



Installation, Operation, and Maintenance Manual

Integrated Sensing Platform (ISP)



WILLIAMS
WC
CARVER CO.

 **ITT**

Table of Contents

1	Introduction and Safety	2
1.1	Safety message levels	2
1.2	User health and safety	2
2	Transportation and Storage.....	5
2.1	Handling and unpacking guidelines.....	5
2.2	Storage, disposal, and return requirements	5
3	Product Description	6
3.1	General Description.....	6
3.2	ISP with AS-i Communication Specifications	7
3.3	ISP with IO-Link, 3-Wire Discrete Specifications.....	9
3.4	ISP with 2-wire Discrete Specifications	12
3.5	ISP with DeviceNet® Communication Specifications.....	13
3.6	ISP With Pneumatics Specifications	16
4	Installation.....	18
4.1	Install the ISP	18
4.2	Install ISP on the Valve Actuator	19
4.3	Piping	19
4.4	Cordsets	20
4.5	ISP-3W Wiring considerations – Applicable to IO-Link / 3-Wire Output Only.....	20
5	Operation.....	22
5.1	Operation of ISP with AS-i Communication	22
5.1.1	Bench test procedure and sensor setting instructions	22
5.1.2	Local Solenoid Override feature.....	23
5.1.3	AS-Interface Wink feature	23
5.2	Operation of ISP with 3-Wire Discrete Operation.....	23
5.2.1	Bench test procedure and sensor setting instructions	24
5.2.2	Local Solenoid Override Feature	25
5.2.3	Output fail-safes	25
5.3	Operation of ISP with 2-Wire Discrete Operation.....	26
5.3.1	Bench test procedure and sensor setting instructions	27
5.4	Operation of ISP with DeviceNet® Communication	27
5.4.1	Bench test procedure and sensor setting instructions	27
5.5	Compliance Statements for ISP with AS-i Communication	29
5.6	Compliance Statements for ISP with IO-Link, 3-Wire Discrete	31
5.7	Compliance Statements for ISP with 2-Wire Discrete	33
5.8	Compliance Statements for ISP with DeviceNet® Communication	34
6	Maintenance.....	37
6.1	ISP Maintenance	37
7	Parts Listing and Cross-Sectional Drawings	38
7.1	Parts Listings and Cross-Sectional Drawings	38

1 Introduction and Safety

1.1 Safety message levels

Definitions

Safety message level	Indication
DANGER: 	A hazardous situation which, if not avoided, will result in death or serious injury
WARNING: 	A hazardous situation which, if not avoided, could result in death or serious injury
CAUTION: 	A hazardous situation which, if not avoided, could result in minor or moderate injury
ELECTRICAL HAZARD: 	The possibility of electrical risks if instructions are not followed in a proper manner
NOTICE:	<ul style="list-style-type: none"> • A potential situation which, if not avoided, could result in an undesirable result or state • A practice not related to personal injury

1.2 User health and safety

General precautions

This product is designed and manufactured using good workmanship and materials, and meets all applicable industry standards. This product should be used only as recommended by an ITT engineer..



WARNING:

- Misapplication of the valve can result in injury or property damage. Select valves and valve components of the proper materials and make sure that they are consistent with your specific performance requirements. Incorrect application of this product includes but is not limited to:
 - Exceeding the pressure or temperature rating
 - Failing to maintain this product according to the recommendations
 - Using this product to contain or control media that is incompatible with the materials of construction
 - Proper containment or protection from hazardous media must be provided by the end user to protect employees and the environment from valve discharge.

Qualifications and training

The personnel responsible for the assembly, operation, inspection, and maintenance of the valve must be appropriately qualified. The operating company must do the following tasks:

- Define the responsibilities and competency of all personnel handling this equipment.
- Provide instruction and training.
- Ensure that the contents of the operating instructions have been fully understood by the personnel.

Instruction and training can be carried out by either ITT or the reseller of the valve by order of the operating company.



WARNING:

California Proposition 65 Cancer and Reproductive Harm <http://www.P65Warnings.ca.gov>.

Plastics in product contain Bisphenol A (BPA) and Glass Wool Fibers, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

Non-compliance risks

Failure to comply with all safety precautions can result in the following conditions:

- Death or serious injury due to electrical, mechanical, and chemical influences
- Environmental damage due to the leakage of dangerous materials
- Product damage
- Property damage
- Loss of all claims for damages

Operational safety precautions

Be aware of these safety precautions when operating this product:

- Do not leave hot or cold components of the product unsecured against contact if they are a source of danger.
- Do not remove the contact guard for moving parts when the product is in operation. Never operate the product without the contact guard installed.
- Do not hang items from the product. Any accessories must be firmly or permanently attached.
- Do not use the product as a step or hand hold.
- Do not paint over the identification tag, warnings, notices, or other identification marks associated with the product.



ELECTRICAL HAZARD:

ISP is designed for nominal 24 VDC or 30.5 VDC power only. See specifications for maximum voltage allowable. Do not apply AC power or excess DC voltage.



CAUTION:

Pinch hazard – Use care with hand tools to avoid injury.



CAUTION:

Pinch hazard – When installing and removing the ISP, ensure that actuator control is locked out so it cannot reposition.



CAUTION:

Pressurized air – Do not exceed pressure ratings. See specifications for maximum air pressure. ISP vents air pressure to atmosphere. Avoid approaching the vent port when ISP is operating.

Maintenance safety precautions

Be aware of these safety precautions when performing maintenance on this product:

- You must decontaminate the product if it has been exposed to harmful substances such as caustic chemicals.

Use of unauthorized parts

Reconstruction or modification of the product is only permissible after consultation with ITT. Genuine spare parts and accessories authorized by ITT serve to maintain safety. Use of non-genuine ITT parts can annul liability of the manufacturer for the consequences. ITT parts are not to be used in conjunction with products not supplied by ITT as this improper use can annul all liability for the consequences.

Unacceptable modes of operation

The operational reliability of this product is only guaranteed when it is used as designated. The operating limits given on the identification tag and in the data sheet may not be exceeded under any circumstances. If the identification tag is missing or worn, contact for specific instructions.

NOTICE:

ISP employs a magnet to indicate valve position. Other than the calibration/solenoid dongle, avoid placing magnets on or around the ISP. Such magnets may erroneously modify the position indication.

Use in hazardous areas



WARNING:

Explosion Hazard. Do not connect or disconnect when energized or unless the area is free of ignitable concentrations.

Specific Conditions of Use:

1. For indoor use only.
2. The enclosure is constructed of plastic which must be shielded from sources of sunlight or UV light.
3. The connector must be tool secured by use of a Turck lokfast® guard to ensure the connector cannot be inadvertently disconnected which could cause sparking at the contacts.
4. Because the ISP 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 ISP.

2 Transportation and Storage

2.1 Handling and unpacking guidelines



CAUTION:

Always observe the applicable standards and regulations regarding the prevention of accidents when handling the product.

Handling guidelines

Follow these guidelines when handling the product to prevent damage:

- Use care when handling the product.
- Leave protective caps and covers on the product until installation.

Unpacking guidelines

Follow these guidelines when unpacking the product:

1. Inspect the package for damaged or missing items upon delivery.
2. Note any damaged or missing items on the receipt and freight bill.
3. Do not lift or pull on the electrical conduit lines. Doing so may cause the POC switches to come out of calibration.

2.2 Storage, disposal, and return requirements

Storage

If you are not immediately installing the product after delivery, store it as follows:

- Store the product in a dry room that maintains a constant temperature.
- Make sure that the products are not stacked on top of one another.

Disposal

Dispose of this product and associated components in compliance with federal, state, and local regulations.

Return

Ensure these requirements are met before you return a product to :

- Contact for specific instructions on how to return the product.
- Clean the valve of all hazardous material.
- Complete a Material Safety Data Sheet or Process Data Sheet for any process fluid that could remain on the valve.
- Obtain a Return Material Authorization from the factory.

3 Product Description

3.1 General Description

The ISP is a compact and robust monitoring and control device for ITT PureFlo and EnviZion valve actuators. The device senses the position of a magnet mounted to the actuator's indicating spindle. The sensor output is calibrated to the valve open and closed positions. Local position indication is provided by several LEDs. As an option, an internal 3-way solenoid valve is provided as a pilot valve to control the valve actuator.

Calibration is automatic or semi-automatic, depending on the model. There is no need to adjust mechanical targets or linkages.

The default local indication colors are red for valve-closed and green for valve-open. The colors can be reversed by the user - see detailed instructions within.

The ISP operates on 24 VDC or 30.5 VDC nominal voltage. The only available electrical connection is to the M12 quick-connect.

There is no user access to the interior of the housing. The ISP is filled with a sealing compound to protect against the intrusion of water and other contaminants.

As a convenience, a companion iOS app is available from the Apple Store. Depending on the ISP model selected, the app may be used to calibrate and operate the ISP, including an internal solenoid valve. The app also permits access to Diagnostic data recorded on the ISP.

ISP Options

ISP - 1 - 2 - 3 - 4 - 5 - 6		
	Code	Option
1. Output	AI	ASi
	2W	2 Wire
	3W	3 Wire with IO-Link
	DN	DeviceNet
2. Solenoid	-	None
	SV	Included
3. Cover Size	-	0.25" - 2"
	LS	2.5" - 4"
4. Diagnostics	-	None
	BL	With Diagnostics
	BT	With Diagnostics and Control
5. Application	-	General Purpose
	HZ	Hazardous Location
6. Special	-	None
Configuration	-xxxxx	Consult Factory *3-5 digit alphanumeric-ID

Model codes are shown to the left. Here are some examples of how model numbers are constructed:

- 3 Wire, no solenoid, 0.25"-2" cover size, no diagnostics: ISP-3W-HZ
- 3 wire, with solenoid, 0.25"-2" cover size, with diagnostics: ISP-3W-SV-BL-HZ
- ASi, no solenoid, 2.5"-4" cover size, no diagnostics: ISP-AI-LS-HZ
- ASi, with solenoid, 0.25"-2" cover size, with diagnostics and control: ISP-AI-SV-BT-HZ

3.2 ISP with AS-i Communication Specifications

ITT ISP, AS-Interface with extended addressing

Communication Protocol	AS-Interface v3.0*1
Configuration	(2) Discrete Inputs (0 or 1) Integral Solenoid(s)
Input Mapping	Bit 0: Closed Position Bit 1: Open Position
Input Mapping	Bit 2: Solenoid Local Override is Active Bit 3: Unused
Output Mapping	Bit 0: Solenoid 1 Bit 1: Unused Bit 2: BLE Overrides Enabled Bit 3: Unavailable
Parameter Mapping	Bit 0: Wink Bits 1-3: Unused
Profile Code	4 In/3 Out, ID = A; IO = 7; ID1 = F; ID2 = E (S.7.A.E)
Default Address	0A

*1 The ISP is backward compatible with previous versions of ASi. Consult factory for more details.

Sensor Specifications

Sensor Specifications	Notes	Minimum	Typical	Maximum	Units
Operation	Normally open				
Supply Voltage Range	Use ASi Power Supply	26.5	30.55	31.6	V
Operating Current	1 LED Color ON, Solenoid OFF, Over Voltage Range 1 LED Color ON, Solenoid ON, Over Voltage Range	23	65		mA
Full Range Accuracy		-0.5		+0.5	mm
"Make" deadband	From Closed Set Point From Open Set Point	25	40		% Full Stroke
Hysteresis	From "Make" Point	5			%Full Stroke
Connector		4 Pin Micro (M12)			
	<u>4 Pin M12 Male A-coded</u>				
	Pin 1: ASi +				
	Pin 2: not used				
	Pin 3: ASi -				
	Pin 4: not used				

Sensor Specifications	Notes	Minimum	Typical	Maximum	Units
ASi Slave Impedance	Better than Extended Address Slave Requirements				
Short circuit	Solenoid Coil is Short Circuit Protected		Continuous	Minutes	
Pneumatic ratings	See Solenoid Valve specification sheet.				
Manual Solenoid Override	<p><u>On all -SV models:</u> Local Latching Solenoid Override. See Local Solenoid Override feature below.</p> <p><u>On models with -SV and -BT:</u> Temporary Solenoid Overrides via the ISP app. Overrides are automatically de-activated when disconnecting from the unit.</p>				

Environmental Specifications

Environmental Specifications	Minimum	Typical	Maximum	Units
Operating temperature	-10	50	°C	
Ingress Protection Degree		IP65/IP67		
Pollution Degree		4		
Location		Indoor		
Altitude		5000	m	
Humidity		90	%	

AS-i/FAULT LED State

AS-i/FAULT LED State:	Possible Cause:	Recommended Action:
LED Off	1) Slave does not have power.	1) Supply power
LED solid green	1) Data communication is established	
	<u>Peripheral Fault:</u>	
	1) The solenoid coil is shorted.	1) Toggle Solenoid bit, if fault still present, replace module.
LED flashing green/red	2) A magnet was not detected.	2) Ensure magnet is properly installed.
	3) Magnetic sensor's internal bond wire is broken.	3) Power cycle module, if fault is still present, replace module.
	<u>No Data Exchange:</u>	
LED solid red	1) The slave is waiting for a <i>Write_Parameter</i> request.	1) Add module to scan list of master.
	2) Slave has detected a No Data Exchange status	2) Verify master is operating correctly.
LED flashing red/yellow	1) No data exchange, and slave's address is set to 0.	1) Assign new address and add to scan list of master.

Bluetooth Specifications

Bluetooth Specifications (Units with model -BT or -BL)	
Communication	Bluetooth 5 Low Energy technology (not compatible with Bluetooth Classic)
Frequency band*	2.402 - 2.480 GHz
Transmit power*	+4 dBm
Data rate	1 Mbps; effective information transmit rate ~10 Kbps
Range	Theoretically up to 100 meters (330 feet) in free space. Range is reduced by obstructions. Line of sight is not necessary.
Application	ISP app available from the App store

Bluetooth Specifications (Units with model -BT or -BL)	
Hand-held	Compatible with iPhone® and iPad® with iOS 9 or later

Optional Diagnostic Features

Optional Diagnostic Feature Description	-BT Supported?	-BL Supported?
Allows Overriding the Solenoid via BLE (Only functions with Integral Solenoid)	Yes	No
Allows Calibrating/Teaching the valve via BLE	Yes	No
Stroke Times (Only functions with Integral Solenoid)	Yes	Yes
Valve Position graph	Yes	Yes
Lifetime Cycle Count (non-resettable)	Yes	Yes
Valve Position graph	Yes	Yes
Auxiliary 4-20mA Input	No	No
Auxiliary Discrete Inputs	No	No
Unlocking the Device: Power the unit with a standard 24VDC power supply, Place the ASi's power supply jumper into "IR addressing" mode, or enable the BLE Overrides bit via the ASi bus.		

3.3 ISP with IO-Link, 3-Wire Discrete Specifications

ITT Integrated Sensing Platform (ISP) 3-Wire with IO-Link

Configuration	(2) Discrete N.O. Push-Pull Input. Self-learning outputs for NPN/PNP/Sinking/Sourcing PLC input cards.
	(0 or 1) Integral Solenoid (Control Signal Input DO ^{1, 3}). Self-learning control input for NPN/PNP/Sinking/Sourcing PLC output cards.
Input Mapping	Pin 2: Open Signal (DI) ^{Note 1} Pin 4: Closed Signal (DI) ^{Note 1} , (C/Q) ^{Note 2}
Output Mapping	Pin 5: Solenoid Signal (DO) ^{Notes 1, 3}

NOTICE:

1. Note: "DI" and "DO" are defined as being from the perspective of the PLC/DCS.
2. Note: IO-Link communication (C/Q) is on the Closed DI signal.
3. Note: Due to the Self-learning DO signal, each DO signal must be wired to a dedicated PLC Output Card point (they cannot be wired together (aka parallel) with other ISP DO signals).

Sensor Specifications

Sensor Specs:	Notes	Minimum	Typical	Maximum	Units
Operation	Normally open (solid state)				
Supply Voltage range		18	24	30	V
Operating Current	Supply = 24V, 1 LED Color ON, Solenoid OFF Supply = 24V, 1 LED Color ON, Solenoid ON		20		mA
Operating Supply power	Supply = 18-30V, 1 LED Color ON, Solenoid OFF		65	0.7	W

Sensor Specs:	Notes	Minimum	Typical	Maximum	Units
	Supply = 18-30V, 1 LED Color ON, Solenoid ON			1.8	
Full Range Accuracy		-0.5		+0.5	mm
"Make" deadband	From Closed Set Point		25		% Full
	From Open Set Point		40		Stroke
Hysteresis	From "Make" Point		5		% Full
					Stroke
	<u>5 Pin M12 Male A-coded</u>			5-Pin Micro Connector (M12)	
Connector	Pin 1: 24V+ (L+)				
	Pin 2: Open Signal				
	Pin 3: 0V (L-)				
	Pin 4: Closed Signal (C/Q)				
	Pin 5: Solenoid Signal (DO)				

Discrete Inputs

Discrete Inputs: Notes	Minimum	Typical	Maximum	Units
On state current	2.0		100	mA
Leakage current		0.00		mA
Voltage drop	10mA DC operation		0.05	0.1
	100mA DC operation		0.30	0.5
"No Load" Protection	Yes, Protected from direct application of 30 VDC all pins			Continuous Minutes
PLC card compatibility	Patented self-learning outputs (inputs to PLC) configure themselves to the card used, whether it be PNP/NPN/Sinking/Sourcing, as long as the Minimum On state current rating is met.			

Discrete Output / Solenoid

Discrete Output / Sole-noid:	Notes	Minimum	Typical	Maximum	Units
Output Card Max Off state leakage	Sinking (NPN) output cards Sourcing (PNP) output cards			1.0 2.0	mA
Solenoid Signal Input Impedance			3.4		kΩ
Short circuit	Solenoid Coil is Short Circuit Protected			Continuous	Minutes
Pneumatic ratings	See Solenoid Valve specification sheet.				
Manual Solenoid Override	<u>On all -SV models:</u> Local Latching Solenoid Override. See Local Solenoid Override feature below. <u>On models with -SV and -BT:</u> Temporary Solenoid Overrides via Bluetooth. Overrides are automatically de-activated when disconnecting from the unit.				
PLC card compatibility	Patented self-learning input (output from PLC) configures itself to the card used, whether it be PNP/NPN/Sinking/Sourcing/Push-pull ³ , as long as the Maximum Off State current rating is met.				

Environmental Specifications

Environmental Specifications	Minimum	Typical	Maximum	Units
Operating temperature	-10		50	°C
Ingress Protection			IP65/IP67	
Pollution Degree			4	
Location			Indoor	
Altitude			5000	m
Humidity			90	%

IO-Link Process Data Mapping

IO-Link Process Data Mapping		
Bit #	Input (2 bytes)	Output (1 byte)
0	Closed	Solenoid
1	Open	Reserved
2	Reserved	Wink
3	Reserved	Reserved
4	Cycle Count Over Limit	Reserved
5	Maximum Device Temperature Exceeded	Reserved
6	Minimum Device Temperature Exceeded	Wireless Link Radio Disabled
7	Other Alarm Active (i.e. Magnet Missing or Shorted Solenoid)	Wireless Link Unlocked
8	Open-to-Closed Stroke Time Over Limit	
9	Open-to-Closed Stroke Time Under Limit	
10	Valve Position Beyond Closed Limit	
11	Valve Failed to Reach Closed Position	
12	Closed-to-Open Stroke Time Over Limit	
13	Closed-to-Open Stroke Time Under Limit	
14	Valve Position Beyond Open Limit	
15	Valve Failed to Reach Open Position	

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

Bluetooth Specifications (Units with model -BT or -BL)**

Communication	Bluetooth 5 Low Energy technology (not compatible with Bluetooth® Classic)
Frequency band*	2.402 - 2.480 GHz
Transmit power*	+4 dBm
Data rate	1 Mbps; effective information transmit rate ~10 Kbps
Range	Theoretically up to 100 meters (330 feet) in free space. Range is reduced by obstructions. Line of sight is not necessary.
Application	ITT ISP available from the App store
Hand-holds	Compatible with iPhone® and iPad®

Optional Bluetooth Features

Optional Bluetooth Feature Description	-BT Supported? (On Full Bluetooth enabled units)	-BL Supported? (On Partial Function Bluetooth enabled units)
Allows Overriding the Solenoid via BLE (Only functions with Integral Solenoid)	Yes	No
Allows Calibrating/Teaching the valve via BLE	Yes	No
Advanced Configuration	Yes	Yes
Stroke Times (Only functions with Integral Solenoid)	Yes	Yes
Valve Position graph	Yes	Yes
Lifetime Cycle Count (non-resettable)	Yes	Yes
Valve Position graph	Yes	Yes
Auxiliary 4-20mA Input	No	No
Auxiliary Discrete Inputs	No	No
Unlocking the Device: By default, in SIO mode, 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 cannot be unlocked until unwired and power cycled. In IO-Link mode, enable the Wireless Link Unlocked bit. The default setting may be modified by end user via the Fail-safe features.		

3.4 ISP with 2-wire Discrete Specifications

Configuration	(2) Two wire solid state switches (sensor powered by "closed" switch)				
(0 or 1) Integral solenoid connector with LED					
All values are at 25°C unless otherwise specified.					
Sensor Specifications:	Notes	Minimum	Typical	Maximum	Units
Operation	Normally open (solid state)				
Supply Voltage Range		8	24	30	V
Full Range Accuracy		-0.5	+0.5	mm	
"Make" Deadband	From Closed Set Point	25	% Full		
	From Open Set Point	40		Stroke	
Hysteresis	From "Make" Point	5	% Full		Stroke
Connector	5 Pin M12 Male A-coded	5-Pin micro connector M12			
Connector	Pin 1: Open/Closed Common	 Male pins			
	Pin 2: Closed NO				
	Pin 3: Open NO				
	Pin 4: Solenoid Power 1				
	Pin 5: Solenoid Power 2				
Discrete Inputs:	Notes	Minimum	Typical	Maximum	Units
On state current		2.0	100	mA	

Leakage current	Short Stroke	260	270	340	µA
	Tall Stroke	370	380	420	
Voltage drop	10mA DC operation		6.4	6.52	V
	100mA DC operation		6.9	7	
"No Load" Protection	Protected from direct application of 30 VDC all pins			Continuous	Minutes
Solenoid Specs:	Notes	Minimum	Typical	Maximum	Units
Input Voltage Range	± 10%	21.6	24	26.4	V
Solenoid Power		1			W
Pneumatic Ratings	See Solenoid Valve Specification Sheet				
Environmental Specifications		Minimum	Typical	Maximum	Units
Operating temperature		-10		50	°C
Ingress Protection				IP65/IP67	
Pollution Degree			4		
Location				Indoor	
Altitude				5000	m
Humidity				90	%

3.5 ISP with DeviceNet® Communication Specifications

Communication Protocol	DeviceNet®
Configuration	(2) Discrete Inputs (0 or 1) Integral Solenoid(s)
Input Mapping	Byte 0, Bit 0: Closed Position Byte 0, Bit 1: Open Position Byte 0, Bit 2: Solenoid Local Override is Active Byte 0, Bit 3: Unused Byte 0, Bit 4: Unused Byte 0, Bit 7: Fault (Bit 0 equals Bit 1) Byte 1-2: Valve Position [0 (0.00%) - 10,000 (100.00%) scaling; and -32767 = Error]
Output Mapping	Byte 0, Bit 0: Solenoid 1 Byte 0, Bit 1: Unused Byte 0, Bit 2: Wink
Output Mapping	Byte 0, Bit 3: Unused Byte 0, Bit 4: Unused Byte 0, Bit 7: BLE Overrides Enabled
Default Address	63 (software assigned)
Default baud rate	125k (software selectable 125K, 250K or 500K baud)
Messaging	Polling, cyclic and change of state
DeviceNet® type	100

Note: DeviceNet® is a trademark of ODVA, Inc.					
Sensor Specifica- tions:	Notes	Minimum	Typical	Maximum	Units
Operation	Normally open				
Supply Voltage Range	(Use of DeviceNet® power supply recommend- ed)	11	24	25	V
Operating Supply Current	Supply = 24V, 1 LED Color ON, Solenoid OFF Supply = 24V, 1 LED Color ON, Solenoid ON	41	82		mA
Operating Supply- Power	Supply = 11-25V, 1 LED Color ON, Solenoid OFF Supply = 11-25V, 1 LED Color ON, Solenoid ON	1.0 2.0			W
Full Range Accu- racy		-0.5	+0.5		mm
"Make" deadband	From Closed Set Point	25			% Full
	From Open Set Point	40			Stroke
Hysteresis	From "Make" Point	5			% Full Stroke
Connector	5 Pin M12 Male A-coded	5-Pin micro connector M12			
	Pin 1: Shield				
	Pin 2: V +				
	Pin 3: V -				
	Pin 4: CAN H				
	Pin 5: CAN L				
Short circuit	Solenoid Coil is Short Circuit Protected		Continuous	Minutes	
Pneumatic ratings	See Solenoid Valve specification sheet.				
Manual Solenoid Override	On all -SV models: Local Latching Solenoid Override. See Local Solenoid Override feature be- low. On models with -SV and -BT: Temporary Solenoid Overrides via Bluetooth. Overrides are auto- matically de-activated when disconnecting from the unit.				
Environmental Specifications		Minimum	Typical	Maximum	Units
Operating temper- ature		-10	50		°C
Ingress Protection Degree		IP65/IP67			
Pollution Degree		4			
Location		Indoor			
Altitude		5000			
Humidity		90			
Module/Network	Possible Cause:	Recommended Action:			
Status LED State**:					
LED Off	1. Slave does not have power. 2. Slave is alone on the bus.	1. Supply power. 2. Verify master is operating correctly.			
LED solid green	1. Slave is online and allocated to a mas- ter.				

Module/Network Status LED State**:		Possible Cause:	Recommended Action:
LED flashing green	1. Slave is online, but not allocated to a master.	1. Add module to scan list of master.	
LED solid red	<u>Major Fault:</u> <ol style="list-style-type: none"> Slave detected a bus off state - communication stopped. Duplicate MAC address detected - communication stopped. Magnetic sensor's internal bond wire is broken. 	<ol style="list-style-type: none"> Verify good connection on CAN_H and CAN_L. Power cycle or reset slave. Change slave's address, and power cycle or reset slave. Power cycle module. If fault is still present, replace module. 	
LED flashing red	<u>Minor Fault:</u> <ol style="list-style-type: none"> Integral solenoid is shorted. A magnet was not detected in the visual indicator. A "pending" address or baud rate does not match the value currently online. Connection to the master has timed-out. Outputs have transitioned to the Fault State. Communication has failed between the sensor and the DeviceNet® bus IC. BLE displayed address and baud rate may be incorrect. 	<ol style="list-style-type: none"> Power cycle module. If fault is still present, replace module. Ensure magnet is properly installed. Power cycle or reset slave to allow slave to use new address/baud rate. Verify master is operating correctly. Power cycle or reset slave. 	

Bluetooth® Specifications (Units with model -BT or -BL)**	
Communication	Bluetooth® 5 Low Energy technology (not compatible with Bluetooth® Classic)
Frequency band*	2.402 - 2.480 GHz
Transmit power*	+4 dBm
Data rate	1 Mbps; effective information transmit rate ~10 Kbps
Range	Theoretically up to 100 meters (330 feet) in free space. Range is reduced by obstructions. Line of sight is not necessary.
Application	ITT Valve Sensing available from the App store
Hand-holds	Compatible with iPhone® and iPad® with iOS 9 or later

Optional Bluetooth Feature Description	-BT Supported? (On Full Bluetooth enabled units)	-BL Supported? (On Partial Function Bluetooth enabled units)
Allows Overriding the Solenoid via BLE (Only functions with Integral Solenoid)	Yes	No
Allows Calibrating/Teaching the valve via BLE	Yes	No
Stroke Times (Only functions with Integral Solenoid)	Yes	Yes
Valve Position graph	Yes	Yes
Lifetime Cycle Count (non-resettable)	Yes	Yes
Auxiliary 4-20mA Input	No	No
Auxiliary Discrete Inputs	No	No

Optional Bluetooth Feature Description	-BT Supported? (On Full Bluetooth enabled units)	-BL Supported? (On Partial Function Bluetooth enabled units)
Unlocking the Device: Power the unit with a standard 24VDC power supply only, close all active DeviceNet® connections, or enable the BLE Overrides bit via the DeviceNet® bus.		

3.6 ISP With Pneumatics Specifications

Manual override	See Output Protocol Specification Sheet
Configuration	Single pilot 3-way, 2-position, spring return
Flow Rating	0.2 Cv (Kv = 0.17 based on flow m3/hr)
Porting	1/8" NPT (Torque 60in-lb recommended; 120in-lb Max.)
Medium	Air or inert gas
Medium Temp. Range (TS)	-10°C to 50°C 14°F to 122°F
Operating Pressure	1.72 to 8.2 bar 25 psi to 120 psi
Operating Temperature	-10°C to 50°C 14°F to 122°F
Operating Life	1,000,000 cycles
Type	Direct acting
Solenoid	
Operating Voltage	See Sensor Specifications in Section 3.2 - 3.5, as appropriate
Power Consumption	See Sensor Specifications in Section 3.2 - 3.5, as appropriate
Operating Temperature	-10°C to 50°C 14°F to 122°F
Filtration Requirements	40 microns

Valve Schematic

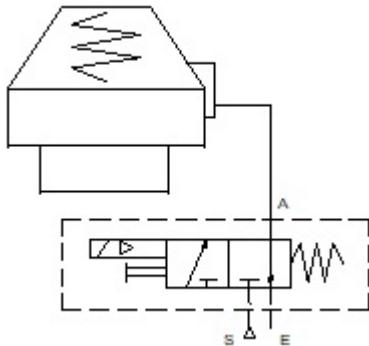


Figure 1: Single Pilot Spring Return Actuator

NOTICE:

- It is recommended to use thread tape etc. on fittings for the (S) and (A) 1/8" NPT ports.
- It is recommended that the exhaust port E be fitted with low restriction mufflers or breather vent caps or elbows etc. to prevent ingestion of water and debris into the pneumatic valve.



WARNING:

Depending on operational and installation factors (air pressure, actuator size, muffler, etc.) the pneumatic exhaust may release a sound pressure level in excess of 100 dBA. It is

recommended that a noise-reducing muffler is fitted to the exhaust and/or protective earpieces are used when in proximity to the device. It is recommended that the sound pressure level is measured after installation to verify the effectiveness of any noise-reducing muffler.

4 Installation

4.1 Install the ISP

Installation details depend on the valve type, size and actuator model. Details are provided in the charts below. See [7.1 Parts Listings and Cross-Sectional Drawings on page 38](#) for details.

Table 1: ISP Mounting Kits for Pure-Flo with Advantage Actuator

Valve Size	Valve Type	Actuator Type		Kit Type
		A Series	B Series	
Bio-Tek	Pure-Flo	A103, A203, A204, A303	B103, B203, B204, B303	T1
0.50	Pure-Flo	A105, A205, A206, A208, A209, A305	B105, B205, B206, B208, B209, B305	T1
0.75	Pure-Flo	A108, A208, A209, A208	B108, B208, B209, B305	T1
1.00	Pure-Flo	A108, A208, A209, A308	B108, B208, B209, B308	T1
1.50	Pure-Flo	A116, A216, A217, A316	B116, B216, B217, B316	T2
2.00	Pure-Flo	A116, A216, A217, A316	B116, B216, B217, B316	T2
2.50 - 4.00	Pure-Flo	A133, A233, A234, A333		T6
2.50 - 4.00	Pure-Flo	A127, A247, A248, A347		T7

Table 2: ISP Mounting Kits for Pure-Flo with ACS Actuator

Valve Size	Valve Type	Actuator Type	Kit Type
Bio Pure	Pure-Flo	ACS1, ACS2, ACS3	N/A
0.50	Pure-Flo	ACS1, ACS2, ACS3	T3
0.75	Pure-Flo	ACS1, ACS2, ACS3	T4
1.00	Pure-Flo	ACS1, ACS2, ACS3	T4
1.50	Pure-Flo	ACS1, ACS2, ACS3	T2
2.00	Pure-Flo	ACS1, ACS2, ACS3	T5

Table 3: ISP Mounting Kits for EnviZion with Advantage Actuator (ZB)

Valve Size	Valve Type	Actuator Type	Kit Type
0.75	EnviZion	ZB1, ZB2, ZB3	T1
1.00	EnviZion	ZB1, ZB2, ZB3	T1
1.50	EnviZion	ZB1, ZB2, ZB3	T2
2.00	EnviZion	ZB1, ZB2, ZB3	T2

Table 4: ISP Mounting Kits for EnviZion with Stainless Steel Actuator (ZA)

Valve Size	Valve Type	Actuator Type	Kit Type
BioviZion	EnviZion	ZA1, ZA2, ZA3	T1
0.50	EnviZion	ZA1, ZA2, ZA3	T1
0.75R	EnviZion	ZA1, ZA2, ZA3	T1

Valve Size	Valve Type	Actuator Type	Kit Type
0.75	EnviZion	ZA1, ZA2, ZA3	T3
1.0	EnviZion	ZA1, ZA2, ZA3	T3
1.50	EnviZion	ZA1, ZA2, ZA3	T2
2.00	EnviZion	ZA1, ZA2, ZA3	T2

Table 5: ISP Mounting Kits for Dia-Flo valves with Advantage Actuators

Valve Size	Valve Type	Actuator Type	Kit Type
0.50	Dia-Flo	A105, A205, A206, A208, A305	T1
0.75	Dia-Flo	A108, A208, A209, A308	T1
1.00	Dia-Flo	A108, A208, A209, A308	T1
1.50	Dia-Flo	A116, A216, A217, A316	T2
2.00	Dia-Flo	A116, A216, A217, A316	T2
2.00	Dia-Flo	A133, A233	T6
3.00	Dia-Flo	A133, A233, A234, A333	T6

4.2 Install ISP on the Valve Actuator

1. The mounting kit supplied by ITT has the correct parts for your specific actuator. Compare the parts supplied with the applicable drawings. Ensure all parts are available.
2. With fingers only, thread the magnet completely into the actuator indicator spindle. Thread locking compound is recommended.
3. If a mounting plate is required, install it along with the appropriate O-rings. Tighten screws securely.

NOTICE:

In order to maintain enclosure type and IP ratings, the 4-40 mounting screws shall be tightened to 3.5 in-lb min. to 5.5 in-lb max.

4. Open the valve. (For fail-closed and double acting actuators, use 90 psi air pressure. Vent any air pressure from fail-open actuators.) Check the height of the magnet above the ISP mounting surface. If the height of the magnet above the mounting surface exceeds 1.04", contact ITT.

NOTICE:

If the above measurement exceeds 1.04", the ISP may be damaged by movement of the magnet.

5. The ISP can be installed in 90 degree increments about the centerline of the actuator. The standard position of installation is with the flat side of the ISP aligned with the actuator ports.
6. Install the ISP along with the appropriate gasket. Tighten screws securely.

4.3 Piping

1. If the ISP has NPT ports on the side, it contains a solenoid valve, which may be used to operate the valve actuator. However, an ISP with solenoid is not normally used with double acting actuators. If an ISP with solenoid is to be mounted on a double acting actuator, contact ITT.
2. Plant instrument air should be connected to port 'S'.
3. The exhaust port is marked 'E'.
 - a) Do not block the exhaust port; the valve will not operate.

b) It is recommended that a breather or muffler accessory be installed at port 'E', to prevent ingestion of debris or water.

4. Port 'A' should be connected to the actuator port.

NOTICE:

Loose pieces of Teflon tape may interfere with the function of the solenoid valve. Use care to avoid excess tape. Do not allow tape to extend beyond the end of the fitting.

4.4 Cordsets

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



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 appropriate rated cap (not supplied) over the receptacle to maintain the rated Ingress Protection of the unit.

When installed in non-hazardous areas in Canada, a Turck eurofast® cordset and the use of a tool secured Turck lokfast® guard is required.

NOTICE:

The unit is rated for Ingress Protection when the mating cord is attached.

Because the ISP 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 ISP.

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.

4.5 ISP-3W Wiring considerations – Applicable to IO-Link / 3-Wire Output Only

The pins 24V+ (L+) and 0V- (L-) provide power for the ISP sensor circuitry and integral solenoid valve. 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 24V+ / 0V- pins to the signal pins. The power supply used must be able to provide enough power/current for the ISP-3W circuitry plus current required for the signals.

Standard input/output mode (SIO)

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

IO-Link mode

The C/Q signal pin (Closed Signal) must be wired to the Host's C/Q communication terminal.

The open signal pin may optionally be wired to the Host's I/Q terminal.

The solenoid control signal pin may optionally be wired to the Host's I/Q terminal. When IO-Link communication is active and valid (or if fail-safes are configured), the state of this pin is ignored, and the IO-Link Process Data Outputs are used for control of the internal solenoid.

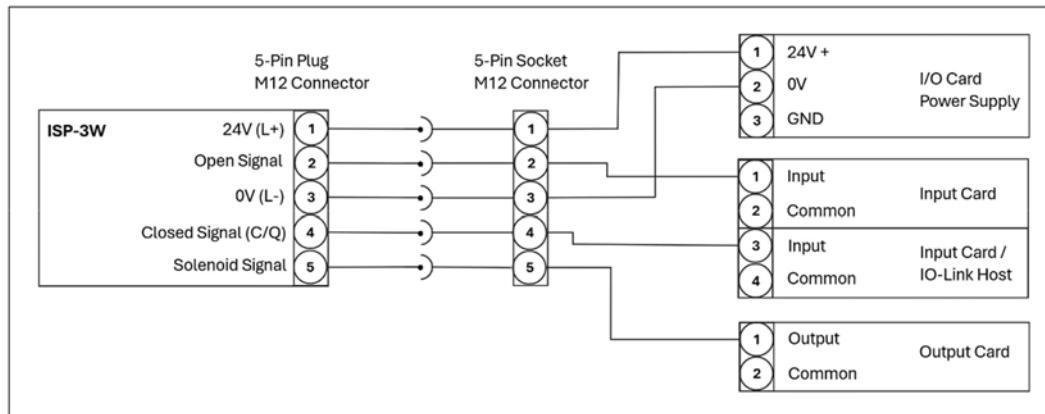


Figure 2: Typical Wiring Diagram

Self-learning signals

Every time power is cycled to 24V+ / 0V-, the ISP-3W 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 ISP-3W will continue to test it until a card is detected. If the open or closed signal is short-circuited, the ISP-3W 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 ISP-3W is booting. Most input cards (especially those designed for solid state sensors) will not experience an ON state during boot up.

5 Operation

5.1 Operation of ISP with AS-i Communication

5.1.1 Bench test procedure and sensor setting instructions



CAUTION:

Performing this procedure will cause the sensor inputs to change state and will cause the valve/actuator to automatically stroke on units with integral solenoid. Performing this procedure is not recommended during a live process. Use appropriate lockout/tagout procedure.

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

1. Apply power across the ASi+ (Pin 1) and ASi- (Pin 3) M12 receptacle.
2. Calibrate:
 - a) Using Dongle:
 - i. Hold Dongle over Dongle Target with word "Calibrate" upwards. Hold for about 2 seconds, until blue LEDs start to flash. Note: flashing will continue for 10 seconds if no further action is taken.
 - ii. Remove Dongle briefly and re-apply Dongle to Dongle Target with either side upwards. Hold for about 1 second until blue LEDs turn solid blue. The 30 second Calibrate sequence has been started. Remove Dongle from Dongle Target.
 1. On units with integral solenoid, the solenoid will change states, stroking the valve.
 2. On units without integral solenoid, the valve must be manually stroked by the operator.
 - iii. If the ISP has detected a full stroke of the valve, the setpoints are saved in non-volatile memory, and the blue LED and valve position (red or green) starts to alternate flash for 10 seconds
 1. During this flashing period, the user may apply either side of the Dongle to the Dongle Target for about 1 second to swap LED colors associated with open and closed positions (default from factory is red for closed, green for open).
 - iv. If the ISP does not detect a full stroke of the valve, the previous setpoints are deleted and the valve position LEDs will remain off until the valve is properly calibrated.
 - b) Using ISP app (Only on -BT units):
 - i. Select unit from the list of Devices.
 - ii. Ensure the device is unlocked (see "Unlocking Device" portion of Optional Diagnostics Feature table). Note: The Calibrate button should have a white background.
 - iii. Select the Calibrate button. After accepting the warning pop-up, the 30 second Calibrate sequence will be started. The unit's blue LEDs will turn solid blue.
 1. On units with integral solenoid, the solenoid will change states, stroking the valve.
 2. On units without integral solenoid, the valve must be manually stroked by the operator.
 - iv. A pop-up showing the current settings for LED colors will appear. The LED colors may be swapped at this time if desired.

- v. If the ISP has detected a full stroke of the valve, the setpoints are saved in non-volatile memory, and the blue LED and valve position (red or green) starts to alternate flash for 10 seconds
 - 1. During this flashing period, the user may apply either side of the Dongle to the Dongle Target for about 1 second to swap LED colors associated with open and closed positions (default from factory is red for closed, green for open).
- vi. If the ISP does not detect a full stroke of the valve, the previous setpoints are deleted and the valve position LEDs will remain off until the valve is properly calibrated.
- 3. Setpoints are retained even after power is removed.

A functioning AS-Interface network is required to test communications.

5.1.2 Local Solenoid Override feature

NOTICE:

Available only on units with integral solenoid (-SV).



CAUTION:

Performing this procedure will cause the valve/actuator to stroke. Performing this procedure is not recommended during a live process. Use appropriate lockout/tagout procedure.

1. Locally Overriding the solenoid will invert the current state of the solenoid. If the solenoid is off, it will turn on; if it is on, it will turn off.
2. The Local Override is a latching override and takes precedence over the ASi master and ISP app overrides.
3. To enable solenoid override, hold Dongle over Dongle Target with word "Solenoid" upwards. Hold for about 2 seconds, until blue LEDs start to flash. The Solenoid LED indicates the current state of the solenoid. ASi input bit 2 is set to "1", indicating the local force to the control system.
 - a) The blue LED will continue to flash until the Local Override is removed.
 - b) ASi input bit 2 is set to "1" until the Local Override is removed.
4. To disable solenoid override, hold Dongle over Dongle Target with word "Solenoid" upwards. Hold for about 2 seconds, until blue LEDs stop flashing. The solenoid is then returned to the ASi Master's control. The Solenoid LED indicates the current state of the solenoid.

5.1.3 AS-Interface Wink feature

This feature provides the capability of setting the CLOSED or OPEN LEDs to flash or "wink". This feature aids in physically locating the unit on the network.

1. AS-Interface communications are required in order to set the "Wink" feature. The unit must be addressed and correctly configured to be recognized by the Control System or the AS-Interface Gateway/Master.
2. Set parameter Bit 0 to "1" in the desired unit. Once the correct unit has been physically located on the network, indicated by the "winking" of the LEDs, set parameter Bit 0 back to "0". Performing this function will not change the Closed and Open sensor setpoints.

5.2 Operation of ISP with 3-Wire Discrete Operation

5.2.1 Bench test procedure and sensor setting instructions



CAUTION:

- Performing this procedure will cause the sensor inputs to change state and will cause the valve/actuator to automatically stroke on units with integral solenoid. Performing this procedure is not recommended during a live process. Use appropriate lockout/tagout procedure.
- Open and closed set-points are not included in IO-Link Data Storage; therefore, sensor must be calibrated after installation on valve.

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

1. Apply power across the L+ (Pin 1) and L- (Pin 3) M12 receptacle.
2. Calibrate:
 - a) Using Dongle:
 - i. Hold Dongle over Dongle Target with word "Calibrate" upwards. Hold for about 2 seconds, until blue LEDs start to flash. Note: flashing will continue for 10 seconds if no further action is taken.
 - ii. Remove Dongle briefly and re-apply Dongle to Dongle Target with either side upwards. Hold for about 1 second until blue LEDs turn solid blue. The 30 second Calibrate sequence has been started. Remove Dongle from Dongle Target.
 1. On units with integral solenoid, the solenoid will change states, stroking the valve.
 2. On units without integral solenoid, the valve must be manually stroked by the operator.
 - iii. If the ISP has detected a full stroke of the valve, the setpoints are saved into non-volatile memory, and the blue LED and valve position (red or green) starts to alternate flash for 10 seconds.
 1. During this flashing period, the user may apply either side of the Dongle to the Dongle Target for about 1 second to swap LED colors associated with open and closed positions (default from factory is red for closed, green for open).
 - iv. If the ISP does not detect a full stroke of the valve, the previous setpoints are deleted and the valve position LEDs will remain off until the valve is properly calibrated.
 - b) Using ISP app (Only on -BT units):
 - i. Select unit from the list of Devices.
 - ii. Ensure the device is unlocked (see "Unlocking Device" portion of Optional Diagnostics Bluetooth table). Note: The Calibrate button should have a white background.
 - iii. Select the Calibrate button. After accepting the warning pop-up, the 30 second Calibrate sequence will be started. The unit's blue LEDs will turn solid blue.
 1. On units with integral solenoid, the solenoid will change states, stroking the valve.
 2. On units without integral solenoid, the valve must be manually stroked by the operator.
 - iv. A pop-up showing the current settings for LED colors will appear. The LED colors may be swapped at this time if desired.
 - v. If the ISP has detected a full stroke of the valve, the setpoints are saved into non-volatile memory, and the blue LED and valve position (red or green) starts to alternate flash for 10 seconds.

1. During this flashing period, the user may apply either side of the Dongle to the Dongle Target for about 1 second to swap LED colors associated with open and closed positions (default from factory is red for closed, green for open).
- vi. If the ISP does not detect a full stroke of the valve, the previous setpoints are deleted and the valve position LEDs will remain off until the valve is properly calibrated.
3. Setpoints are retained even after power is removed.

5.2.2 Local Solenoid Override Feature

NOTICE:

Available only on units with integral solenoid (-SV).



CAUTION:

Performing this procedure will cause the valve/actuator to stroke. Performing this procedure is not recommended during a live process. Use appropriate lockout/tagout procedure.

1. Locally Overriding the solenoid will invert the current state of the solenoid. If the solenoid is off, it will turn on; if it is on, it will turn off.
2. The Local Override is a latching override and takes precedence over the PLC output card and ISP app overrides.
3. To enable solenoid override, hold Dongle over Dongle Target with word "Solenoid" upwards. Hold for about 2 seconds, until blue LEDs start to flash. The Solenoid LED indicates the current state of the solenoid.
 - a) The blue LED will continue to flash until the Local Override is removed.
4. To disable solenoid override, hold Dongle over Dongle Target with word "Solenoid" upwards. Hold for about 2 seconds, until blue LEDs stop flashing. The solenoid is then returned to the PLC output card's control. The Solenoid LED indicates the current state of the solenoid.

5.2.3 Output fail-safes

General fail-safes

The unit 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 internal 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).

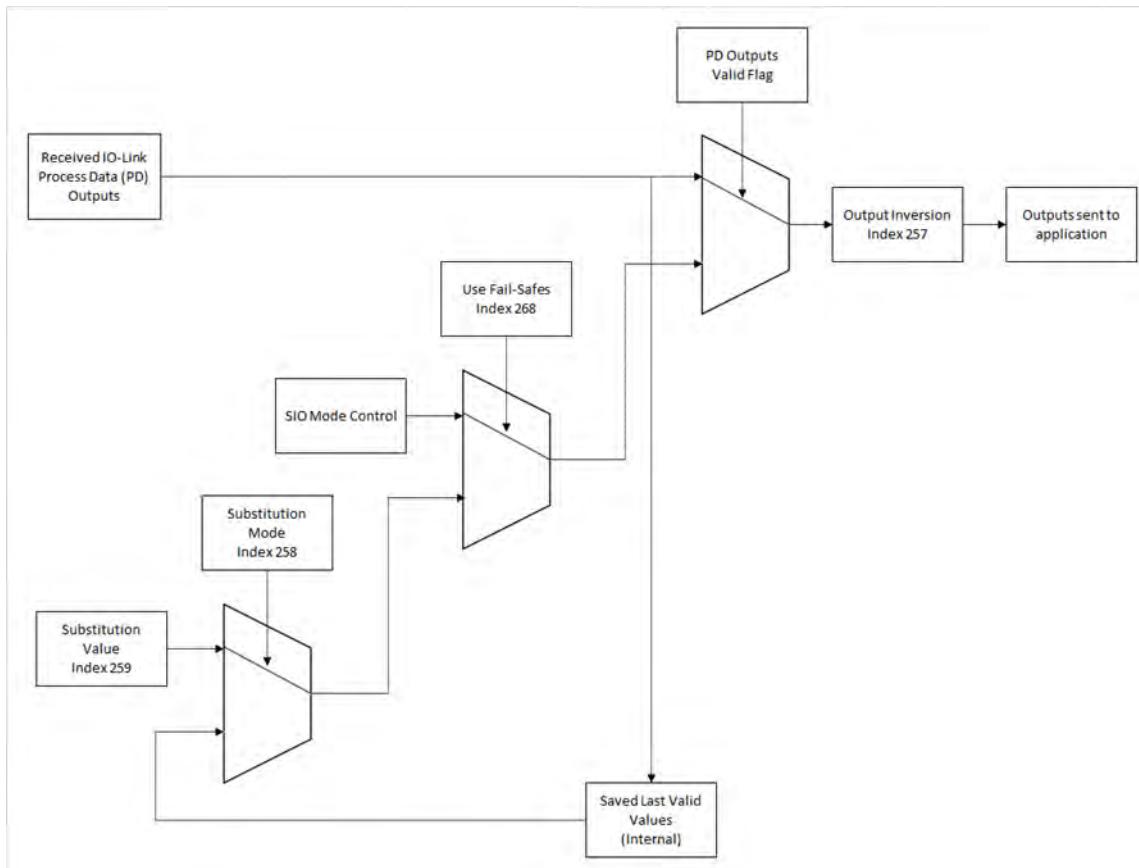


Figure 3: Process data output flow diagram

The combination of these 3 parameters results in 4 fail-safe states, as described in the table below.

Table 6: Fail-safes

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

A Wireless Link enabled ISP 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).

5.3 Operation of ISP with 2-Wire Discrete Operation

5.3.1 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.



CAUTION:

A series load resistor must be used when bench testing in order to ensure proper module operation.

To test sensors, use a 24 VDC power supply with series load resistor 250Ω – 10kΩ (required).

1. Apply power across the Open/Closed Common (Pin 1) and Closed NO (Pin 2) M12 receptacle.
2. Calibrate using Dongle:
 - a) Hold Dongle over Dongle Target with word "Calibrate" upwards. Hold for about 2 seconds, until either blue LED start to flash. Note: flashing will continue for 10 seconds if no further action is taken.
 - b) Remove Dongle briefly and re-apply Dongle to Dongle Target with either side upwards. Hold for about 1 second until blue LEDs turn solid blue. The 30 second Calibrate sequence has been started. Remove Dongle from Dongle Target. The valve must be manually stroked by the operator.
 - c) If the ISP has detected a full stroke of the valve, the setpoints are saved to non-volatile memory, and the blue LED and valve position (red or green) starts to alternate flash for 10 seconds. During this flashing period, the user may apply either side of the Dongle to the Dongle Target for about 1 second to swap LED colors associated with open and closed positions (default from factory is red for closed, green for open).
 - d) If the ISP does not detect a full stroke of the valve, the previous setpoints are deleted and the valve position LEDs will remain off until the valve is properly calibrated.
3. Setpoints are retained even after power is removed.

5.4 Operation of ISP with DeviceNet® Communication

5.4.1 Bench test procedure and sensor setting instructions



CAUTION:

Performing this procedure will cause the sensor inputs to change state and will cause the valve/actuator to automatically stroke on units with integral solenoid. 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 V+ (Pin 2) and V- (Pin 3) M12 receptacle.
2. Calibrate, using Dongle:
 - a) Hold Dongle over Dongle Target with word "Calibrate" upwards. Hold for about 2 seconds, until blue LEDs start to flash.

NOTICE:

Flashing will continue for 10 seconds if no further action is taken.

- b) Remove Dongle briefly and re-apply Dongle to Dongle Target with either side upwards. Hold for about 1 second until blue LEDs turn solid blue. The 30 second Calibrate sequence has been started. Remove Dongle from Dongle Target.
 - i. On units with integral solenoid, the solenoid will change states, stroking the valve.
 - ii. On units without integral solenoid, the valve must be manually stroked by the operator.
- c) If the ISP has detected a full stroke of the valve, the setpoints are saved in to non-volatile memory, and the blue LED and valve position (red or green) starts to alternate flash for 10 seconds
 - i. During this flashing period, the user may apply either side of the Dongle to the Dongle Target for about 1 second to swap LED colors associated with open and closed positions (default from factory is red for closed, green for open).

- d) If the ISP does not detect a full stroke of the valve, the previous setpoints are deleted and the valve position LEDs will remain off until the valve is properly calibrated.

3. Calibrate using Bluetooth App (Only on -BT units):
 - a) Select unit from the list of Devices.
 - b) Ensure the device is unlocked (see "Unlocking Device" portion of Optional Bluetooth Feature table).

NOTICE:

The Calibrate button should have a white background.

- c) Select the Calibrate button. After accepting the warning pop-up, the 30 second Calibrate sequence will be started. The unit's blue LEDs will turn solid blue.
 - i. On units with integral solenoid, the solenoid will change states, stroking the valve.
 - ii. On units without integral solenoid, the valve must be manually stroked by the operator.
- d) A pop-up showing the current settings for LED colors will appear. The LED colors may be swapped at this time if desired.
- e) If the ISP has detected a full stroke of the valve, the setpoints are saved in to non-volatile memory, and the blue LED and valve position (red or green) starts to alternate flash for 10 seconds. During this flashing period, the user may apply either side of the Dongle to the Dongle Target for about 1 second to swap LED colors associated with open and closed positions (default from factory is red for closed, green for open).
- f) If the ISP does not detect a full stroke of the valve, the previous setpoints are deleted and the valve position LEDs will remain off until the valve is properly calibrated.

4. Setpoints are retained even after power is removed.

NOTICE:

A functioning DeviceNet® network is required to test communications.

5.4.1.1 Local Solenoid Override feature

NOTICE:

Available only on units with integral solenoid (-SV).

**CAUTION:**

Performing this procedure will cause the valve/actuator to stroke. Performing this procedure is not recommended during a live process.

1. Locally Overriding the solenoid will invert the current state of the solenoid. If the solenoid is off, it will turn on; if it is on, it will turn off.
2. The Local Override is a latching override and takes precedence over the DeviceNet® master and Bluetooth overrides.
3. To enable solenoid override, hold Dongle over Dongle Target with word "Solenoid" upwards. Hold for about 2 seconds, until blue LEDs start to flash. The Solenoid LED indicates the current state of the solenoid. DeviceNet® input byte 0, bit 2 is set to "1", indicating the local force to the control system.
 1. The blue LED will continue to flash until the Local Override is removed.
 2. DeviceNet® input byte 0, bit 2 is set to "1" until the Local Override is removed.
4. To disable solenoid override, hold Dongle over Dongle Target with word "Solenoid" upwards. Hold for about 2 seconds, until blue LEDs stop flashing. The solenoid is then returned to the DeviceNet® Master's control. The Solenoid LED indicates the current state of the solenoid.

5.4.1.2 DeviceNet® Wink feature

This feature provides the capability of setting the CLOSED or OPEN LEDs to flash or "wink". This feature aids in physically locating the unit on the network.

1. DeviceNet® communications are required in order to set the "Wink" feature. The unit must be addressed and correctly configured to be recognized by the Control System.
2. Set byte 0, Bit 2 to "1" in the desired unit. Once the correct unit has been physically located on the network, indicated by the "winking" of the LEDs, set byte 0, Bit 2 back to "0". Performing this function will not change the Closed and Open sensor setpoints.

5.5 Compliance Statements for ISP with AS-i Communication

Statements required by 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.

NOTICE:

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.



CAUTION:

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

Contains FCC ID: SQQL651 IC: 3147A-BL651

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.

Statements required by Industry Canada (IC)

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.

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 conservé 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.

Statements required by EU Declaration of Conformity (CE)

Products with Bluetooth:

Directive:

2014/53/EU – Radio Equipment Directive (RED)

Harmonized Standards:

EN 60950-1:2006 +A11:2009 +A1:2010 +A12:2011 +A2:2013

EN 62311:2020

EN 301 489-1 v2.2.0 (2017-03)

EN 301 489-17 v3.2.0 (2017-03)

EN 300 328 v2.2.2 (2019-07)

EN 62026-2:2013 +A1:2019

Products without Bluetooth:

Directive:

2014/30/EU – Electromagnetic Compatibility (EMC)

Harmonized Standards:

EN 62026-2:2013 +A1:2019



CAUTION:

To maintain safety, only power supplies that provide Double/Reinforced insulation, such as those with PELV/SELV outputs, shall be used.

NOTICE:

If the unit is used in a manner not specified by the manufacturer, the protection provided by it may be impaired.

NOTICE:

In order to maintain enclosure type and IP ratings, the 4-40 mounting screws shall be tightened to 3.5 in-lb min. to 5.5 in-lb max.

5.6 Compliance Statements for ISP with IO-Link, 3-Wire Discrete

Statements required by 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.

NOTICE:

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.



CAUTION:

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

Contains FCC ID: SQQL651 IC: 3147A-BL651

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.

Statements required by Industry Canada (IC)

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.

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 conservé 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.

Statements required by EU Declaration of Conformity (CE)

Products with Bluetooth:

Directive:

2014/53/EU – Radio Equipment Directive (RED)

Harmonized Standards:

EN 60950-1:2006 +A11:2009 +A1:2010 +A12:2011 +A2:2013

EN 62311:2020

EN 301 489-1 v2.2.0 (2017-03)

EN 301 489-17 v3.2.0 (2017-03)

EN 300 328 v2.2.2 (2019-07)

EN IEC 60947-5-2:2020

EN IEC 61010-2-201:2018

Products without Bluetooth:

Directive:

2014/30/EU – Electromagnetic Compatibility (EMC)

Harmonized Standards:

EN IEC 60947-5-2:2020



WARNING:

Depending on operational and installation factors (air pressure, actuator size, muffler, etc.) the pneumatic exhaust may release a sound pressure level in excess of 100 dBA. It is recommended that a noise-reducing muffler is fitted to the exhaust and/or protective earpieces are

used when in proximity to the device. It is recommended that the sound pressure level is measured after installation to verify the effectiveness of any noise-reducing muffler.



WARNING:

To maintain safety, only power supplies that provide Double/Reinforced insulation, such as those with PELV/SELV outputs, shall be used.

NOTICE:

If the unit is used in a manner not specified by the manufacturer, the protection provided by it may be impaired.

NOTICE:

In order to maintain enclosure type and IP ratings, the 4-40 mounting screws shall be tightened to 3.5 in-lb min. to 5.5 in-lb max.

NOTICE:

Open and closed set-points are not included in IO-Link Data Storage; therefore, sensor must be calibrated after installation on valve.

5.7 Compliance Statements for ISP with 2-Wire Discrete

Statements required by 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.

NOTICE:

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.



CAUTION:

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

Statements required by Industry Canada (IC)

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.

Statements required by EU Declaration of Conformity (CE)

Directive:

2014/30/EU – Electromagnetic Compatibility (EMC)

Harmonized Standards:

EN IEC 60947-5-2:2020

EN IEC 61010-2-201:2018

EN 61010-1



CAUTION:

To maintain safety, only power supplies that provide Double/ Reinforced insulation, such as those with PELV/SELV outputs, shall be used.

NOTICE:

If the unit is used in a manner not specified by the manufacturer, the protection provided by it may be impaired.

NOTICE:

In order to maintain enclosure type and IP ratings, the 4-40 mounting screws shall be tightened to 3.5 in-lb min. to 5.5 in-lb max.

5.8 Compliance Statements for ISP with DeviceNet® Communication

Statements required by 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.

NOTICE:

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.



CAUTION:

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

Contains FCC ID: SQQL651 IC: 3147A-BL651

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.

Statements required by Industry Canada (IC)

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.

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.

Statements required by EU Declaration of Conformity (CE)

Products with Bluetooth:

Directive:

2014/53/EU – Radio Equipment Directive (RED)

Harmonized Standards:

EN 60950-1:2006 +A11:2009 +A1:2010 +A12:2011 +A2:2013

EN 62311:2020

EN 50385:2017

EN 50665:2017

EN 301 489-1 v2.2.0 (2017-03)

EN 301 489-17 v3.2.0 (2017-03)

EN 300 328 v2.2.2 (2019-07)

EN 62026-3:2015 +AC:2019 +A11:2020

NOTICE:

Radio Equipment Directive requires marking "CE" on the product packaging (2014/53/EU Article 20 section 1).

Products without Bluetooth:

Directive:

2014/30/EU – Electromagnetic Compatibility (EMC)

Radiation Exposure Statement

Harmonized Standards:

EN 62026-3:2015 +AC:2019 +A11:2020

EN 61010-1



CAUTION:

To maintain safety, only power supplies that provide Double/ Reinforced insulation, such as those with PELV/SELV outputs, shall be used.

NOTICE:

If the unit is used in a manner not specified by the manufacturer, the protection provided by it may be impaired.

NOTICE:

In order to maintain enclosure type and IP ratings, the 4-40 mounting screws shall be tightened to 3.5 in-lb min. to 5.5 in-lb max.

6 Maintenance

6.1 ISP Maintenance

The ISP is permanently sealed and no maintenance is required.

Periodically inspect the ISP to check:

- Mounting. The ISP should be attached securely to the actuator. Tighten the mounting screws as necessary.
- Cracks. The ISP must be replaced if cracked.
- Internal moisture. The ISP must be replaced if internal moisture is noted.
- Piping connections are secure and not leaking. Seal and tighten as appropriate.

AS-i and DeviceNet units have LED fault indicators. See the applicable section for explanation of these indications.

Additional status information and error codes is available via the ISP app (if ISP is equipped with diagnostics.) See the User Guide for the ISP App: Diagnostics and Control.



WARNING:

Explosion Hazard. Do not connect or disconnect when energized or unless the area is free of ignitable concentrations.

7 Parts Listing and Cross-Sectional Drawings

7.1 Parts Listings and Cross-Sectional Drawings

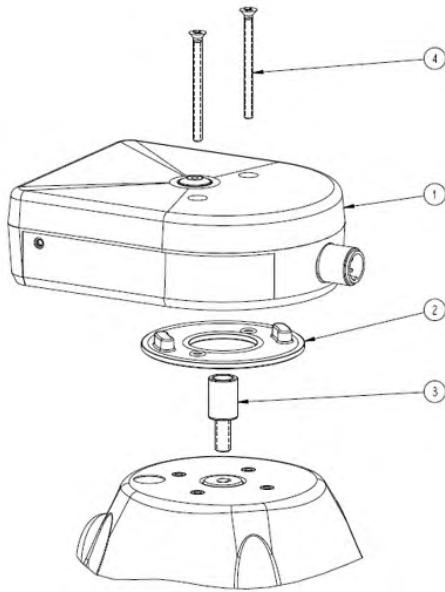


Figure 4: Type 1

Table 7: List of Parts

Item	Dwg. No.	Qty.	Description	Note
1	-	1	ISP switchpack	
2	-	1	Gasket	1
3	-	1	Magnet	1
4	-	2	MCHSCR-FL PHH 4-40 x 1.38	1

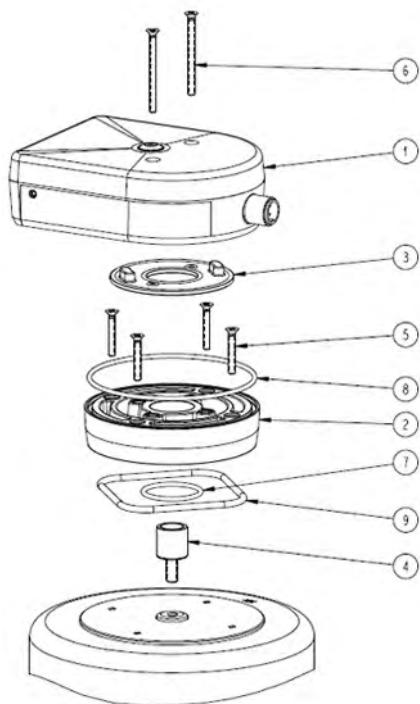
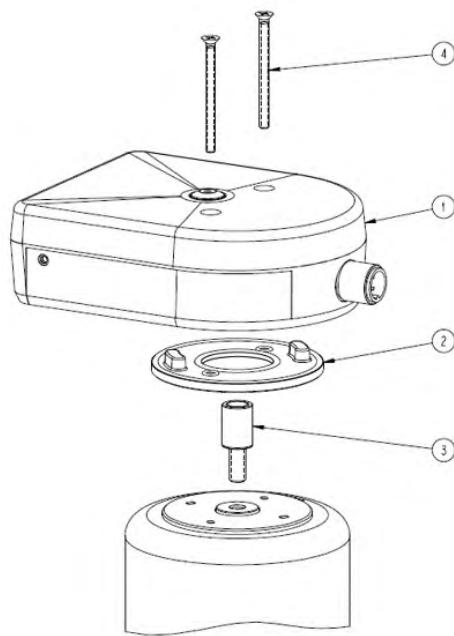


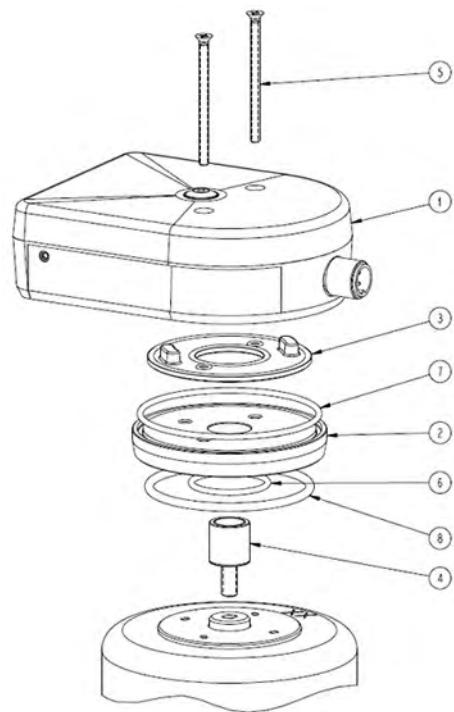
Figure 5: Type 2

Table 8: List of Parts

Item	Dwg. No.	Qty.	Description	Note
1	-	1	ISP Switchpack	
2	-	1	Mounting plate	1
3	-	1	Gasket	1
4	-	1	Magnet	1
5	-	4	MCHSCR-FL PHH 4-40 x 0.75	1
6	-	2	MCHSCR-FL PHH 4-40 x 1.38	1
7	106308	1	O-ring 020	1
8	106308	1	O-ring 038	1
9	106308	1	O-ring 140 (shown in shape of gland)	1

**Figure 6: Type 3****Table 9: List of Parts**

Item	Dwg. No.	Qty.	Description	Note
1	-	1	ISP switchpack	
2	-	1	Gasket	1
3	-	1	Magnet	1
4	-	2	MCHSCR-FL PHH 4-40 x 1.38	1

**Figure 7: Type 4****Table 10: List of Parts**

Item	Dwg. No.	Qty.	Description	Note
1	-	1	ISP Switchpack	
2	124452	1	Mounting plate - ISP	
3	-	1	Gasket	1
4	-	1	Magnet	1
5	-	2	MCHSCR-FL PHH 4-40 x 1.63	
6	106308	1	O-ring 020	
7	106308	1	O-ring 038	
8	106308	1	O-ring 134	

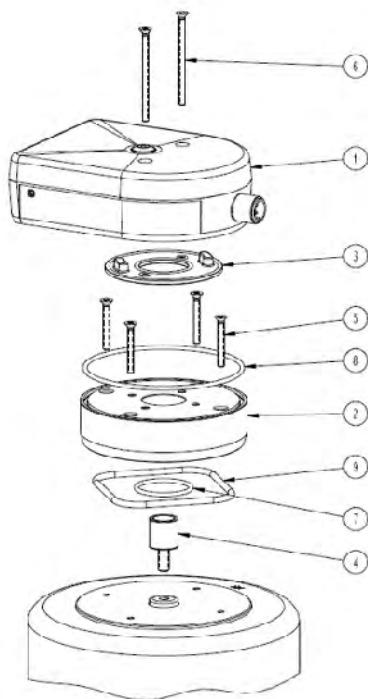


Figure 8: Type 5

Table 11: List of Parts

Item	Dwg. No.	Qty.	Description	Note
1	-	1	ISP Switchpack	
2	124453	1	Mounting plate - ISP	
3	-	1	Gasket	1
4	-	1	Magnet	1
5	-	4	MCHSCR-FL PHH 4-40 x 0.88	
6	-	2	MCHSCR-FL PHH 4-40 x 1.63	
7	106308	1	O-ring 020	
8	106308	1	O-ring 038	
9	106308	1	O-ring 140 (shown in shape of gland)	

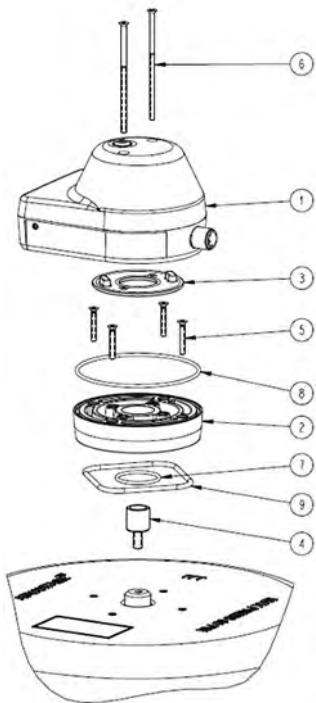
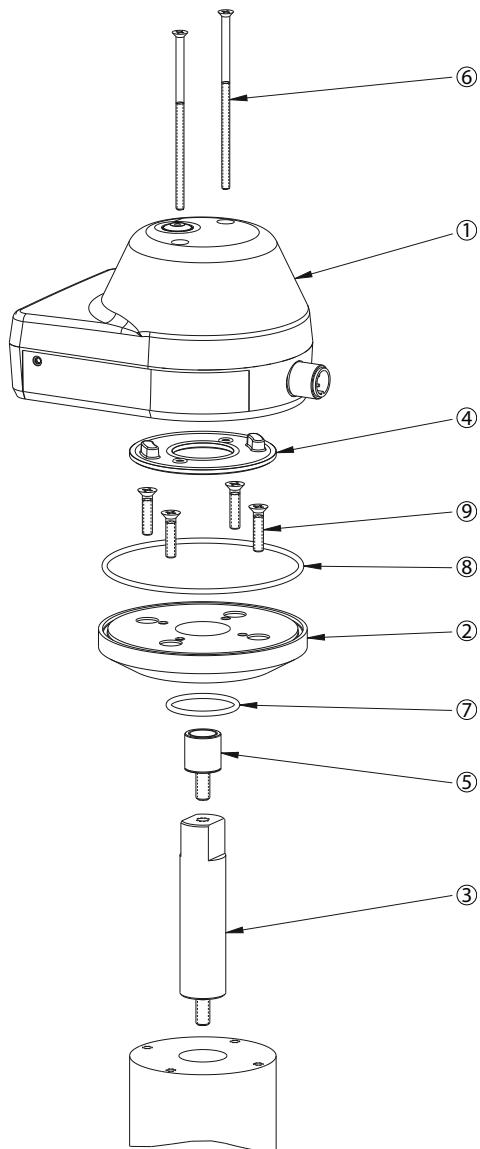


Figure 9: Type 6

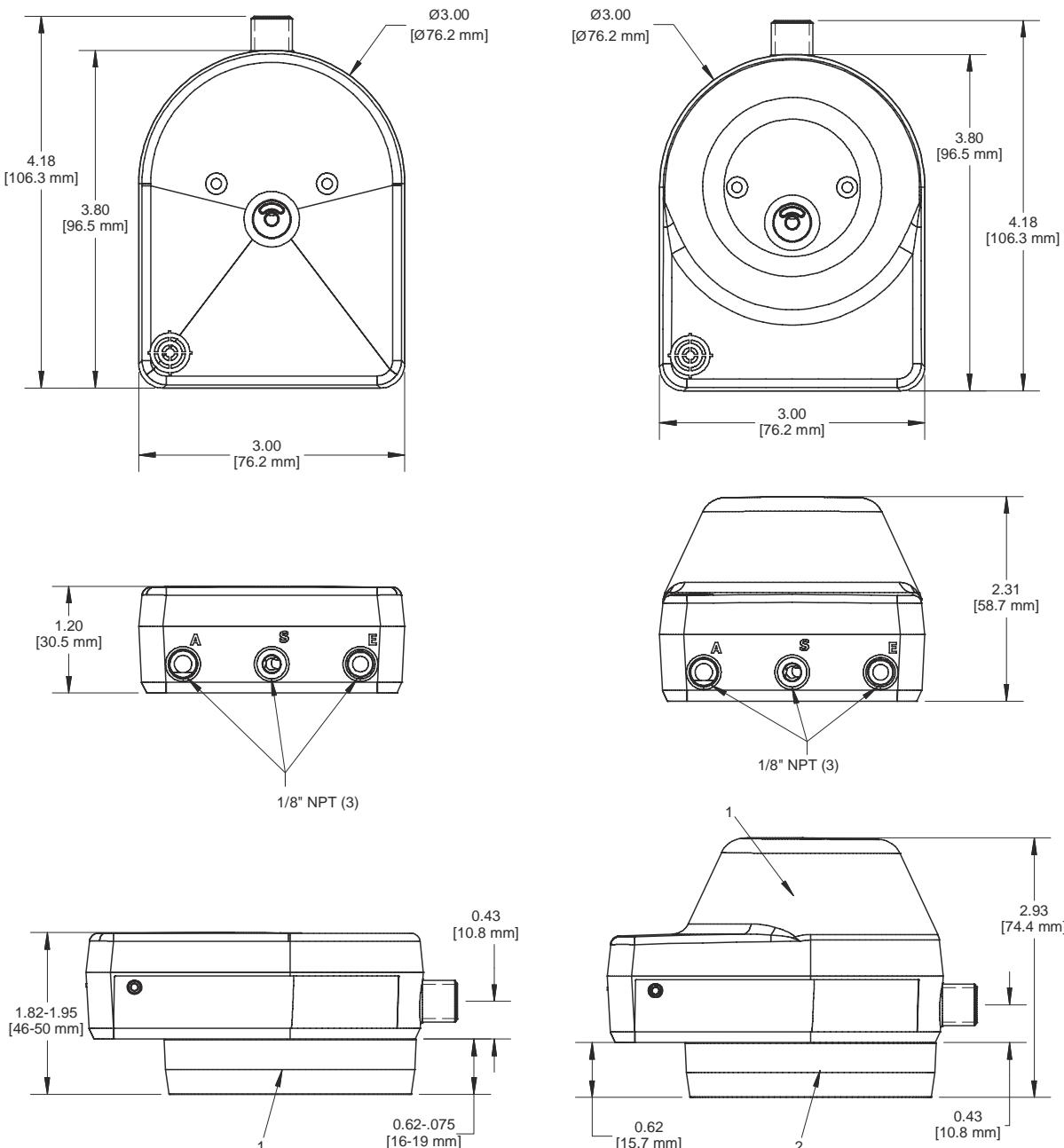
Table 12: List of Parts

Item	Dwg. No.	Qty.	Description	Note
1	-	1	ISP Switchpack	
2	-	1	Mounting plate	1
3	-	1	Gasket	1
4	-	1	Magnet	1
5	-	4	MCHSCR-FL PHH 4-40 x 0.75	1
6	-	2	MCHSCR-FL PHH 4-40 x 2.50	1
7	106308	1	O-ring 020	1
8	106308	1	O-ring 038	1
9	106308	1	O-ring 140 (shown in shape of gland)	1

**Figure 10: Type 7****Table 13: List of Parts**

Item	Dwg. No.	Qty.	Description	Note
1	-	1	ISP Switchpack	
2	K23879A	1	Mounting plate - ISP	
3	K23880A	1	Spindle - Extension	
4	-	1	Gasket	1
5	-	1	Magnet	1
6	-	2	MCHSCR-FL PHH 4-40 x 2.50	1
7	-	1	O-ring 020	1
8	-	1	O-ring 038	1
9	-	4	MCHSCR-FL PHH 6-32 x 0.63	

ISP Dimensions



1. Spacer for valves $\geq 1.5"$

Figure 11: Short Cover

1. Tall cover, 3 - 4" valves

2. Spacer for valves $\geq 1.5"$

Figure 12: Tall Cover



The Williams - Carver Co., Inc.

4001 Mission Road
Kansas City, Kansas 66103
(913) 236-4949 FAX (913) 236-9331
www.williamscarver.com



ITT Engineered Valves
33 Centerville Road
Lancaster, PA 17603
USA

Form IOM.ISP.en-US.2025-03 StoneL Document 105500 Rev D