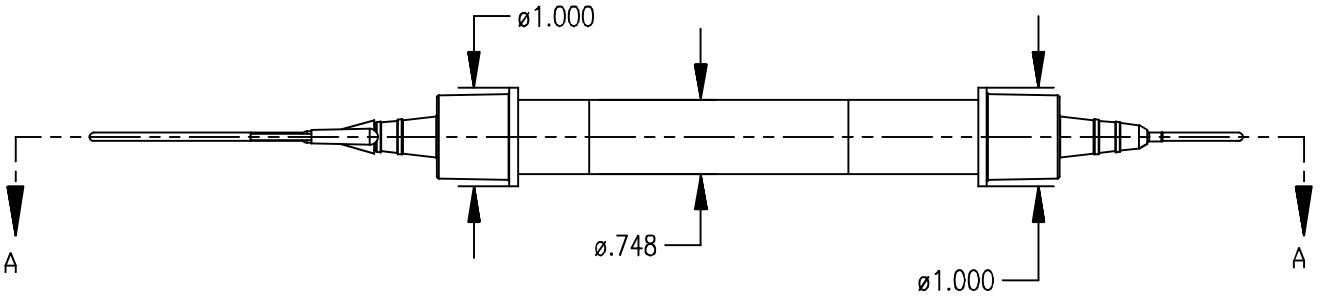
Specifications

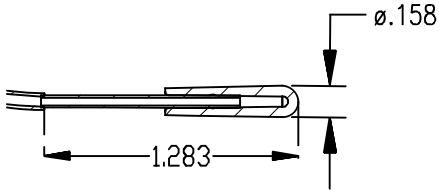
Service:	Compatible liquids.
Wetted Materials:	Body: 316 SS, 316L SS; Cable: Polyether polyurethane or ETFE; Seals: Fluoroelastomer.
Accuracy:	±0.25% FS (includes linearity, hysteresis, and repeatability).

Temperature Limit:	PBLT2: 0 to 200°F (-18 to 93°C); PBLTX: ETFE -4 to 176°F (-20 to 80°C); Polyurethane: -4 to 149°F (-20 to 65°C)
Compensated Temperature Range:	PBLT2: 0 to 180°F (-18 to 82°C), PBLTX: 0 to 176°F (-18 to 80°C).
Thermal Effect:	±0.02% FS/°F.
Pressure Limit:	2X FS.
Power Requirement:	PBLT2: 13 to 30 VDC, PBLTX: 10 to 28 VDC.
Output Signal:	4 to 20 mA DC, two wire.
Response Time:	50 msec.
Loop Resistance:	900 Ω.
Electrical Connection:	Wire pigtail.
Mounting Orientation:	Suspended in tank below level being measured.
Electrical Protection:	PBLT2: Lightning and surge protection, PBLTX: none.
Weight:	4.3 lb (2.0 kg).
Agency Approvals:	PBLT2: CE, PBLTX: CE, cULus intrinsically safe for Class I, Div. 1, Groups A, B, C, D; Class II, Div. 1, Groups E, F, G; Class III, Div. 1. (According to control drawing 001833-44)*
	*Up to 196 ft (59.5 m) for ETFE cable; Up to 333 ft (101.5 m) for polyurethane cable. 60' of cable



SECTION A-A





DETAIL B
SCALE 1 : 1

SCALE 1:2

Notice: RoHS Compliance Required

The supplier certifies that all components or materials supplied meet the specification of this print and Dwyer Drawing FR. NO. 71-001414-00. Compliance certification must be supplied as listed below:

RoHS Material Composition Declaration required with each shipment.

Internal Reference Code: C

Ⓒ = CRITICAL DIMENSION

STANDARD TOLERANCES UNLESS NOTED:
ALL DECIMAL DIMENSIONS ± .005
ALL ANGLES ± 1°

NO.	CHANGES	BY/DATE

DATE
DWN BY
CHKD
APPD

NAME

ARTWORK
A-297
DESSICANT FILTER
(FOR REFERENCE ONLY)

ACAD2002

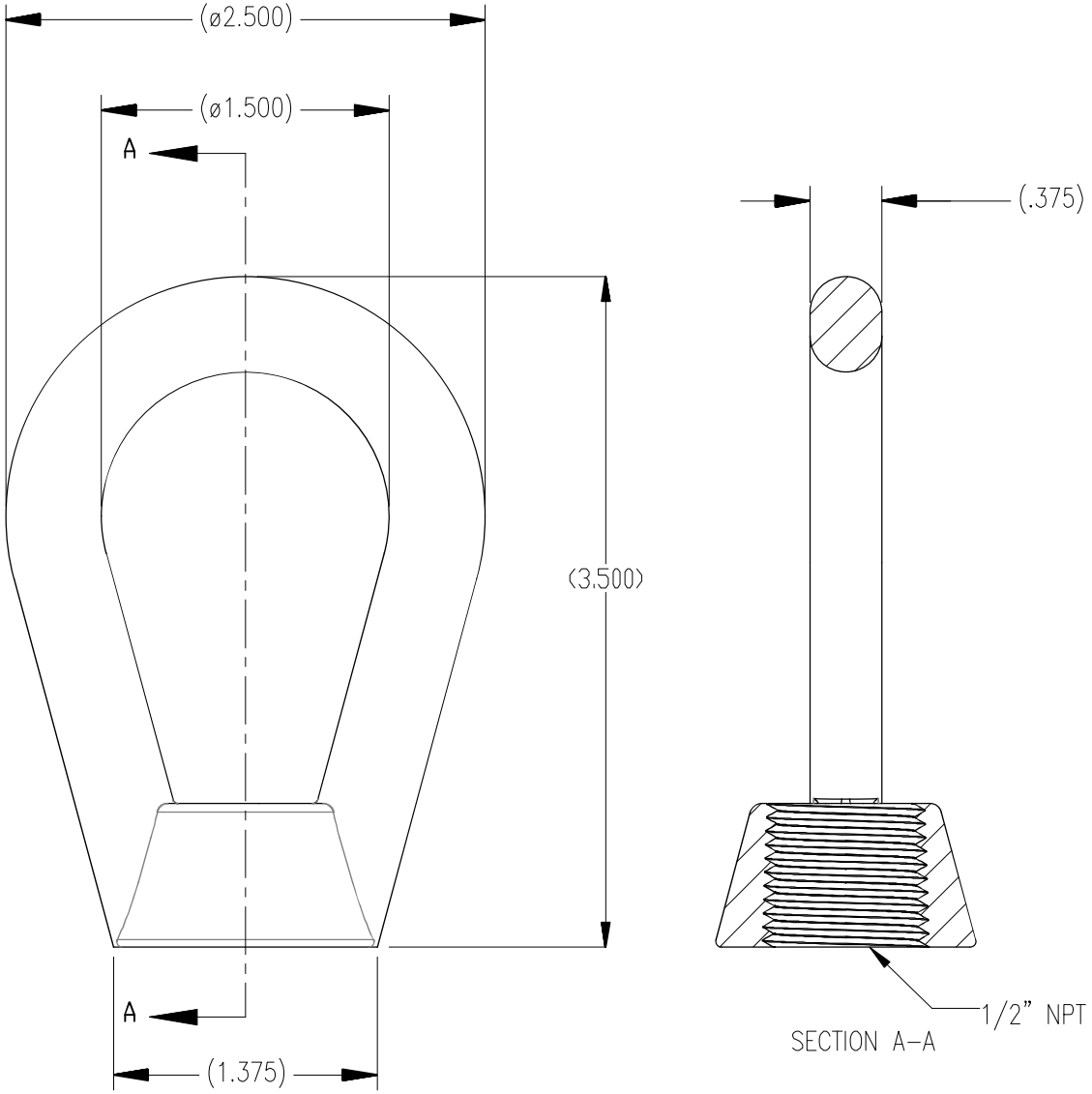
MATERIAL

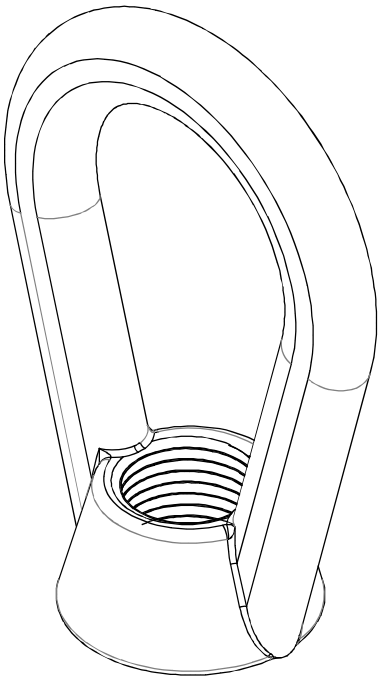
FINISH

DWYER INSTRUMENTS, INC.
MICHIGAN CITY, INDIANA 46360 U.S.A.

FR. NO. R3-701332-00

R3-701332-00





R2-701333-00

CD = CRITICAL DIMENSION

STANDARD TOLERANCES UNLESS NOTED:
ALL DECIMAL DIMENSIONS ± .005
ALL ANGLES ± 1°

SCALE 1:1

NO.	CHANGES	BY/DATE

DATE
DWN BY
CHKD
APPD

NAME

ARTWORK
A-625
LIFT LUG
(FOR REFERENCE ONLY)

ACAD2002

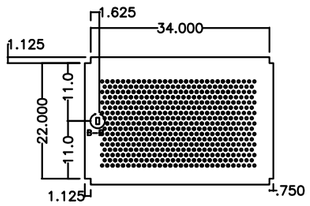
MATERIAL

FINISH

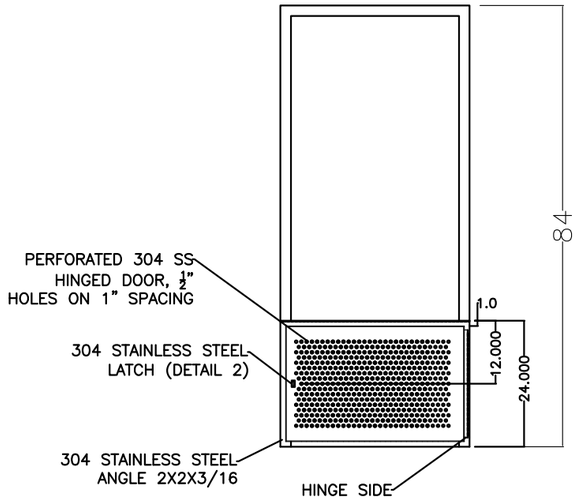
DWYER INSTRUMENTS, INC.
MICHIGAN CITY, INDIANA 46360 U.S.A.

FR. NO. R2-701333-00

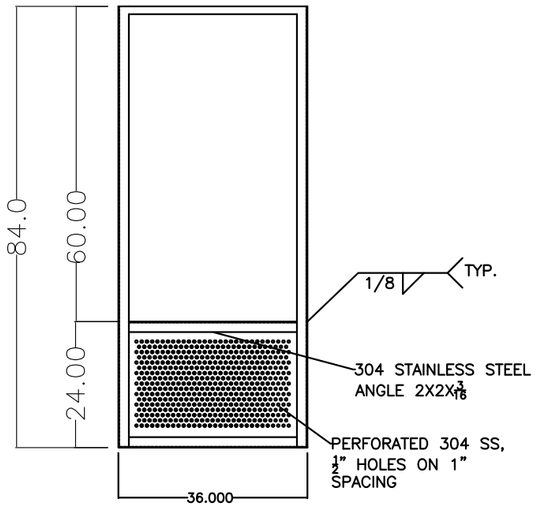
BILL OF MATERIALS:			
ITEM	MATERIAL	DESCRIPTION	QTY
1	304 SS TUBE	2X2X$\frac{1}{8}$" 84L	2
2	304 SS ANGLE	2X2X$\frac{3}{16}$ 24L	2
3	304 SS ANGLE	2X2X$\frac{3}{16}$ 32L	3
4	304 SS ANGLE	2X2X$\frac{3}{16}$ 12L	4
5	304 SS PLATE	1X2X.375	1
6	304 SS HINGE	$\frac{1}{4}$ HINGE 24L	1
7	304 SS PERF	$\frac{1}{2}$@1 PERF. 12 GAUGE	17.3300 SQ. FT.



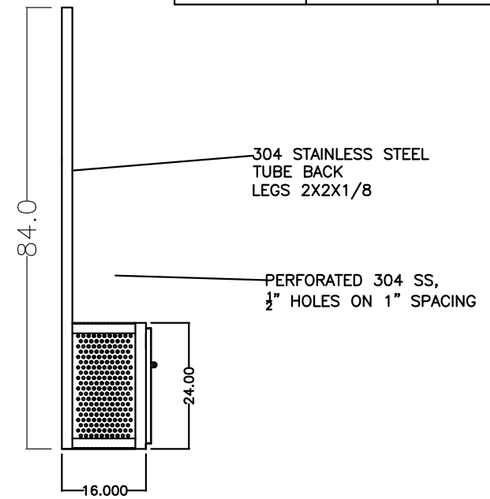
FORMED DOOR FLAT



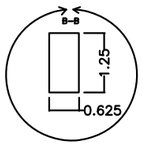
FRONT VIEW



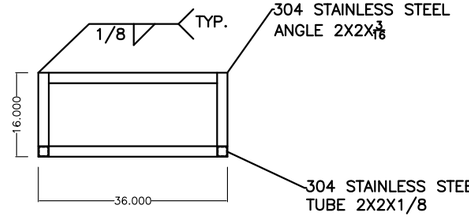
BACK VIEW



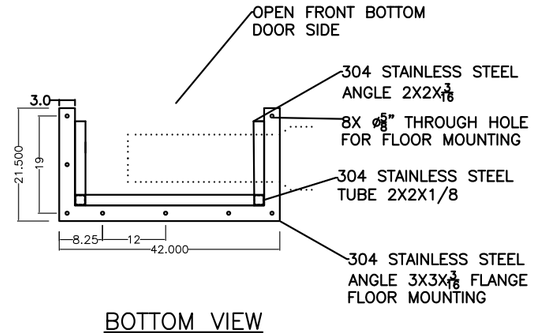
SIDE VIEW



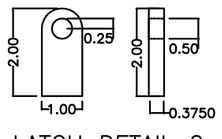
DETAIL B–B – LATCH CUTOUT
(NOT TO SCALE)



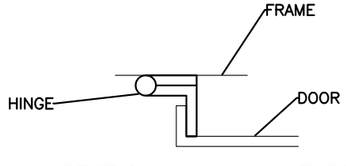
TOP VIEW



BOTTOM VIEW



LATCH DETAIL 2
(NOT TO SCALE)



SECTION A–A, HINGE DETAIL 1
(NOT TO SCALE)

NOTES:

1. 1" BORDER ON ALL PERFORATED MATERIAL FROM HOLE CENTER TO EDGE OR BREAK

2. ALL PANEL MATERIAL TO BE 304 STAINLESS STEEL #4 FINISH, ANGLE IRON TO BE STANDARD FINISH

3. ALL ANGLE FRAME MATERIAL IS 2X2 ANGLE, DIMENSIONED AS SHOWN

4. WELD PER ANSI SPECIFICATIONS, $\frac{1}{8}$" FILLET WELD AS NEEDED.

5. DESIGNED FOR 60"Hx36"Wx16"D PCP.

NO.	REVISION	BY	DATE	APVD.	DATE

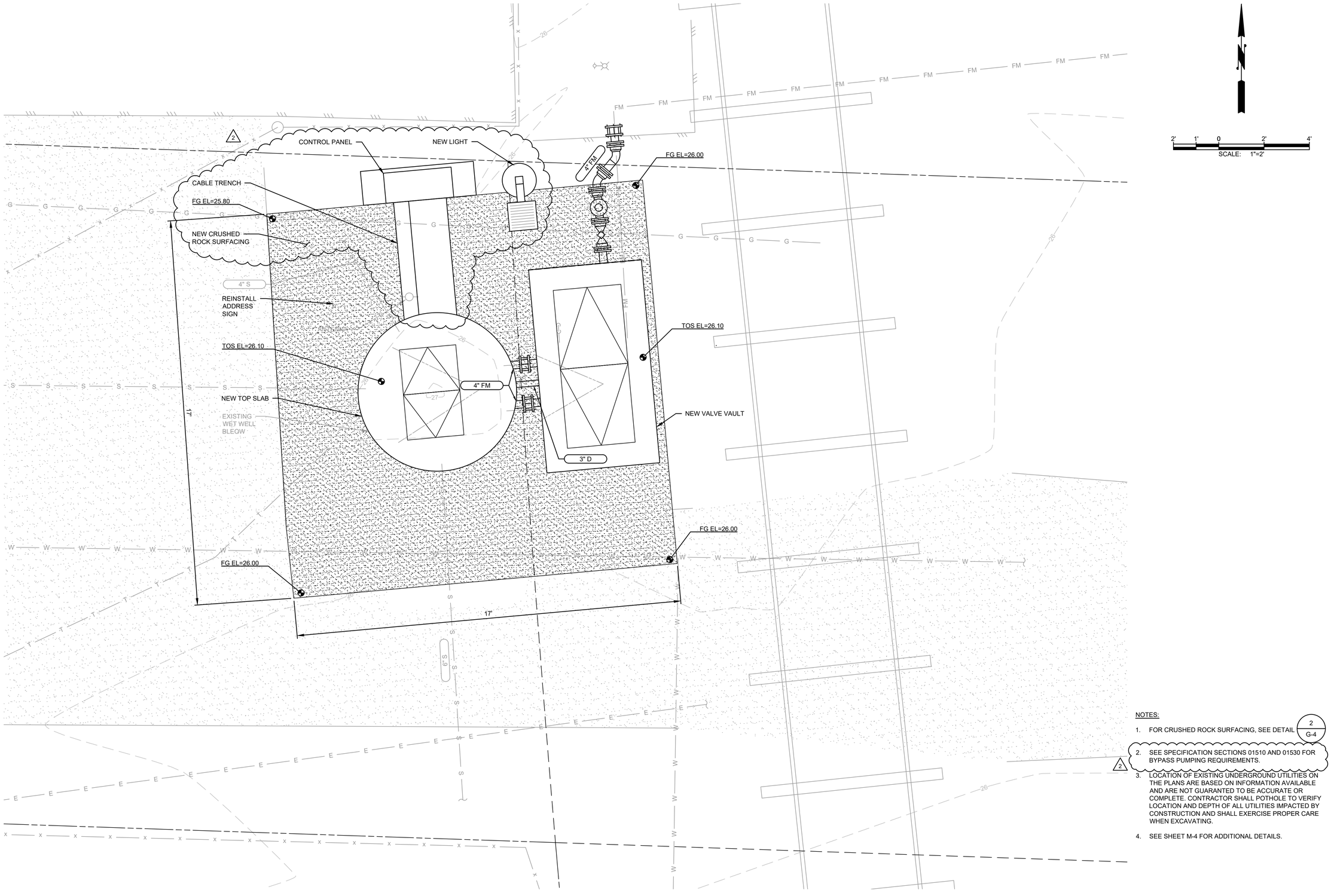
SHEET 1 OF 1

UNLESS OTHERWISE NOTED:			
MACHINE TOLERANCE ON:			
WHOLE AND FRACTIONS	± 1/32		
1 PLACE DEC.	± 0.1		
2 PLACE DEC.	± 0.02		
3 PLACE DEC.	± 0.005		
ANGLES	± 0.15°		
FABRICATION TOLERANCE ON:			
UP TO 12"	± 1/32		
OVER 12" TO 48"	± 1/16		
OVER 48" TO 120"	± 1/8		
OVER 120"	± 3/16		
ANGLES	± 0.5°		
DRAWN	DATE 10/2/2018	BY ADM	
CHKR.	DATE	BY	
PROJ. ENGR.	DATE	BY	
APVD.	DATE	BY	

FLYGT
a xylem brand

WOODLAND LS 5 PUMP CONTROL PANEL STAND

REF.	NUMBER	REV.
SCALE PLOT TO FIT	PCP–100218	D



NOTES:

1. FOR CRUSHED ROCK SURFACING, SEE DETAIL 2/G-4
2. SEE SPECIFICATION SECTIONS 01510 AND 01530 FOR BYPASS PUMPING REQUIREMENTS.
3. LOCATION OF EXISTING UNDERGROUND UTILITIES ON THE PLANS ARE BASED ON INFORMATION AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE OR COMPLETE. CONTRACTOR SHALL POTHOLE TO VERIFY LOCATION AND DEPTH OF ALL UTILITIES IMPACTED BY CONSTRUCTION AND SHALL EXERCISE PROPER CARE WHEN EXCAVATING.
4. SEE SHEET M-4 FOR ADDITIONAL DETAILS.

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JAY LEONARD SWIFT — STATE OF WASHINGTON — 36095 — REGISTERED PROFESSIONAL ENGINEER

City of WOODLAND WASHINGTON

CITY OF WOODLAND
WASTEWATER LIFT STATION 8 UPGRADE

348 N PEKIN RD
WOODLAND, WA 98674

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CHECKED BY:	BJ
DRAWN BY:	MAN
DESIGNER:	BJ
G & O JOB NO.:	22559
FILE:	P-SITE.DWG

0 1" 2"
TWO INCHES AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

CIVIL

NEW SITE PLAN

DRAWING: **C-2** OF: **2**

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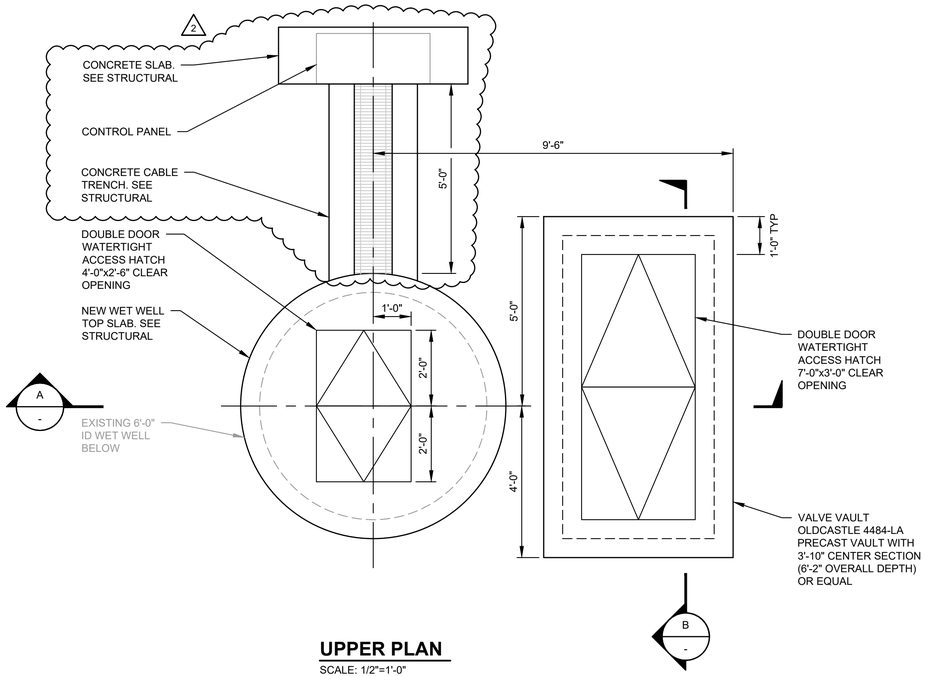
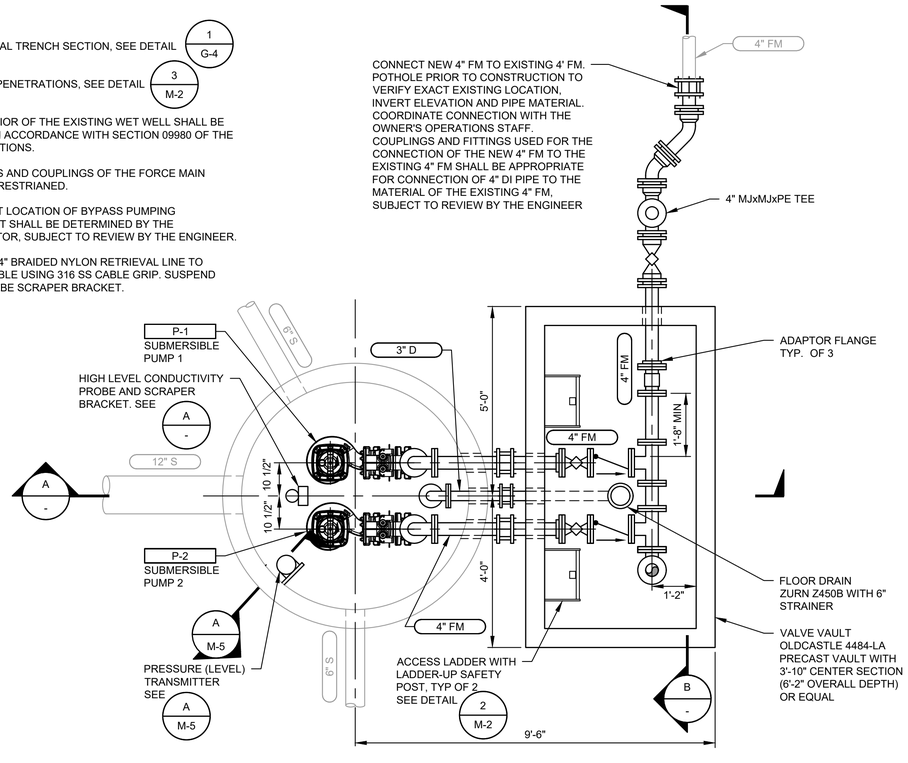


UPPER PLAN

SCALE: 1/2"=1'-0"

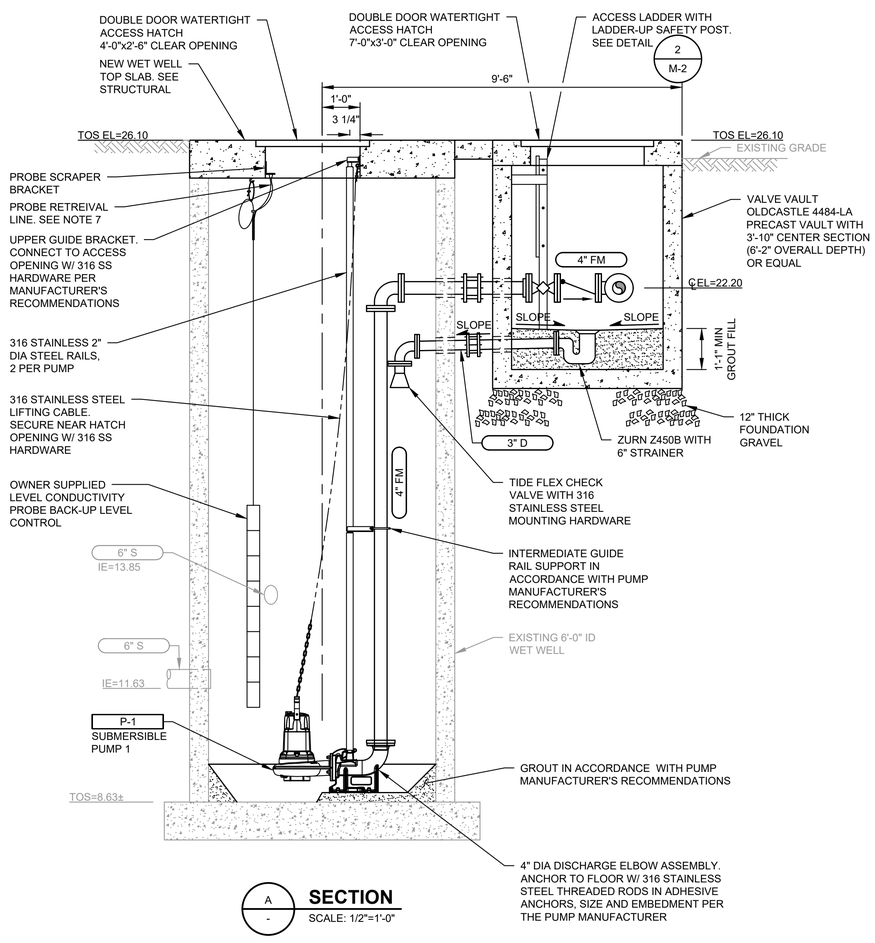
NOTES:

1. FOR TYPICAL TRENCH SECTION, SEE DETAIL 1 / G-4
2. FOR PIPE PENETRATIONS, SEE DETAIL 3 / M-2
3. THE INTERIOR OF THE EXISTING WET WELL SHALL BE COATED IN ACCORDANCE WITH SECTION 09980 OF THE SPECIFICATIONS.
4. ALL JOINTS AND COUPLINGS OF THE FORCE MAIN SHALL BE RESTRIANED.
5. THE EXACT LOCATION OF BYPASS PUMPING EQUIPMENT SHALL BE DETERMINED BY THE CONTRACTOR, SUBJECT TO REVIEW BY THE ENGINEER.
6. ATTACH 3/4" BRAIDED NYLON RETRIEVAL LINE TO PROBE CABLE USING 316 SS CABLE GRIP. SUSPEND FROM PROBE SCRAPER BRACKET.



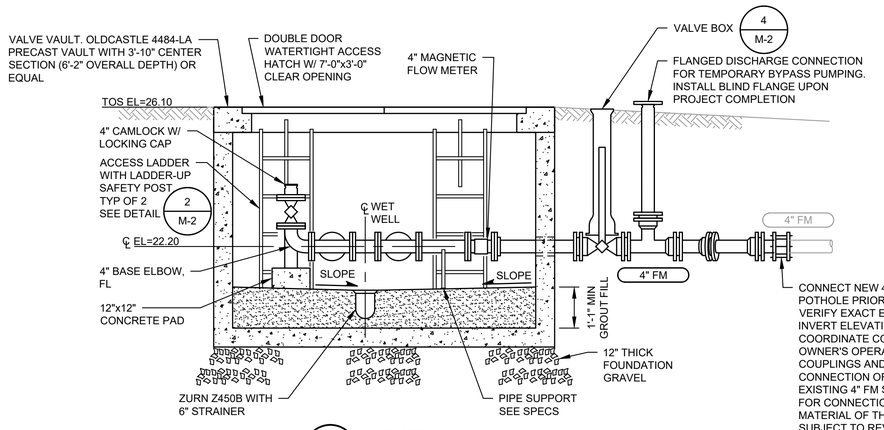
LOWER PLAN

SCALE: 1/2"=1'-0"



SECTION

A / - SCALE: 1/2"=1'-0"



SECTION

B / - SCALE: 1/2"=1'-0"

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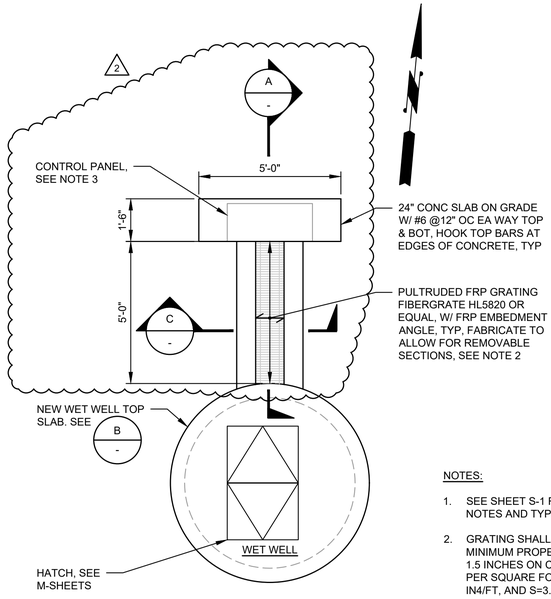
FILE:	M_PL-SEC.DWG

0 1" 2"
TWO INCHES AT FULL SCALE. IF NOT, SCALE ACCORDINGLY

MECHANICAL

UPPER PLAN, LOWER PLAN AND SECTIONS

DRAWING: **M-4** OF: **5**

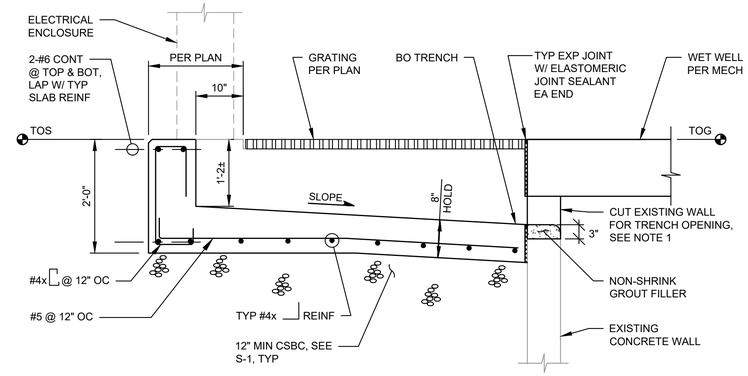


NOTES:

1. SEE SHEET S-1 FOR GENERAL STRUCTURAL NOTES AND TYPICAL DETAILS.
2. GRATING SHALL HAVE THE FOLLOWING MINIMUM PROPERTIES: 2" LOAD BARS AT 1.5 INCHES ON CENTER, WEIGHT OF 8.7 LBS PER SQUARE FOOT, A=9.2 IN2/FT, I=3.12 IN4/FT, AND S=3.12 IN3/FT.
3. VERIFY CONTROL PANEL DIMENSIONS PRIOR TO STARTING WORK.

FOUNDATION PLAN

SCALE: 3/8"=1'-0"

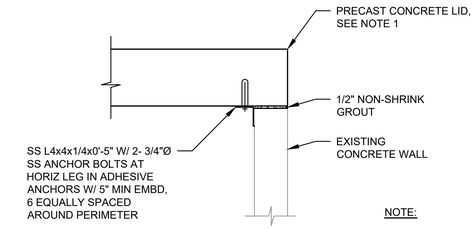


NOTE:

1. AT CONCRETE DEMOLITION, SEE DETAIL FOR TYPICAL REBAR DEMOLITION DETAIL. D -

A - **SECTION**

SCALE: 3/4"=1'-0"

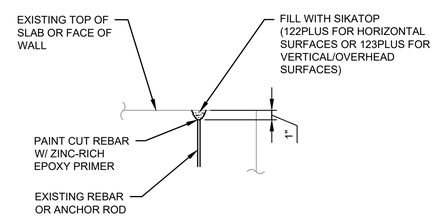


NOTE:

1. PRECAST CONCRETE LID SHALL BE DESIGNED FOR H-20 LOADING.

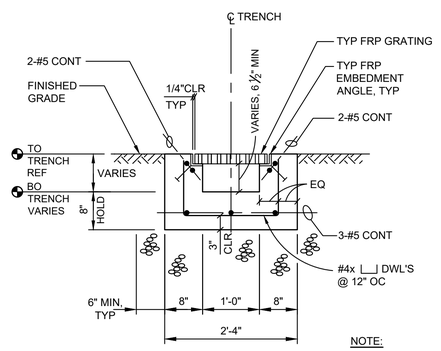
B - **SECTION**

SCALE: 3/4"=1'-0"



D TYP - **TYPICAL REBAR DEMOLITION DETAIL**

SCALE: 1 1/2"=1'-0"



NOTE:

1. MAX SPACING BETWEEN REMOVABLE GRATING SECTIONS SHALL BE 1/2".

C - **SECTION**

SCALE: 3/4"=1'-0"

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STRUCTURAL ENGINEER
PROFESSIONAL ENGINEER

CITY OF WOODLAND
WASHINGTON

CITY OF WOODLAND
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FILE:	S_PL-SEC.DWG

0 1" 2"
TWO INCHES AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

STRUCTURAL

FOUNDATION PLAN AND DETAILS

DRAWING: **S-2** OF: **2**

DEVICE TAG LIST

TAG ID#	TAG DESCRIPTION	VINTAGE
01 ANT 01	ANTENNA, RADIO	NEW
01 CP 01	CONTROL PANEL	NEW
01 HH 01	HANDHOLE	NEW
01 LP 01	CONDUCTIVITY LEVEL PROBE	NEW
01 MB 01	METER BASE	EXISTING
01 MFM 01	MAGNETIC FLOW METER	NEW
01 P 01	PUMP NO. 1	NEW
01 P 02	PUMP NO. 2	NEW
01 PLT 01	POLE LIGHT	NEW
01 SLT 01	SUBMERSIBLE LEVEL TRANSMITTER	NEW
01 UP 01	UTILITY POWER POLE	EXISTING
01 USDS 01	UTILITY SERVICE DISCONNECT SWITCH	EXISTING
01 UT 01	UTILITY TRANSFORMER	EXISTING
01 VV 01	VALVE VAULT	NEW
01 WW 01	WET WELL	EXISTING

POWER CABLE AND CONDUIT SCHEDULE

NUMBER	SOURCE	DESTINATION	SIZE	CONDUCTORS	E-1	NOTES
P0101	[01 HH 01], HANDHOLE	[01 CP 01], CONTROL PANEL	2"	3X #4 AWG XHHW-2; 1X #6 AWG XHHW-2 N		
P0102	[01 CP 01], CONTROL PANEL	[01 PLT 01], POLE LIGHT	3/4"	1X #12 AWG XHHW-2; 1X #12 AWG XHHW-2 N; 1X #12 AWG XHHW-2 G		

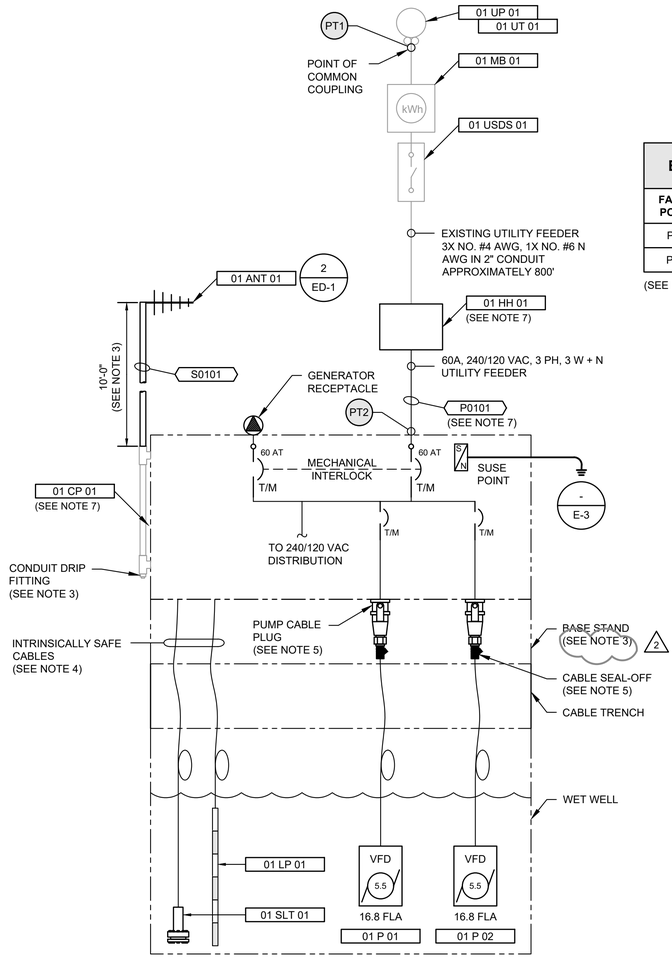
INSTRUMENTATION CABLE AND CONDUIT SCHEDULE

NUMBER	SOURCE	DESTINATION	SIZE	CONDUCTORS	E-1	NOTES
S0101	[01 CP 01], CONTROL PANEL	[01 ANT 01], ANTENNA, RADIO	1"	MANUFACTURER'S RECOMMENDED CABLE	* 3	
S0102	[01 CP 01], CONTROL PANEL	JUNCTION BOX, JS0102	1"	MANUFACTURER'S RECOMMENDED CABLES	* 3	
S0102A	JUNCTION BOX, JS0102	[01 MFM 01], MAGNETIC FLOW METER	1"	MANUFACTURER'S RECOMMENDED CABLES	* 3	

LOAD SUMMARY

(CALCULATIONS BASED ON 240 V)

	CONNECTED LOADS			UTILITY LOAD DEMAND	
LOAD DESCRIPTION	STARTER	HP	kVA	D.F.	kVA
[01 P 01], PUMP NO. 1	VFD	5.5	5.7	100%	5.7
[01 P 01], PUMP NO. 2	VFD	5.5	5.7	0%	0
ANCILLARY	NA	NA	2.0	80%	1.6
25% LARGEST MOTOR (5.5 HP)			1.4		1.4
TOTAL kVA:			14.8		8.7
RESULTING AMPACITY AT 240 VAC, 3 PH:			35.5		20.9
SYSTEM SIZED AT: 60A					



BOLTED FAULT TABLE

FAULT POINT	3PH SHORT CIRCUIT VALUES
PT1	4.4 kAIC
PT2	0.9 kAIC

(SEE NOTE 6)

NOTES:

1. THE POWER COMPANY IS COWLITZ COUNTY PUBLIC UTILITY DISTRICT NO 1. CONTRACTOR SHALL COMPLETE AND SUBMIT A SERVICE APPLICATION WITH THE PUD AND COORDINATE ANY SERVICE DISCONNECT/RECONNECT WITH THE PUD. CONTRACTOR SHALL PAY ALL PUD CHARGES. ALL POWER OUTAGES/DISRUPTIONS SHALL BE COORDINATED WITH THE OWNER.
2. [01 UP 01], [01 MB 01], AND [01 USDS 01] ARE LOCATED APPROXIMATELY 800' TO THE NORTHWEST.
3. PUMP CONTROL PANEL [01 CP 01] IS PROVIDED AND PROGRAMMED BY THE OWNER, INSTALLED AND CONNECTED BY THE CONTRACTOR. THE PUMP CONTROL PANEL IS PROVIDED WITH A SERVICE DISCONNECT BREAKER AND A MECHANICAL INTERLOCK TO A GENERATOR RECEPTACLE BREAKER. THE FADED CONDUIT TEE'S, DRIP FITTING, AND THE CONDUIT BETWEEN THE TEE'S ARE PROVIDED BY THE OWNER WITH CONTROL PANEL [01 CP 01]. THE CONTRACTOR SHALL PROVIDE A 10 FOOT ANTENNA RISER CONDUIT S0101 TO THE TOP TEE AND MOUNT AND CONNECT THE ANTENNA. THE CONTRACTOR SHALL INSTALL OWNER SUPPLIED ANTENNA CABLE. THE BASE STAND IS SUPPLIED BY THE OWNER AND INSTALLED BY THE CONTRACTOR. 2
4. SUBMERSIBLE LEVEL TRANSDUCER [01 SLT 01], LEVEL PROBE [01 LP 01], AND MOTORS [01 MTR 01, 02] ARE PROVIDED BY THE OWNER AND INSTALLED BY THE CONTRACTOR.
5. THE PUMP POWER CABLES PLUG INTO [01 CP 01] THROUGH MOTOR PLUG/RECEPTACLE SETS PROVIDED BY THE OWNER. THE PLUGS ARE WIRED BY THE CONTRACTOR. PROVIDE A SEAL-OFF FITTING JUST AHEAD OF THE PLUGS IF REQUIRED BY THE L&I ELECTRICAL INSPECTOR.
6. THREE PHASE SHORT CIRCUIT BOLTED FAULT CALCULATIONS ARE BASED ON INFINITE UTILITY CONTRIBUTION, +10% VARIANCE IN UTILITY VOLTAGE, -10% VARIANCE IN TRANSFORMER IMPEDANCE, AND A 30 KVA TRANSFORMER BANK WITH 2.1% ASSUMED IMPEDANCE. FAULT CALCULATIONS ALSO INCLUDE 170 AIC MOTOR REGENERATIVE CONTRIBUTION FROM 1x 5.5 HP MOTOR ADDED TO EACH FAULT POINT. ALL CALCULATIONS ARE BASED ON 240 V.
7. CONTRACTOR SHALL DETERMINE WHICH LINE CONDUCTOR IS 208V TO THE NEUTRAL CONDUCTOR AND MARK PER NEC 110.15 IN THE HANDHOLE AND IN THE CONTROL PANEL.

1 / - **ONE LINE DIAGRAM**
NOT TO SCALE

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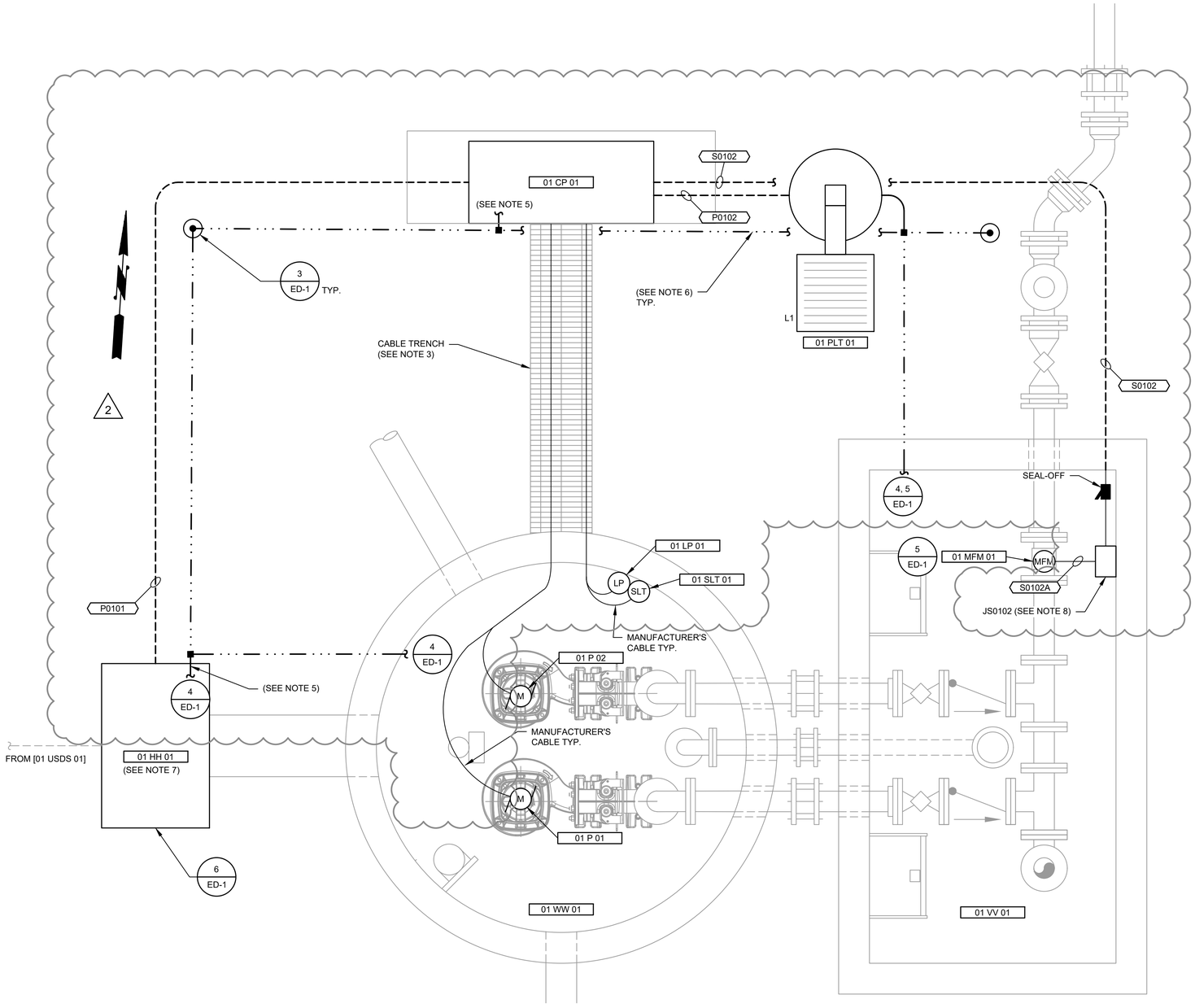
FILE: E_SYM_ABBR.DWG

ELECTRICAL

TAG LIST, ONE LINE DIAGRAM, AND CABLE AND CONDUIT SCHEDULES

DRAWING: **E-2** OF: **3**



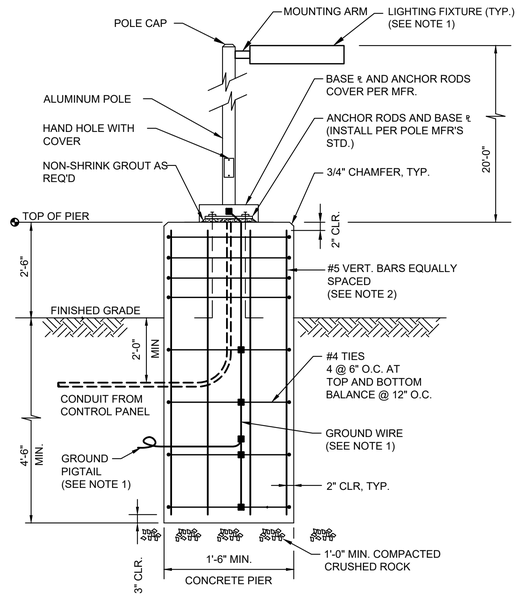
SITE ELECTRICAL PLAN

SCALE: 1"=1'-0"

NOTES:

1. ELECTRICAL DEMOLITION IS NOT SHOWN ON THE ELECTRICAL DRAWINGS, REFERENCE THE MECHANICAL DRAWINGS FOR ELECTRICAL DEMOLITION. ALL EXISTING ELECTRICAL EQUIPMENT, CONDUIT, CABLES, AND CONDUCTORS SHALL BE DEMOLISHED UNLESS NOTED OTHERWISE. DEMOLISH UNDERGROUND CONDUITS TO TWO FEET BELOW GRADE AND BACKFILL TO MATCH SURROUNDINGS.
2. THE EXISTING UTILITY SERVICE FEEDER AND CONDUIT FROM THE UTILITY DISCONNECT SWITCH SHALL BE RE-USED.
3. BOTH POWER AND INTRINSICALLY SAFE INSTRUMENTATION CABLES WILL BE ROUTED FROM PUMP CONTROL PANEL [01 CP 01] TO THE WET WELL IN A 12-INCH WIDE TRENCH. PROVIDE A 2-INCH WIDE CABLE TRAY ALONG THE EAST EDGE OF THE TRENCH FOR THE INTRINSICALLY SAFE INSTRUMENTATION CABLES. 2"x2" HEAVY DUTY RIBBED PANDUIT CHANNEL (WITH COVER) IS ACCEPTABLE. LAG INTO TRENCH WITH 316 STAINLESS STEEL FASTENERS. THE MOTOR POWER CABLES CAN LAY FREELY WITHIN THE TRENCH. SEPARATE THE POWER CABLES FROM CABLE TRAY AS MUCH AS POSSIBLE. REFERENCE STRUCTURAL DRAWINGS FOR ADDITIONAL CONDUIT TRENCH DETAILS.
4. ALL CONDUITS SHALL BE UNDERGROUND WITH THE EXCEPTION OF ANTENNA CONDUIT S0101.
5. PROVIDE GROUND RODS AND GROUND ROD BOXES AS SHOWN. CONNECT WITH #6 AWG BARE COPPER GROUNDING ELECTRODE CONDUCTORS PER SPECIFICATION 16060. CONNECT GECs TO THE BASE OF [01 CP 01]. PROVIDE PVC SCHEDULE 80 CONDUIT FOR THE GEC TO THE SUSE POINT OF THE MAIN BREAKER IN [01 CP 01].
6. GEC SHALL BE #6 AWG STRANDED BARE COPPER.
7. CONTRACTOR SHALL LOCATED AND PROTECT THE EXISTING FEEDER FROM [01 USDS 01]. INSTALL [01 HH 01] OVER THE EXISTING FEEDER, SHORTEN THE EXISTING CONDUIT AS NEEDED AND SPLICE CONDUIT [P0101] CONDUCTORS TO THE EXISTING CONDUCTORS WITH DIRECT BURY RATED SPLICES.
8. PROVIDE EXPLOSION-PROOF JUNCTION BOX RATED FOR A CLASS 1, DIVISION 1 ENVIRONMENT.

LIGHTING SCHEDULE								
MNEMONIC	TECHNOLOGY	APPLICATION	DESCRIPTION	MANUFACTURER		INPUT (VA)	VOLTAGE	COMMENTS
L1	LED	POLE LIGHT	RECTANGULAR, WEATHERPROOF DOWN LIGHT.	RAB LIGHTING	ALED4T78	79	120 VAC, 1 PH	7564 LUMENS, 5100 K, HIGH OUTPUT, THREE DRIVER, CLASS 2, 96 LUMENS/WATT WITH PHOTOCELL. PROVIDE WITH LIGHTING ADAPTOR FOR RECTANGULAR POLE MOUNTING.
P1	---	LIGHT POLE	STEEL, SQUARE, STRAIGHT.	STERNER	SSS	---	---	20' MOUNTING HEIGHT, 4" BASE, 0.188 GAUGE, SIDE ARM MOUNTING, BLACK.



NOTES:

1. PROVIDE CONCRETE PIER WITH #6 AWG BARE COPPER GROUND WIRE, WITH 24" EXTENSION FROM SIDE OF PIER. CONNECT PIGTAIL AS SHOWN IN PLAN VIEW.
2. USE ROUND PIER WITH 6 VERTICAL BARS MINIMUM OR SQUARE PIER WITH 8 VERTICAL BARS MINIMUM.

1 TYP **POLE LIGHT DETAIL**

NOT TO SCALE

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WOODLAND, WA 98674

No.	DATE	REVISION
2	03/2023	ADDENDUM NO. 2

ISSUED FOR:	BID SET
ISSUE DATE:	FEB 2023
APPROVED BY:	JRN
CHECKED BY:	PAM
DRAWN BY:	PEB
DESIGNER:	PAM
G & O JOB NO.:	22559
FILE:	E_SP.DWG

0 1" 2"
TWO INCHES AT FULL SCALE.
IF NOT, SCALE ACCORDINGLY

ELECTRICAL

ELECTRICAL SITE PLAN

DRAWING: **E-3** OF: **3**

M:\WOODLAND\22559.00 Is8 design\Planset\Electrical\E_SP.dwg, 3/28/2023 12:04 PM, PHILIP MARSHALL