

Stonel™ Eclipse™ valve monitor EC series

Installation, maintenance and
operating instructions

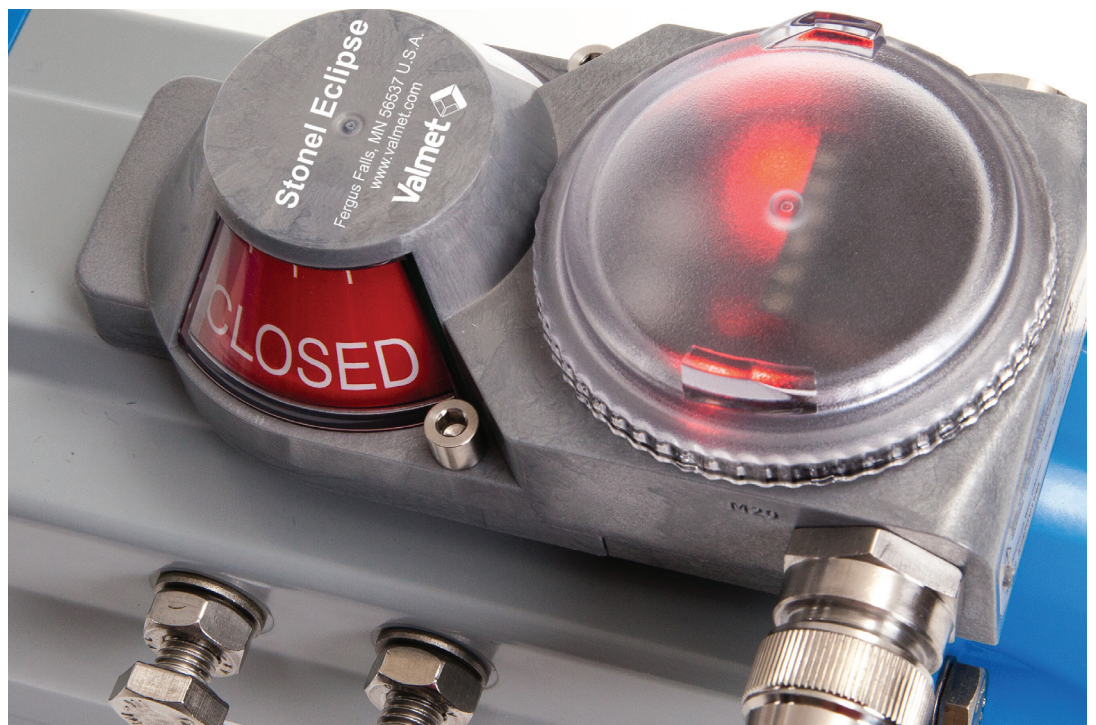


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Read these instructions first!

These instructions provide information about safe handling and operation of the limit switch. If you require additional assistance, please contact the manufacturer or manufacturer's representative. Addresses and phone numbers are printed on the back cover.

Save these instructions.

Subject to change without notice.

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1. GENERAL

1.1 INTRODUCTION

This manual incorporates the Installation, Maintenance and Operation (IMO) instructions for the Eclipse EC series valve controllers. The Eclipse EC is designed to provide position feedback indication and pneumatic control of on/off automated valves.

Note

The selection and use of the Eclipse EC in a specific application requires close consideration of detailed aspects. Due to the nature of the product this manual cannot cover all the likely situations that may occur when installing, using, or servicing the Eclipse EC. If you are uncertain about the use of this device, or its suitability for your intended use, please contact the manufacturer for assistance.

1.2 TITLE PLATE MARKINGS

The limit switch has an identification plate attached to the cover.

1. Product name and manufacturer identification
2. Electrical rating(s)
3. Note
4. Warning
5. Approval markings*
6. Protection class information*
7. Identification plate markings:
 8. Model
 9. Serial number
 10. Date

1.3 CE MARKINGS

The limit switch meets the requirements of European Directives and has been marked according to the directive.

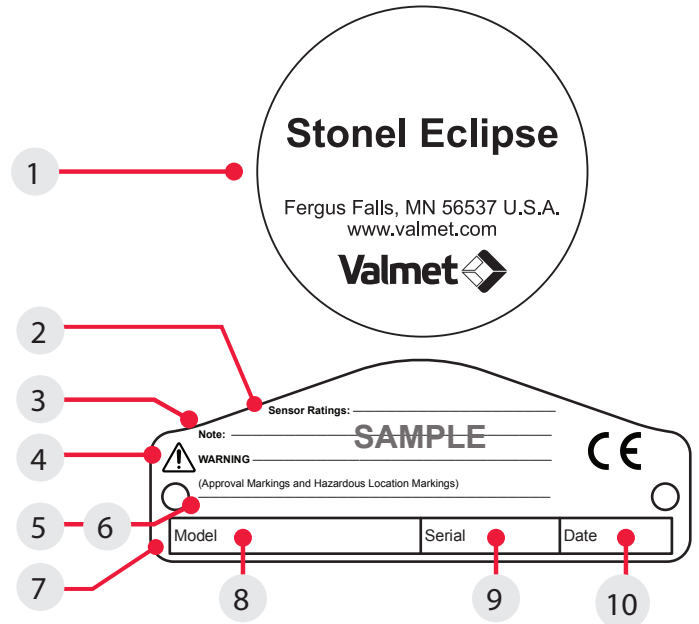
1.4 RECYCLING AND DISPOSAL

Most limit switch parts can be recycled if sorted according to material. In addition, separate recycling and disposal instructions are available from us. A limit switch can also be returned to us for recycling and disposal for a fee.

1.5 SAFETY PRECAUTIONS

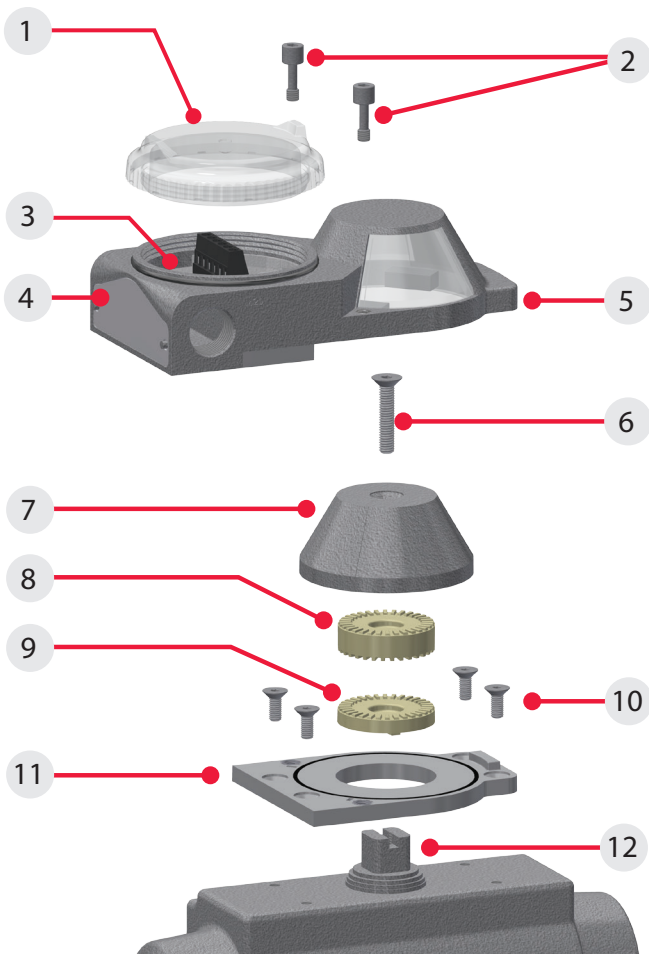
Do not exceed the permitted values! Exceeding the permitted values marked on the limit switch may cause damage to the switch and to equipment attached to the switch and could lead to uncontrolled pressure release in the worst case. Damage to the equipment and personal injury may result.

To prevent ignition of hazardous atmospheres, replace cover before energizing the electrical circuits. Keep cover tightly closed when in operation.



1.6 ASSEMBLY DRAWING

1. Cover
2. Body screws
3. Internal ground lug
4. Title plate
5. Body
6. Visual indicator drum retaining screw
7. Visual indicator/trigger drum
8. Visual indicator drum coupler
9. Drive block
10. Mounting plate screws
11. Mounting plate
12. Actuator shaft

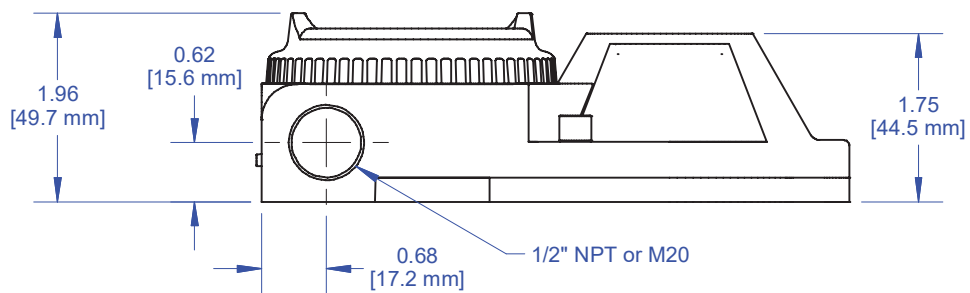
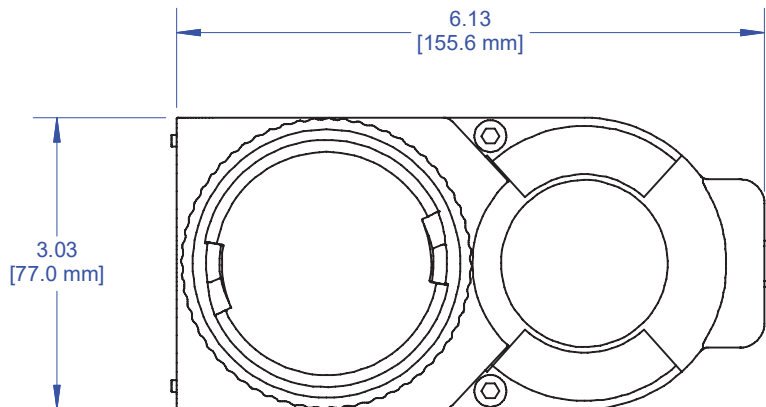


1.7 SPECIFICATIONS FOR ALL MODELS

See page 8 for function specific details.

Specifications	
Materials of construction	
Housing & air manifold plate	Polycarbonate
Visual indicator drum	Nylon
Visual indicator cover	Polycarbonate
Fasteners	Stainless steel
O-rings & seals	Nitrile compound
Operating life	Unlimited
Temperature range	-40° C to 80° C (-40° F to 176° F)
Enclosure protection	Type 4, 4X, and 6 and IP66 / IP67
Warranty	
Sensing & communication module	Five years
Mechanical components	Five years
Unit weights	
Standard	0.36 kg / 0.80 lb
Unit dimensions	
Unit height	49.53 mm [1.95 in]
Cover removal clearance	62.23 mm [2.45 in]
Position sensing	
Accuracy	Within 1°
Repeatability	Within 1°
Setting buffer	4° from set point (Rotational distance from original set point where switch will energize on return stroke)
Dead band (Hysteresis)	6° from set point (Rotational distance from original set point where switch will de-energize)
Past band	15° past set point (Amount valve can rotate past set-point without leaving ON state. Do not rotate past this point during normal operation)
Max rotational range	120° (90° optimum)
Terminal block specifications	
Recommended torque	4.42 in.lbs (0.5 Nm)
Conductor strip length	0.22 -0.25 in (5.5-6.5 mm)
Maximum wire size	30-12 AWG (0.5-2.5 mm ²)
Wire type	Stranded or solid
Environmental conditions	
Location	Indoor and outdoor
Maximum altitude	5000 m
Maximum humidity	90%
Pollution degree	4
Ratings and approvals*	See official website
* Only models listed on manufacturer's official website are approved per specific rating.	

1.8 DIMENSIONS



Note

Stonel Eclipse EC certified dimensional drawing can be found on manufacturer's **official website** under the Download tab.

2. ASSEMBLY AND MOUNTING

2.1 INSTRUCTIONS

Steps

Refer to Eclipse EC assembly figure when performing mounting and assembly procedures. Eclipse unit and mounting kit are supplied separately. From Eclipse shipping container, ensure items A, B, and D are present. From the mounting kit, ensure items C, E, F, G, and H are present.

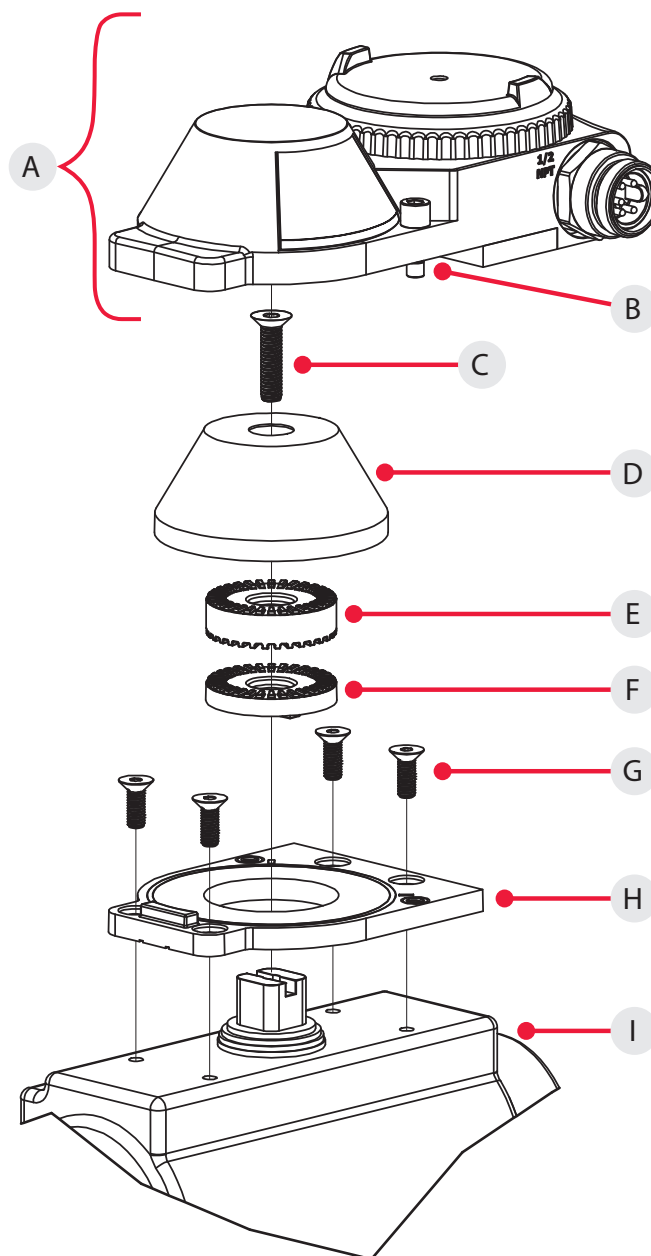
1. Locate the mounting plate (Item H) and place on the actuator. Using an M3 allen wrench, fasten with the four mounting plate screws (Item G). Torque screws to 46 to 56 in.lbs (5.1 to 6.3 Nm).
2. Place visual indicator drive block (Item F) into slot in the actuator shaft. Place visual indicator drum coupler (Item E) onto the visual indicator drive block (Item E is only used in applications with a Namur 1 mounting pattern). Next, place the visual indicator/trigger drum (Item D) onto the visual indicator drum coupler. Align the holes in all three items with the threaded hole in the actuator shaft and fasten down with the visual indicator drum retaining screw (Item C). Leave screw loose in order to facilitate indexing of the visual indicator.
3. With the actuator in the closed position, center the visual indicator drum until the CLOSED quadrants are centered to the left and right of the long axis of the actuator. With an M4 allen wrench, tighten down with the visual indicator drum retaining screw. Torque screw to 79 to 96 in.lbs (8.9 to 10.9 Nm).
4. Set the Eclipse body (Item A) in place. With an M4 allen wrench, torque the Eclipse body screws (Item B) to Torque screws to 46 to 56 in.lbs (5.1 to 6.3 Nm).
5. After all wiring and sensor setting procedures have been completed, install Eclipse cover and hand tighten.

Special notes

- Mounting of the Eclipse requires a Stonel mounting kit specific to the actuator the Eclipse is to be mounted to.
- It is recommended that thread lubricant or anti-seize be used on the Eclipse body screws (Item B) prior to assembly.
- In high cycle or high vibration applications, blue Loctite® may be used on the mounting plate screws (Item G) and the visual indicator drum retaining screw (Item C).

2.2 ECLIPSE EC ASSEMBLY FIGURE

- A. Eclipse EC unit
- B. Body screws (2)
- C. Visual indicator drum retaining screw
- D. Visual indicator/trigger drum
- E. Visual indicator drum coupler
- F. Drive block
- G. Mounting plate screws (4)
- H. Mounting plate
- I. Actuator



3. MAINTENANCE, REPAIR AND INSTALLATION

3.1 MAINTENANCE AND REPAIR

No routine maintenance of Eclipse units is required when installed in environments for which they are designed. Repair of Eclipse units must be done by the manufacturer or by qualified personnel that are knowledgeable about the installation of electromechanical equipment in hazardous areas. All parts needed for repair must be purchased through an authorized distributor for Stonel products to maintain warranty and to ensure the safety and compliance of the equipment.

3.2 INSTALLATION

WARNING

Solenoid power supplied must be limited with a fuse or circuit breaker rated to 2 Amps maximum.



CAUTION: TO MAINTAIN SAFETY, ONLY POWER SUPPLIES THAT PROVIDE DOUBLE/REINFORCED INSULATION, SUCH AS THOSE WITH PELV/SELV OUTPUTS, SHALL BE USED. (AS APPLICABLE)



ATTENTION: IF THE UNIT IS USED IN A MANNER NOT SPECIFIED BY STONEL, THE PROTECTION PROVIDED BY IT MAY BE IMPAIRED.



ATTENTION: IF REQUIRED, THE ECLIPSE HOUSING CAN BE GROUNDED TO EARTH POTENTIAL BY THE INTERNAL GROUND LUG. (SEE ASSEMBLY DRAWING 1.6 ITEM 3 ON PAGE 4)



ATTENTION: IN ORDER TO MAINTAIN ENCLOSURE TYPE AND IP RATINGS, COVER SHALL BE TIGHTENED BY HAND UNTIL COVER MAKES CONTACT WITH THE HOUSING. DO NOT USE ANY TOOL TO TIGHTEN THE COVER.



ATTENTION: THE CONDUITS ON THE UNIT ARE RATED FOR END-OF-LINE INSTALLATION ONLY. THE SECOND CONDUIT ENTRY SHALL BE PLUGGED OR USED FOR CONNECTION TO A LOCAL AUXILIARY DEVICE (I.E. SOLENOID) ONLY. TORQUE CONDUIT FITTINGS TO 8 FT. LBS.

Field wiring

- This product comes shipped with conduit covers in an effort to protect the internal components from debris during shipment and handling. It is the responsibility of the receiving and/or installing personnel to provide appropriate permanent sealing devices to prevent the intrusion of debris or moisture when stored or installed outdoors.
- Use field wiring rated at least 10 K (+10° C) above ambient temperature.

All models

WARNING

EXPLOSION HAZARD. DO NOT CONNECT OR DISCONNECT WHEN ENERGIZED UNLESS THE AREA IS FREE OF IGNITABLE CONCENTRATIONS.

Models with receptacles

WARNING

THE UNIT IS RATED FOR INGRESS PROTECTION WHEN THE MATING CORDSET IS ATTACHED. THE MATING CORDSET SHALL REMAIN CONNECTED DURING OPERATION AND SHALL ONLY BE DISCONNECTED / RECONNECTED BY TRAINED SERVICE PERSONNEL. IF THE MATING CORD SET IS DISCONNECTED, IT IS THE RESPONSIBILITY OF THE SERVICE PERSONNEL TO INSTALL AN APPROPRIATELY RATED CAP (NOT SUPPLIED) OVER THE RECEPTACLE TO MAINTAIN THE RATED INGRESS PROTECTION OF THE UNIT.

When installed in Division 2 areas in the United States and Canada, a Division 2 FM approved Turck eurofast® or minifast® cordset and the use of a tool-secured Turck lokfast® guard is required.

Because the unit is rated for Ingress Protection with the mating cordset attached, care must be taken when selecting the cordset to ensure it is rated by the manufacturer with equivalent Ingress Protection ratings to the unit.

The Turck lokfast® guard renders the cordset not “normally arcing” and maintains ingress protection rating by making the connection tool secured. Refer to the lokfast® guard’s documentation for details on releasing the locking mechanism.

The cordsets, as specified above, are available with cable rated for various wiring methods, such as ITC, PLTC, MC, etc. It is the responsibility of the installer, or end user, to install this product in accordance with the wiring method(s) specified by the cordset manufacturer.

It is the responsibility of the installer, or end user, to install this product in accordance with the National Electrical Code (NFPA 70) for the US, CE Code, Part I for Canada, or any other national or regional code defining proper practices.

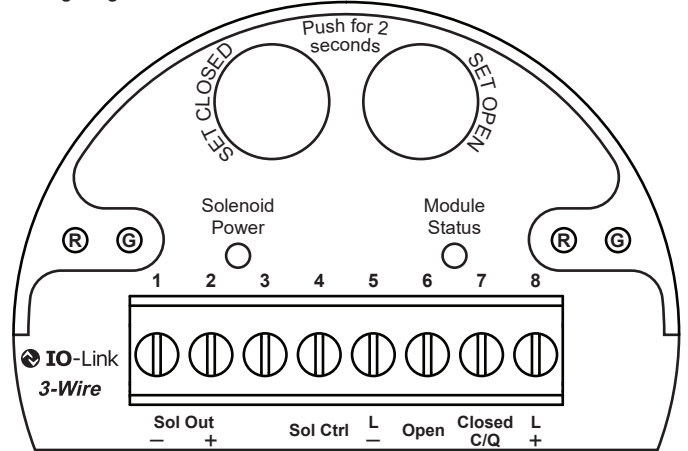
4. FUNCTION SPECIFIC DETAILS

4.1 SENSOR/SWITCHING MODULES

4.1.1 IO-LINK, 3 WIRE PNP / NPN SWITCHING SENSORS (30S, 30W)

Specifications	
Configuration	(2) 24 VDC N.O. solid state sensors. Self-learning outputs for NPN/PNP/Sinking/ Sourcing PLC input cards.
	(1) 24 VDC output for external solenoid. Self-learning control input for NPN/PNP/Sinking/ Sourcing PLC output cards.
Voltage range	18 - 30 VDC
Minimum on current	2.0 mA
Maximum continuous current	0.1 amps
Maximum leakage current	0.0
Maximum voltage drop	0.1 volts @ 10 mA 0.5 volts @ 100 mA
Operating power (1 LED "ON" Solenoid "OFF")	0.6 watts
Operating power (1 LED "ON" 2W Solenoid "ON")	3.0 watts
Circuit protection	Protected against short circuits and direct application of voltage with no load.
Output Specifications	
Solenoid input voltage	18 - 30 VDC
Solenoid output voltage	24 VDC
Solenoid output current	85 mA
Solenoid output power	2.0 watts
Circuit protection	External solenoid output is short circuit protected
Wireless link features (30W)*	Allows Set Open / Set Closed Stroke times (Only functions when attached to external solenoid) Valve Position graph Lifetime Cycle Count (non-resettable)

Wiring diagrams

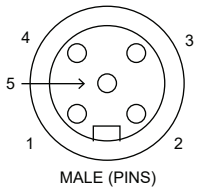


* Unlocking the wireless link features (30W only)

The device is unlocked until any of the signals (Open/Closed/Solenoid) are wired to a PLC/DCS card, at which time it locks and it cannot be unlocked until unwired and power cycled. The wireless link feature does not work simultaneous with an active IO-Link connection.

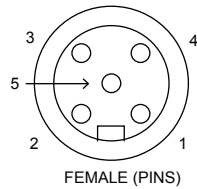
Common receptacle options pin-out

5-PIN MICRO CONNECTOR (M12)



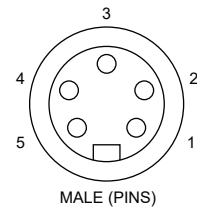
Pin	Signal
1	L +
2	OPEN
3	L -
4	CLOSED C/Q
5	SOL CTRL

5-PIN MICRO CONNECTOR (M12)

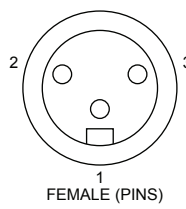


Pin	Signal
1	NOT USED
2	NOT USED
3	SOL OUT -
4	SOL OUT +
5	NOT USED

5-PIN MINI CONNECTOR



3-PIN MINI CONNECTOR



Pin	Signal
1	NOT USED
2	SOL OUT -
3	SOL OUT +

Note

Consult factory for additional quick connector options.

4.1.1 IO-LINK, 3 WIRE PNP / NPN SWITCHING SENSORS (30S, 30W) CONTINUED

Bench test procedure and sensor setting instructions

WARNING

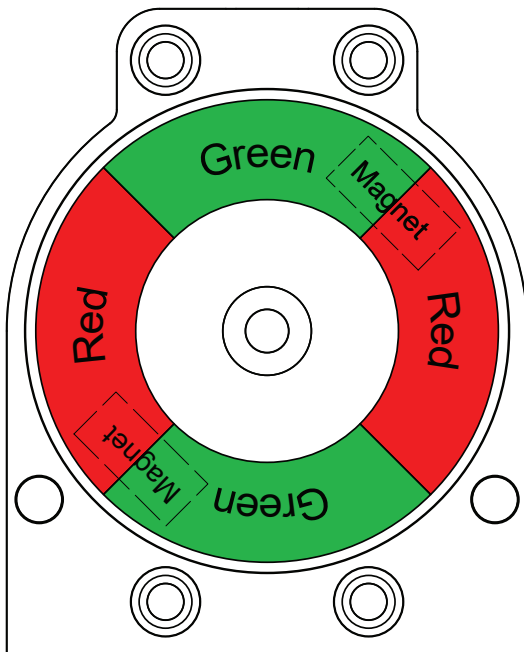
DO NOT APPLY EXTERNAL POWER TO SOL OUT +/- TERMINALS. THIS MAY CAUSE PERMANENT DAMAGE TO THE UNIT.



CAUTION: PERFORMING THIS PROCEDURE WILL CAUSE THE SENSOR INPUTS TO CHANGE STATE. PERFORMING THIS PROCEDURE IS NOT RECOMMENDED DURING A LIVE PROCESS.

To test sensors, use a 24 VDC power supply. No series load resistor is required.

1. Apply power across the L+ and L- terminal block points. (No power required on open/closed terminals.)
2. Attach indicator such that the closed quadrants will face out when in the closed position. This figure shows a Red Closed visual indicator in the closed position.



3. Save set-points:
 - a. Operate actuator to the closed position.
 - b. Press and hold SET CLOSED button until closed LED is lit or flashes (2 seconds). Release button.
 - c. Operate actuator to the open position.
 - d. Press and hold SET OPEN button until the open LED is lit or flashes (2 seconds). Release button.

NOTE: If red or green LEDs flash when trying to set the set-point, the magnet is too far away from the sensing element. Adjust Visual Indicator drum to bring the magnet slightly closer to the sensing unit and try again.

4. Setpoints are retained even after power is removed.
5. To electrically test solenoid output, connect Solenoid Control Signal terminal to L+ or L-. The Solenoid Output will activate.

Note

If using only one of the sensors for valve position feedback, either sensor may be used independently.

Specifications for Wireless Link

Communication	Bluetooth® technology; single mode (not compatible with Bluetooth® Classic)
Frequency band	2.402-2.480 Ghz
Transmit power	4dBm or ~2.5 milliwatts
Data rate	1 Mbit/second; effective information transmit rate ~10 Kbits/second
Range	Up to 100 meters (330 feet) in free space. Range is reduced by obstructions between handheld device and Wireless Link VCT. Line of site is not necessary.
Registrations	FCC, IC, CE
CE compliance	Exceeds industrial compliance standards
VCT identification	VCTs in range will be displayed in order of signal strength
VCT link	One device accessed at a time between client (handheld device) and server (VCT). Each server accessed by one client at a time
Application	Stonel Wireless Link available from the App store
Hand-helds	Compatible with iPhone® and iPad®

Power/Fault LED status

Module status	Fault description
LED off	Device does not have power
Solid green	Normal operation
Flashing red	Output shorted No magnet detected The Open or Closed output signal is shorted. Unit temperature exceeds 80° C Low supply voltage Internal sensor fault - sensor may need replacing

IO-Link Process Data Mapping

Bit #	Input	Output
0	Closed	Output 1
1	Open	Reserved
2	Reserved	Wink
3	Reserved	Set Closed (Hold 2 seconds)
4	Cycle count over limit	Set Open (hold 2 seconds)

For a list of all Process, Parameters, System Commands and Events data, see IODD file.

4.1.1 IO-LINK, 3 WIRE PNP / NPN SWITCHING SENSORS (30S, 30W) CONTINUED

Typical basic installation

Wiring considerations

The pins L+ (24V+) and L- (0V) provide power for the unit's sensor circuitry and solenoid output. These pins should be wired to the same 24 VDC (18-30 VDC) source used for field wiring connections of the input / output card(s). There is no isolation between L+ / L- pins to the signal pins. The power supply used must be able to provide enough power/current for the unit's circuitry plus current required for the signals and external solenoid.

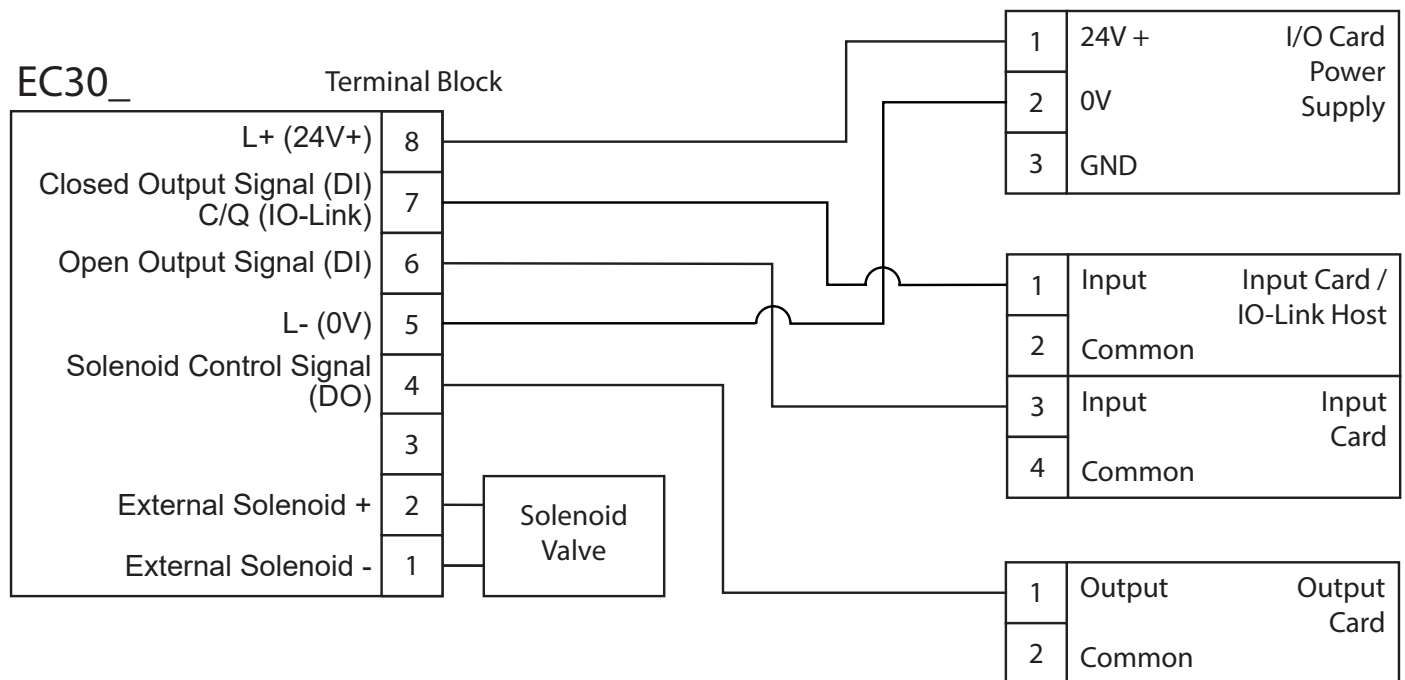
The open and closed signal pins should be wired to the input card's signal input terminal. No connection to the common terminal is required.

The solenoid control signal pin should be wired to the output card's output (switched) terminal. No connection to the common terminal is required.

Self-learning signals

Every time power is cycled to L+ / L-, the device will test the signal wires to learn what type of input and/or output card(s) are wired to each signal. If a signal is open-circuit, the device will continue to test it until a card is detected. If the open or closed signal is short-circuited, the device will retest the signal once the short circuit is removed.

Like most solid-state sensors, some current restrictive input cards may detect a momentary ON state while the device is booting. Most input cards (especially those designed for solid-state sensors) will not experience an ON state during boot up.



4.1.1 IO-LINK, 3 WIRE PNP / NPN SWITCHING SENSORS (30S, 30W) CONTINUED

Output Fail-Safes

General Fail-Safes

The Eclipse EC30 supports parameters for configuration of fail-safes of the Process Data Outputs. By default, these fail-safe settings are disabled (Enable Output Fail-safe parameter, index 268), and the external solenoid output is controlled by the state of the Solenoid Control Signal pin (in SIO mode).

If the Enable Output Fail-safe parameter is set to “true”, then the fail-safe state of each output is determined by the bitwise combination of two parameters: Output Substitution Mode (index 258) and Output Substitution Value (index 259).

Use Fail-Safes (Global to all bits)	Substitution Mode for each output bit	Substitution Value for each output bit	Result
0	Don't care	Don't care	Use SIO Mode
1	1	0	Fail-Off
1	1	1	Fail-On
1	0	Don't care	Hold Last Valid Value

Wireless Link Fail Safe Configuration

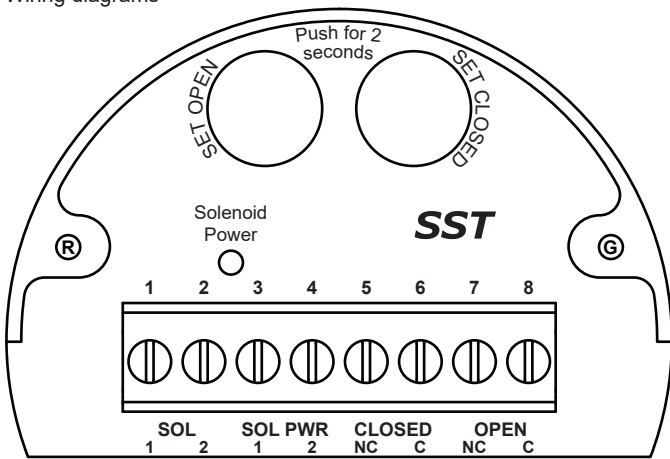
Eclipse EC30W defaults from the factory to have the Wireless Link radio enabled and unlocked whenever only L+ and L- terminals are wired. Fail-safe settings can be changed by using the Wireless Link app “Advanced Configuration” page, or via the IO-Link parameters for Output Substitution Mode and Output Substitution Value (using bits 6 and 7 to disable radio and unlock respectively).

4.1 SENSOR/SWITCHING MODULES

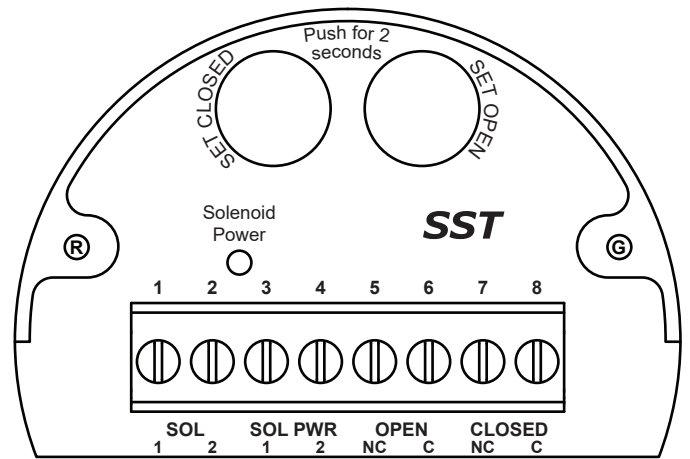
4.1.2 SST N.C. SENSOR (34S)

Specifications	
Configuration	(2) Universal voltage N.C. 2-wire solid state sensors (2) Wire terminations for one solenoid
Voltage range	20 - 250 VAC 50/60 Hz; 20 - 250 VDC
Minimum on current	2.0 mA
Maximum continuous current	0.1 amps
Maximum leakage current	<0.5 mA
Maximum voltage drop	6.7 volts @ 10 mA 7.5 volts @ 100 mA
Circuit protection	Protected against short circuits and direct application of voltage with no load.
Solenoid pass-thru specifications	
Solenoid voltage range	20 - 250 VAC 50/60 Hz; 20 - 250 VDC
Maximum solenoid current	0.75 amps

Wiring diagrams



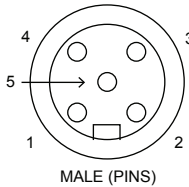
Red closed



Green closed

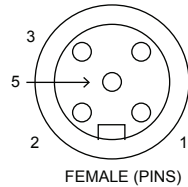
Common receptacle options pin-out

5-PIN MICRO CONNECTOR (M12)



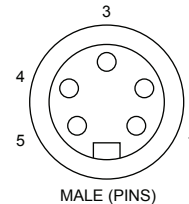
Pin	Signal
1	OPEN NC
2	CLOSED NC
3	SOL PWR 2
4	SOL PWR 1
5	OPEN / CLOSED C [Jumper installed]

5-PIN MICRO CONNECTOR (M12)



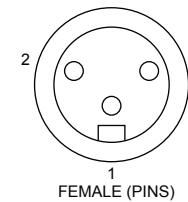
Pin	Signal
1	NOT USED
2	NOT USED
3	SOL 2
4	SOL 1
5	NOT USED

5-PIN MINI CONNECTOR



Pin	Signal
1	OPEN / CLOSED C [Jumper installed]
2	CLOSED NC
3	OPEN NC
4	SOL PWR 1
5	SOL PWR 2

3-PIN MINI CONNECTOR



Pin	Signal
1	NOT USED
2	SOL 2
3	SOL 1

Note

Consult factory for additional quick connector options.

4.1.2 SST N.C. SENSOR (34S) CONTINUED

Bench test procedure and sensor setting instructions

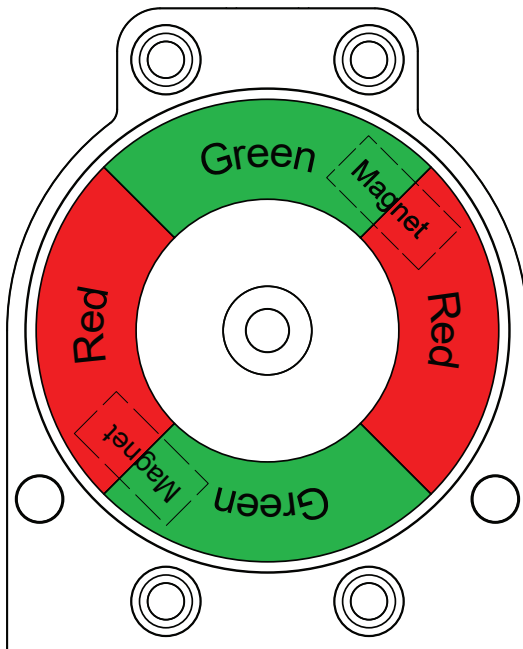


Caution: Performing this procedure will cause the sensor inputs to change state. Performing this procedure is not recommended during a live process.

Note When performing this procedure on a Normally Closed (function 34) switch, the LEDs will turn off during the setup procedure instead of on.

Use a 24 VDC power supply with series load resistor, (2K - 6K Ω), connected to the 24 VDC+.

1. Connect 24 VDC + (with resistor) to the CLOSED C (common) and OPEN C (common) terminals. Connect 24 VDC- to the CLOSED NC and OPEN NC terminals.
2. Attach indicator such that the closed quadrants will face out when in the closed position. This figure shows a Red Closed visual indicator in the closed position.



3. Save set-points
 - a. Operate actuator to the closed position.
 - b. Press and hold SET CLOSED button until closed LED changes state (2 seconds). Release button.
 - c. Operate actuator to the open position.
 - d. Press and hold SET OPEN button until the open LED changes state (2 seconds). Release button.

NOTE: If red or green LEDs flash when trying to set the set-point, the magnet is too far away from the sensing element. Adjust Visual Indicator drum to bring the magnet slightly closer to the sensing unit and try again.
4. Setpoints are retained even after power is removed.
5. To electrically test solenoid output, apply power to the SOL PWR 1 and SOL PWR 2 terminals.

Note

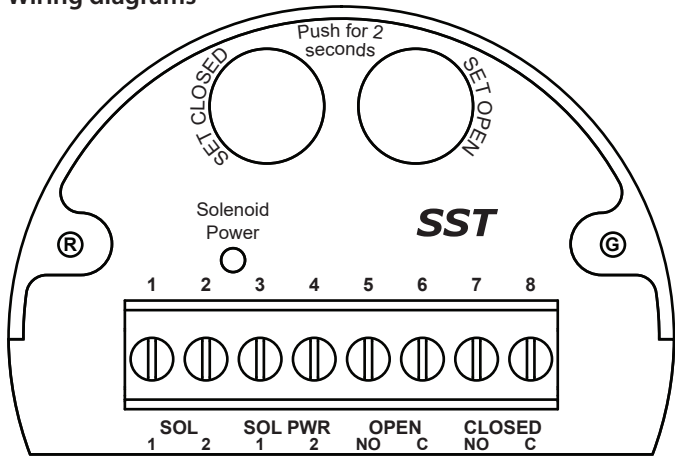
If using only one of the sensors for valve position feedback, either sensor may be used independently.

4.1 SENSOR/SWITCHING MODULES

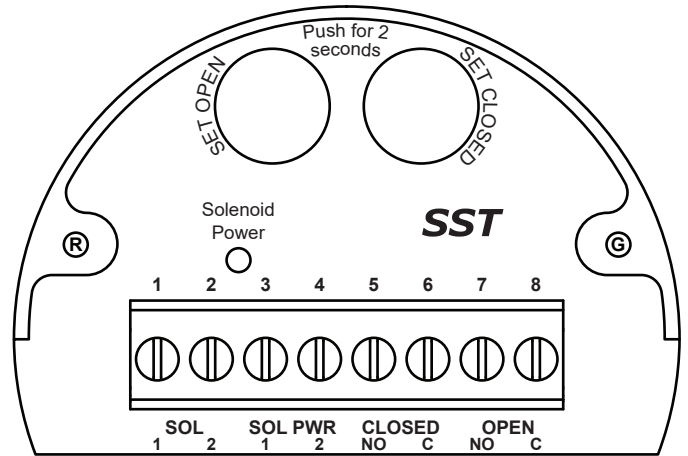
4.1.3 SST N.O. SENSOR (35S)

Specifications	
Configuration	(2) Universal voltage N.O. 2-wire solid state sensors (2) Wire terminations for one solenoid
Voltage range	20 - 250 VAC 50/60 Hz; 20 - 250 VDC
Minimum on current	2.0 mA
Maximum continuous current	0.1 amps
Maximum leakage current	<0.5 mA
Maximum voltage drop	6.7 volts @ 10 mA 7.5 volts @ 100 mA
Circuit protection	Protected against short circuits and direct application of voltage with no load.
Solenoid pass-thru specifications	
Solenoid voltage range	20 - 250 VAC 50/60 Hz; 20 - 250 VDC
Maximum solenoid current	0.75 amps

Wiring diagrams



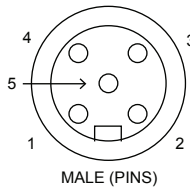
Red closed



Green closed

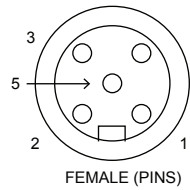
Common receptacle options pin-out

5-PIN MICRO CONNECTOR (M12)



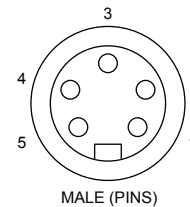
Pin	Signal
1	OPEN NO
2	CLOSED NO
3	SOL PWR 2
4	SOL PWR 1
5	OPEN / CLOSED C <i>[Jumper installed]</i>

5-PIN MICRO CONNECTOR (M12)



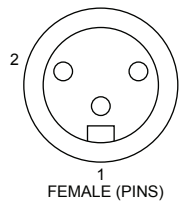
Pin	Signal
1	NOT USED
2	NOT USED
3	SOL 2
4	SOL 1
5	NOT USED

5-PIN MINI CONNECTOR



Pin	Signal
1	OPEN / CLOSED C <i>[Jumper installed]</i>
2	CLOSED NO
3	OPEN NO
4	SOL PWR 1
5	SOL PWR 2

3-PIN MINI CONNECTOR



Pin	Signal
1	NOT USED
2	SOL 2
3	SOL 1

Note

Consult factory for additional quick connector options

4.1.3 SST N.O. SENSOR (35S) CONTINUED

Bench test procedure and sensor setting instructions

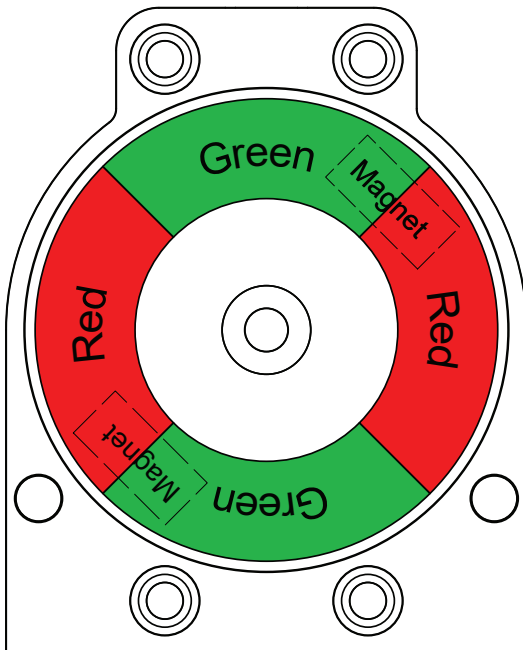


Caution: Performing this procedure will cause the sensor inputs to change state. Performing this procedure is not recommended during a live process.

Note When performing this procedure on a Normally Open (function 35) switch, the LEDs will turn on during the setup procedure instead of off.

Use a 24 VDC power supply with series load resistor, (2K - 6K Ω), connected to the 24 VDC+.

1. Connect 24 VDC + (with resistor) to the CLOSED C (common) and OPEN C (common) terminals. Connect 24 VDC- to the CLOSED NO and OPEN NO terminals.
2. Attach indicator such that the closed quadrants will face out when in the closed position. This figure shows a Red Closed visual indicator in the closed position.



3. Save set-points
 - a. Operate actuator to the closed position.
 - b. Press and hold SET CLOSED button until closed LED changes state (2 seconds). Release button.
 - c. Operate actuator to the open position.
 - d. Press and hold SET OPEN button until the open LED changes state (2 seconds). Release button.
- NOTE: If red or green LEDs flash when trying to set the set-point, the magnet is too far away from the sensing element. Adjust Visual Indicator drum to bring the magnet slightly closer to the sensing unit and try again.
4. Setpoints are retained even after power is removed.
 5. To electrically test solenoid output, apply power to the SOL PWR 1 and SOL PWR 2 terminals.

Note

If using only one of the sensors for valve position feedback, either sensor may be used independently.

4.1 SENSOR/SWITCHING MODULES

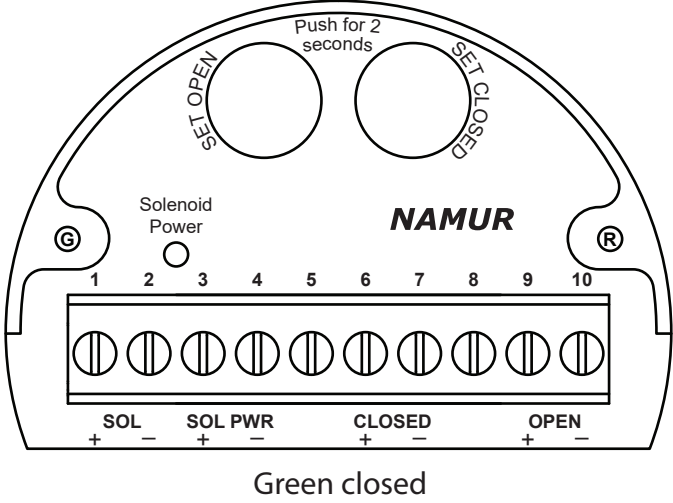
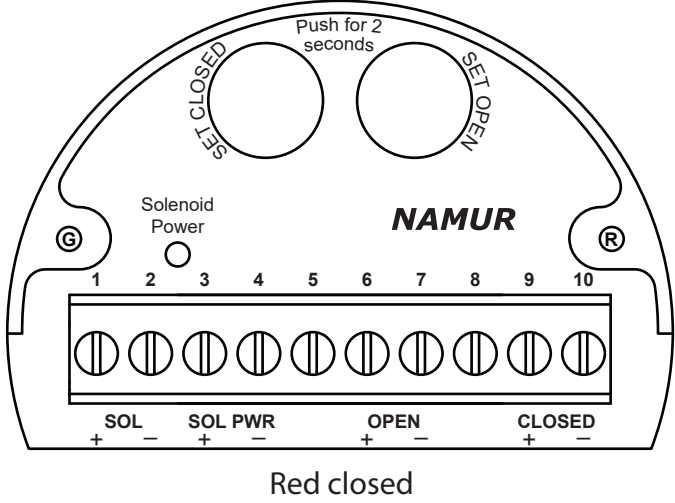
4.1.4 NAMUR SENSOR (45S)

Specifications			
Configuration	(2) N.C. NAMUR sensors (EN 60947-5-6; IS) (2) Wire terminations for one solenoid		
Voltage range	5 - 25 VDC		
Current ratings	Target present	current < 1.0 mA	
	Target absent	current > 2.1 mA	
Solenoid pass-thru specifications			
Solenoid voltage range	30 VDC max		
Maximum solenoid current	0.75 amps		
<i>Use with intrinsically safe repeater barrier. NAMUR sensors conform to EN 60947-5-6 standard.</i>			



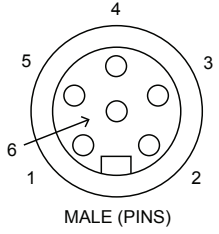
Reference controlled installation drawing #105521 for proper intrinsic safe installation details. Find document in the Appendix on page 27 or on **the manufacturer's website**.

Wiring diagrams



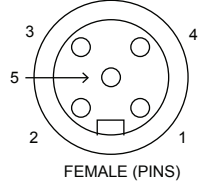
Common receptacle options pin-out

6-PIN MICRO CONNECTOR (M12)



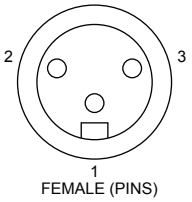
Pin	Signal
1	OPEN +
2	OPEN -
3	SOL PWR +
4	CLOSED +
5	CLOSED -
6	SOL PWR -

5-PIN MICRO CONNECTOR (M12)



Pin	Signal
1	NOT USED
2	NOT USED
3	SOL -
4	SOL +
5	NOT USED

3-PIN MINI CONNECTOR



Pin	Signal
1	NOT USED
2	SOL -
3	SOL +

Note

Consult factory for additional quick connector options.

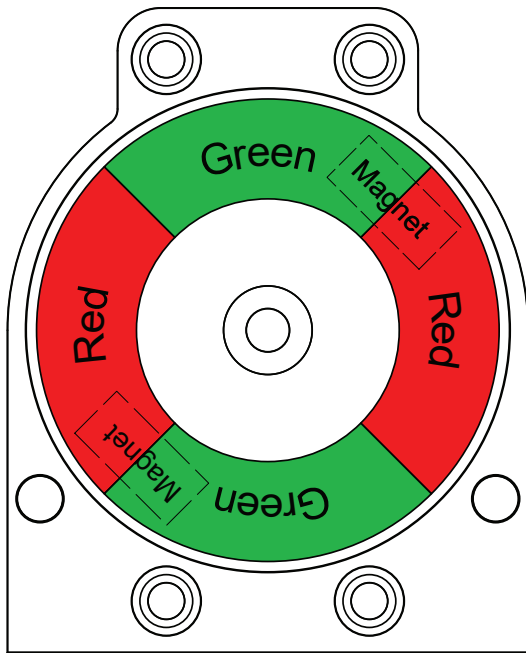
4.1.4 NAMUR SENSOR (45S) CONTINUED

Bench test procedure and sensor setting instructions



Caution: Performing this procedure will cause the sensor inputs to change state. Performing this procedure is not recommended during a live process.

1. Connect 24 VDC + to the CLOSED (+) and OPEN (+) terminals.
2. Connect 24 VDC - to the CLOSED (-) and OPEN (-) terminals.
3. Attach indicator such that the closed quadrants will face out when in the closed position. This figure shows a Red Closed visual indicator in the closed position.



4. Save set-points:
 - a. Operate actuator to the closed position.
 - b. Press and hold SET CLOSED button until closed LED is OFF (2 seconds). Release button.
 - c. Operate actuator to the open position.
 - d. Press and hold SET OPEN button until the open LED is OFF (2 seconds). Release button.

NOTE: If red or green LEDs flash when trying to set the set-point, the magnet is too far away from the sensing element. Adjust Visual Indicator drum to bring the magnet slightly closer to the sensing unit and try again.

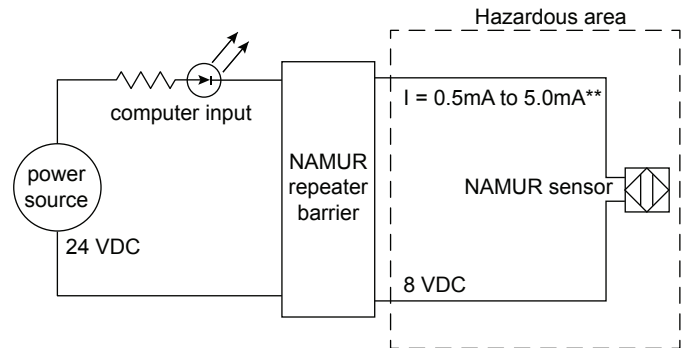
5. Setpoints are retained even after power is removed.
6. To electrically test solenoid output, apply power to the SOL PWR (+) and SOL PWR (-) terminals.

Note

If using only one of the sensors for valve position feedback, either sensor may be used independently.

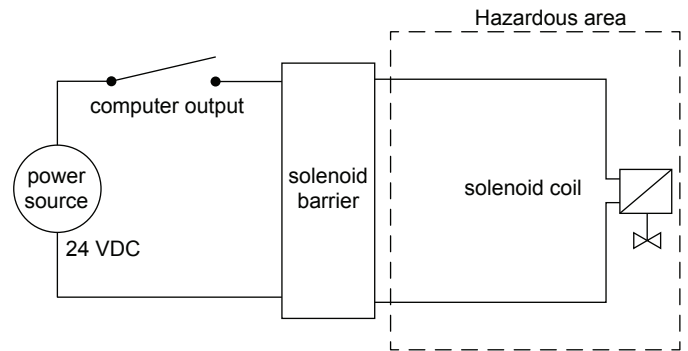
Typical basic intrinsically safe circuits

NAMUR sensor circuit



** Barrier off state (target off): current in NAMUR sensor circuit >2.1 mA
Barrier on state (target on): current in NAMUR sensor circuit <1.0 mA

Solenoid circuit

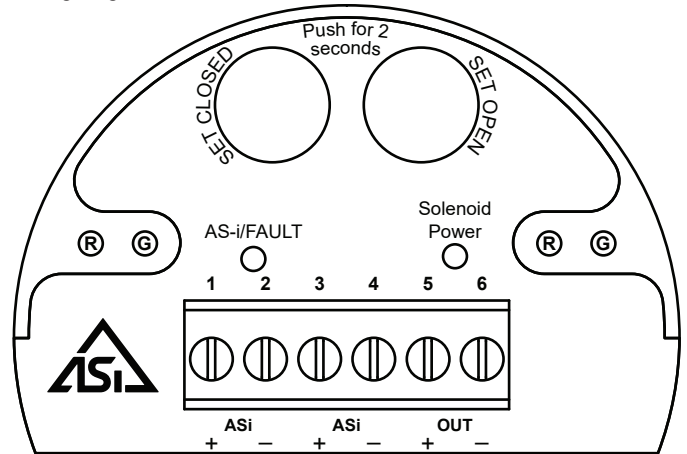


4.2 VALVE COMMUNICATION TERMINALS (VCT)

4.2.1 VCT WITH AS-INTERFACE COMMUNICATION (96S)

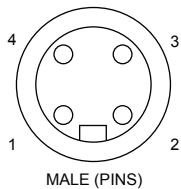
Specifications		
Communication protocol	AS-Interface v3.0	
Configuration	(2) Discrete inputs (sensors) (1) Discrete output (solenoid)	
Input voltage	26.5-31.6 VDC (AS-I voltage)	
Output voltage	24 VDC (+/- 10%)	
Quiescent current	32 mA	
Maximum output current	85 mA	
Maximum output power	2 watts	
Output overcurrent protection	100 mA	
Default address	00	
Maximum devices per network	31	
ID/IO codes	ID = F; IO = 4; ID1 = F; ID2 = E (S-4.F.E.)	
Bit assignment		
Inputs	Outputs	Parameters
Bit 0 = not used	Bit 0 = not used	Bit 0 = wink
Bit 1 = not used	Bit 1 = not used	Bit 1-3 = not used
Bit 2 = Valve open	Bit 2 = output (OUT +/-)	
Bit 3 = Valve closed	Bit 3 = not used	

Wiring diagrams



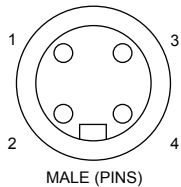
Common receptacle options pin-out

4-PIN MICRO CONNECTOR (M12)

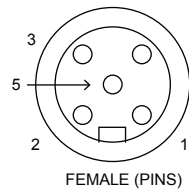


Pin	Signal
1	ASi +
2	not used
3	ASi -
4	not used

4-PIN MINI CONNECTOR

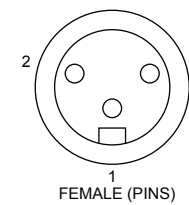


5-PIN MICRO CONNECTOR (M12)



Pin	Signal
1	NOT USED
2	NOT USED
3	OUT -
4	OUT +
5	NOT USED

3-PIN MINI CONNECTOR



Pin	Signal
1	NOT USED
2	OUT -
3	OUT +

Note


Consult factory for additional quick connector options.

4.2.1 VCT WITH AS-INTERFACE COMMUNICATION AND EXTENDED ADDRESSING (96S) CONTINUED

Bench test procedure and sensor setting instructions

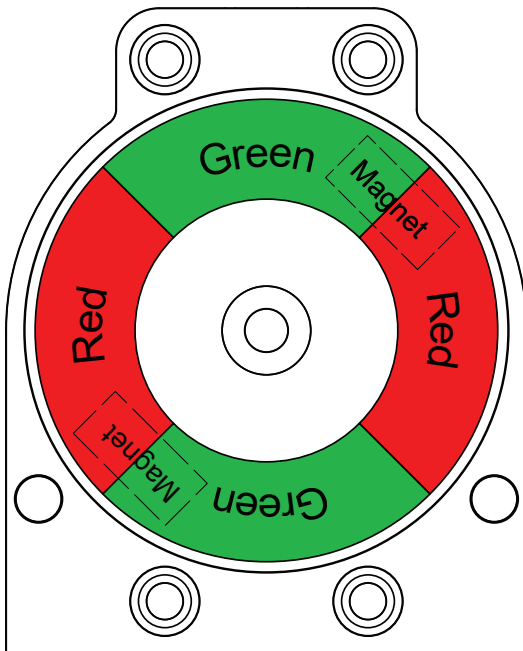
WARNING

DO NOT APPLY EXTERNAL POWER TO THE OUTPUT TERMINALS. THIS WILL CAUSE PERMANENT DAMAGE TO THE UNIT.



Caution: Performing this procedure will cause the sensor inputs to change state. Performing this procedure is not recommended during a live process.

1. To test sensors, it is best to connect to an AS-i bus using an AS-i power supply so that communication can also be tested. However, if a network is not available, to set the open and closed set points, use a 24 VDC power supply. Connect 24 VDC+ to AS-i+ and 24 VDC- to AS-i -.
2. Attach indicator such that the closed quadrants will face out when in the closed position. This figure shows a Red Closed visual indicator in the closed position.



3. Save set-points:
 - a. Operate actuator to the closed position.
 - b. Press and hold SET CLOSED button until closed LED is lit (2 seconds). Release button.
 - c. Operate actuator to the open position.
 - d. Press and hold SET OPEN button until the open LED is lit (2 seconds). Release button.

NOTE: If red or green LEDs flash when trying to set the set-point, the magnet is too far away from the sensing element. Adjust Visual Indicator drum to bring the magnet slightly closer to the sensing unit and try again.

4. Setpoints are retained even after power is removed.
5. To electrically test the solenoid output, the unit should be connected to an AS-i bus and commanded to turn on.

Note

If using only one of the sensors for valve position feedback, either sensor may be used independently.

Wink feature

The Wink feature provides the capability of setting the closed or open LEDs to flash or wink at a 2 Hz rate. This feature aids in physically locating the unit on the network. It does not change valve state indication in the control system.

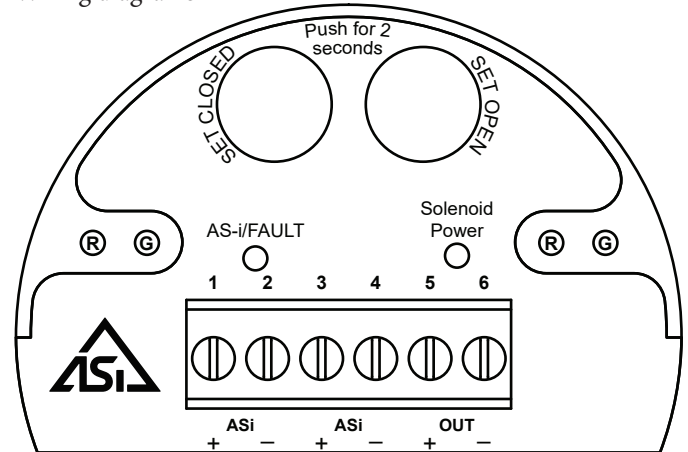
Power/Fault LED status	
AS-i status LED	Fault description
LED off	Device does not have power
Solid green	Normal operation
Flashing red/green	Output shorted
Flashing red/green	No magnet detected
Flashing red/green	Internal sensor fault - sensor may need replacing
Flashing yellow/red	No data exchange (device address = 0)
Solid red	No data exchange

4.2 VALVE COMMUNICATION TERMINALS (VCT)

4.2.2 VCT WITH AS-INTERFACE COMMUNICATION AND EXTENDED ADDRESSING (97S & 97W)

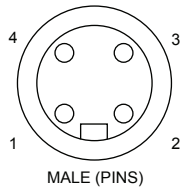
Specifications	
Communication protocol	AS-Interface v3.0
Configuration	(2) Discrete inputs (sensors) (1) Discrete output (solenoid)
Input voltage	26.5-31.6 VDC (AS-I voltage)
Output voltage	24 VDC (+/- 10%)
Quiescent current	32 mA
Maximum output current	85 mA
Maximum output power	2 watts
Output overcurrent protection	100 mA
Default address	0A
Maximum devices per network	62
ID/IO codes	ID = A; IO = 7; ID1 = F; ID2 = E (S-7.A.E.)
Bit assignment	
Inputs	Outputs
Bit 0 = Valve closed	Bit 0 = output (OUT +/-)
Bit 1 = Valve open	Bit 1 = not used
Bit 2 = not used	Bit 2 = wireless link unlocked <small>[97W only]</small>
Bit 3 = not used	Bit 3 = not available
	Parameters
	Bit 0 = wink
	Bit 1-3 = not used

Wiring diagrams



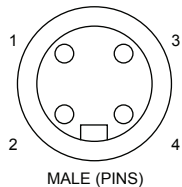
Common receptacle options pin-out

4-PIN MICRO CONNECTOR (M12)

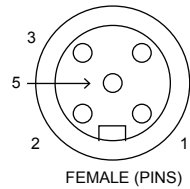


Pin	Signal
1	ASi +
2	not used
3	ASi -
4	not used

4-PIN MINI CONNECTOR

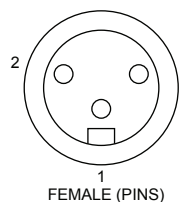


5-PIN MICRO CONNECTOR (M12)



Pin	Signal
1	NOT USED
2	NOT USED
3	OUT -
4	OUT +
5	NOT USED

3-PIN MINI CONNECTOR



Pin	Signal
1	NOT USED
2	OUT -
3	OUT +

Note

Consult factory for additional quick connector options.

4.2.2 VCT WITH AS-INTERFACE COMMUNICATION AND EXTENDED ADDRESSING (97S & 97W) CONTINUED

Bench test procedure and sensor setting instructions

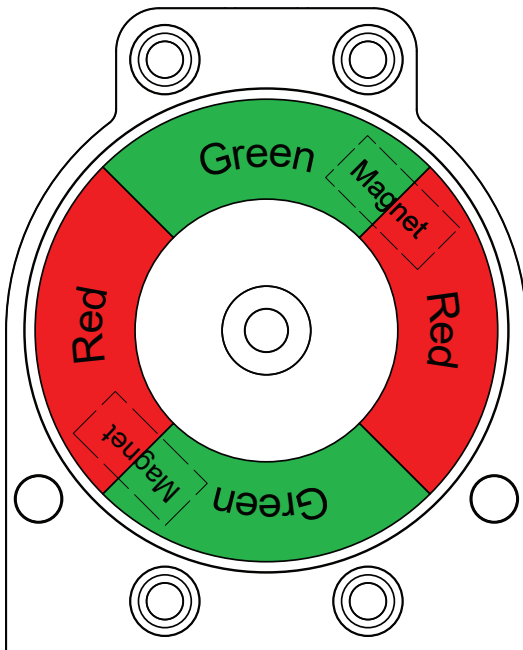
WARNING

DO NOT APPLY EXTERNAL POWER TO THE OUTPUT TERMINALS. THIS WILL CAUSE PERMANENT DAMAGE TO THE UNIT.



Caution: Performing this procedure will cause the sensor inputs to change state. Performing this procedure is not recommended during a live process.

- To test sensors, it is best to connect to an AS-i bus using an AS-i power supply so that communication can also be tested. However, if a network is not available, to set the open and closed set points, use a 24 VDC power supply. Connect 24 VDC+ to AS-i+ and 24 VDC- to AS-i -.
- Attach indicator such that the closed quadrants will face out when in the closed position. This figure shows a Red Closed visual indicator in the closed position.



Save set-points:

- Operate actuator to the closed position.
- Press and hold SET CLOSED button until closed LED is lit (2 seconds). Release button.
- Operate actuator to the open position.
- Press and hold SET OPEN button until the open LED is lit (2 seconds). Release button.

NOTE: If red or green LEDs flash when trying to set the set-point, the magnet is too far away from the sensing element. Adjust Visual Indicator drum to bring the magnet slightly closer to the sensing unit and try again.

- Setpoints are retained even after power is removed.
- To electrically test the solenoid output, the unit should be connected to an AS-i bus and commanded to turn on. Optionally, the solenoid can be energized via the Stonel wireless link app if the device is configured with wireless capability and is unlocked.

Note

If using only one of the sensors for valve position feedback, either sensor may be used independently.

Wink feature

The Wink feature provides the capability of setting the closed or open LEDs to flash or wink at a 2 Hz rate. This feature aids in physically locating the unit on the network. It does not change valve state indication in the control system.

Specifications for Wireless Link

Communication	Bluetooth® technology; single mode (not compatible with Bluetooth® Classic)
Frequency band	2.402-2.480 Ghz
Transmit power	4dBm or ~2.5 milliwatts
Data rate	1 Mbit/second; effective information transmit rate ~10 Kbits/second
Range	Up to 100 meters (330 feet) in free space. Range is reduced by obstructions between handheld device and Wireless Link VCT. Line of site is not necessary.
Registrations	FCC, IC, CE
CE compliance	Exceeds industrial compliance standards
VCT identification	VCTs in range will be displayed in order of signal strength
VCT link	One device accessed at a time between client (handheld device) and server (VCT). Each server accessed by one client at a time
Application	Stonel Wireless Link available from the App store
Hand-helds	Compatible with iPhone® and iPad®

Power/Fault LED status

AS-i status LED	Fault description
LED off	Device does not have power
Solid green	Normal operation
Flashing red/green	Output shorted
Flashing red/green	No magnet detected
Flashing red/green	Internal sensor fault - sensor may need replacing
Flashing yellow/red	No data exchange (device address = 0)
Solid red	No data exchange

5. STONEL WIRELESS LINK APP

5.1 FEDERAL COMMUNICATION COMMISSION (FCC)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.



Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

EC 30W/EC 97W: CONTAINS FCC ID: SQGBL651

FCC Radiation Exposure Statement

The product complies with the US portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

5.2 ISED CANADA (IC) STATEMENT

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

1. This device may not cause interference; and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage;
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

EC 30W/EC 97W: CONTAINS IC: 3147A-BL651

Radiation Exposure Statement

The product complies with the Canada portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

Déclaration d'exposition aux radiations

Le produit est conforme aux limites d'exposition pour les appareils portables RF pour les Etats-Unis et le Canada établies pour un environnement non contrôlé. Le produit est sûr pour un fonctionnement tel que décrit dans ce manuel. La réduction aux expositions RF peut être augmentée si l'appareil peut être conserve aussi loin que possible du corps de l'utilisateur ou que le dispositif est réglé sur la puissance de sortie la plus faible si une telle fonction est disponible.

5.3 USER GUIDE

The User guide is available

1. By selecting the Menu option in the app
2. At <https://www.valmet.com/flowcontrol/stonel-wireless-link-user-guide> and
3. By scanning this QR code



6. MODEL/TYPE CODE

Model selector					
SERIES					
EC	Nonincendive or intrinsically safe				
FUNCTIONS					
Sensor/switching modules with IO-Link					
30S	(2) 24 VDC NO solid state sensors [self-learning outputs for NPN/ PNP/Sinking/Sourcing PLC input cards] and (1) 24 VDC output for external solenoid [self-learning control input for NPN/ PNP/Sinking/Sourcing PLC output cards]				
30W	(2) 24 VDC NO solid state sensors [self-learning outputs for NPN/ PNP/Sinking/Sourcing PLC input cards] and (1) 24 VDC output for external solenoid [self-learning control input for NPN/ PNP/Sinking/Sourcing PLC output cards] with Wireless Link				
Sensor/switching modules					
34S	(2) SST NC sensors				
35S	(2) SST NO sensors				
Intrinsically safe module					
45S	(2) NAMUR sensors (EN 60947-5-6; I.S.)				
Valve Communication Terminals (VCT)					
96S	AS-Interface				
97S	AS-Interface with extended addressing				
97W	AS-Interface with extended addressing and Wireless Link				
ENCLOSURE					
C	North American (NEC/CEC)				
D	International (IEC)				
H	Brazilian				
L	Russian				
Conduit/connectors <i>[consult factory for additional quick connector options]</i>					
02	(2) 1/2" NPT conduit entry				
05	(2) M20 conduit entry				
10	(1) 4-pin mini male				
11	(1) 5-pin mini male				
12	(1) 5-pin mini male and (1) 3-pin mini female				
13	(1) 4-pin M12 micro male				
14	(1) 4-pin M12 micro male and (1) 5-pin M12 micro female				
15	(1) 5-pin M12 micro male				
16	(1) 5-pin M12 micro male and (1) 5-pin M12 micro female				
30	(1) 4-pin mini male and (1) 3-pin mini female				
33	(1) 6-pin mini male and (1) 3-pin mini female				
37	(1) 6-pin M12 male and (1) 5-pin M12 female				
VISUAL INDICATOR					
GA	Green closed/Red open				
RA	Red closed/green open				
1A	T-1 three-way (90° rotation)				
2A	T-2 three-way (90° rotation)				
XA	Special				
Model number example					
EC	35S C 02 RA - Optional				
<table border="1"> <thead> <tr> <th>Model number</th> <th>Partnership id</th> </tr> </thead> <tbody> <tr> <td>EC 35S C 02 RA</td> <td>-</td> </tr> </tbody> </table>		Model number	Partnership id	EC 35S C 02 RA	-
Model number	Partnership id				
EC 35S C 02 RA	-				
Mounting hardware required and sold separately. Some models may include 5-digit identification suffix.					

7. REGULATORY, SPECIFIC CONDITIONS OF USE, AND PRODUCT MARKING

DECLARATION OF CONFORMITY

8. APPENDIX

8.1 CONTROLLED INSTALLATION DRAWINGS

EC45S

HAZARDOUS (CLASSIFIED) LOCATION

Stonel Enclosure

NON-HAZARDOUS (SAFE AREA) LOCATION

INSTALLATION NOTES:
(US - Class I, II, III, Division 1 & 2, Groups A, B, C, D, E, F, G T5;
Class I / Zone 0 / AEx ia IIC T5 Ga)
(Canada - Class I, II, III, Division 1 & 2, Groups A, B, C, D, E, F, G T5;
Class I / Zone 0 / Ex ia IIC T5 Ga)

Entity Parameters:
Sensors: $U_i = 22 \text{ VDC}$; $I_i = 120 \text{ mA}$; $P_i = 0.4 \text{ W}$; $C_i = 3 \text{ nF}$; $L_i = 0 \text{ mH}$
Solenoid Junction Terminals: $U_j = 28 \text{ VDC}$; $I_j = 120 \text{ mA}$; $C_j_{\text{junction}} = 0$; $L_j_{\text{junction}} = 0$
* Solenoid installation shall meet: $C_a \geq C_{L_{\text{solenoid}}} + C_{j_{\text{junction}}} + C_{\text{cable}}$; $L_a \geq L_{L_{\text{solenoid}}} + L_{j_{\text{junction}}} + L_{\text{cable}}$;

Entity Parameters:
Sensors: $U_i = 22 \text{ VDC}$; $I_i = 120 \text{ mA}$; $P_i = 0.4 \text{ W}$; $C_i = 3 \text{ nF}$; $L_i = 0 \text{ H}$
Solenoid Junction Terminals: $U_j = 28 \text{ VDC}$; $I_j = 120 \text{ mA}$; $C_j_{\text{junction}} = 0$; $L_j_{\text{junction}} = 0$
* Solenoid installation shall meet: $C_a \geq C_{L_{\text{solenoid}}} + C_{j_{\text{junction}}} + C_{\text{cable}}$; $L_a \geq L_{L_{\text{solenoid}}} + L_{j_{\text{junction}}} + L_{\text{cable}}$;

- The Associated Apparatus and I.S. solenoid must be FM Approved.
- The Entity Concept allows interconnection of intrinsically safe apparatus with associated apparatus when the following is true: V_{oc} , V_t or $U_o < U_j$; I_{sc} , I_t or $I_o < I_j$; $C_a > C_j + C_{\text{cable}}$; $L_a > L_j + L_{\text{cable}}$.
- Dust-tight conduit seal must be used when installed in Class II and Class III environments.
- Control equipment connected to barrier must not use or generate more than 250 Vrms or VDC.
- Installation should be in accordance with ANS/ISA RPA12.06.01 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electrical Code (ANSI/NFPA 70) or in accordance with the Canadian Electric Code.
- Associated apparatus manufacturer's installation drawing must be followed when installing this equipment.
- To maintain intrinsic safety, wiring associated with each sensor or solenoid coil wiring must be run in separate cables or separate shields connected to intrinsically safe (associated apparatus) ground.
- Conduit Grounding - Upon installation verify electrical continuity between conduit and ground terminal.
- Resistance between Intrinsic Safe Ground and earth ground must be less than one ohm.

Specific Conditions of Use:
1. The enclosure is constructed from plastic. To prevent the risk of electrostatic sparking the plastic surface should only be cleaned with a damp cloth.
2. For Division 2 installation the Turck minifast® and eurofast® male receptacles shall be mated with a Turck minifast and eurofast female cordset and the use of tool secured Turck lokfast® guard is required.

Specific Conditions of Use:
1. The enclosure is constructed from plastic. To prevent the risk of electrostatic sparking the plastic surface should only be cleaned with a damp cloth.

INSTALLATION NOTES (Ex ia IIC T6...T5 Ga):

Entity Parameters:
Sensors: $U_i = 22 \text{ VDC}$; $I_i = 120 \text{ mA}$; $P_i = 0.4 \text{ W}$; $C_i = 3 \text{ nF}$; $L_i = 0 \text{ mH}$
Solenoid Junction Terminals: $U_j = 28 \text{ VDC}$; $I_j = 120 \text{ mA}$; $C_j_{\text{junction}} = 0$; $L_j_{\text{junction}} = 0$
* Solenoid installation shall meet: $C_a \geq C_{L_{\text{solenoid}}} + C_{j_{\text{junction}}} + C_{\text{cable}}$; $L_a \geq L_{L_{\text{solenoid}}} + L_{j_{\text{junction}}} + L_{\text{cable}}$;

- V_{oc} , V_t or $U_o < U_j$; I_{sc} , I_t or $I_o < I_j$; $C_a > C_j + C_{\text{cable}}$; $L_a > L_j + L_{\text{cable}}$.
- Dust-tight conduit seal must be used when installed in Zone 20, Zone 21, and Zone 22 environments or where Ingress Protection of IP67 is required.
- Control equipment connected to barrier must not use or generate more than 250 Vrms or VDC.
- Installation should be in accordance with appropriate local code or practice.
- The configuration of associated apparatus for each sensor wiring pair or solenoid wiring pair must be approved.
- Associated apparatus manufacturer's installation drawing must be followed when installing this equipment.
- To maintain intrinsic safety, wiring associated with each sensor or solenoid coil wiring must be run in separate cables or separate shields connected to intrinsically safe (associated apparatus) ground.
- Conduit Grounding - Upon installation verify electrical continuity between conduit and ground terminal.
- Resistance between Intrinsic Safe Ground and earth ground must be less than one ohm.

Specific Conditions of Use:
1. The enclosure is constructed from plastic. To prevent the risk of electrostatic sparking the plastic surface should only be cleaned with a damp cloth.

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