WESTLOCK
CONTROLS CORPORATION

ICOT-FF
INTELLIGENT VALVE POSITIONER
INSTALLATION & OPERATION MANUAL

IOM: Tech-469		**Revision:** B	
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Reviewed By: M. Twardowski	**Date:** 3/4/13	**Approved By:** R. Frey	**Date:** 3/5/13

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Revision History

Revision	Revision A	Revision B
8/3/12	5/2/12	2/26/14
Initial release		
Information described in initial release was tested using the following: FIRMWARE REVISION: 3.1.0 MANUFAC_ID: 574343 DEV_TYPE: 1100 DEV_REV: 0301		
Firmware revision is subject to change without revising IOM if it does not affect fit, form or function.		

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1. Introduction

1.1. *Definitions, abbreviations, acronyms and terms.*

This section contains definitions to all acronyms or abbreviations used in this document. Some of them were extracted from IEC, ISO and FF documents as referred in the 'References' section.

Table 1

Definitions and Acronyms	
Acronym	**Definitions**
0x	Prefix to indicate that the number is in the Hexadecimal format, i.e. 0x05 (=5) or 0x0a (=10) or 0xfe(=254)
AI	Analog Input
AO	Analog Output
ASN.1	Abstract Syntax Notation 1
Auto	Automatic mode
Cas	Cascade mode
CCITT	International Telegraph and Telephone Consultative Committee
CFF	Common File Format
DC	Direct Current
DCS	Distributed Control System
DD	Device Description
DDL	Device Description Language
DI	Discrete Input
DO	Discrete Output
EUC	End User Council
FB	Function Block
FBAP	Function Blocks Application Process
FF	Fieldbus Foundation
fieldbus	FOUNDATION™ Fieldbus
Gbit/s	Gigabits per second
H1	FOUNDATION fieldbus network operating at 31.25 kbit/second
HW	Hardware
IEC	International Electrotechnical Commission
IMan	Initialization Manual mode
IP	Internet Protocol
IS.	Intrinsically Safe
ISA	The International Society for Measurement and Control
ISO	International Organization of Standards
kbit/s	kilobits per second

Definitions and Acronyms	
Acronym	**Definitions**
kHz	kilohertz
LAN	Local Area Network
LAS	Link Active Scheduler
LO	Local Override mode
mA	Milliampere
Man	Manual mode
Mbit/s	Megabits per second
MV	Measured Variable
OD	Object Dictionary
OOS or O/S	Out Of Service mode
OSI	Open Systems Interconnect
PC	Personal Computer
PDU	Protocol Data Unit
PHY	Physical Layer
PID	Proportional, Integral, Derivative
PLC	Programmable Logic Controller
PV	Process Variable
RB	Resource Block
RCas	Remote-Cascade mode
Rout	Remote-Output mode
SW	Software
TB	Transducer Block
TCP/IP	Transport Control Protocol/Internet Protocol
VCR	Virtual Communication Relationship
VFD	Virtual Field Device

FF-related definitions[1]

- **Acyclic Period**

That portion of the communication cycle time, during which information other than Publish/Subscribe data is transmitted. Typical information transmitted during this time includes Alarms/Events, Maintenance/ Diagnostic information, Program invocations, Interlocks, Display information, Trend Information and Configuration.

- **Application Layer**

One of the layers in the communication stack containing the object dictionary.

- **Automation System**

A process automation, control, and diagnostic system composed of distinct modules. These modules may be physically and functionally distributed over the plant area. The automation

[1] For the complete list of definitions please see the FF application guide AG-181

system contains all the modules and associated software required to accomplish the regulatory control and monitoring of a process plant. This definition of automation system excludes field instruments, remote terminal units, auxiliary systems and management information systems.

- **Basic Device**

A Basic Device is any device not having the capability to control communications on an H1 fieldbus segment.

- **Bus**

A H1 FOUNDATION fieldbus cable between a Host and field devices connected to multiple segments, sometimes through the use of repeaters.

- **Capabilities File and the Common File Format (CFF) File**

A Capabilities File describes the communication objects in a fieldbus device. A configuration device can use Device Description (DD) Files and Capabilities Files to configure a fieldbus system without having the fieldbus devices online.
An ASCII text file used by the host to know the device detailed fieldbus capabilities without requiring the actual device. This file format is used for the Capabilities files (CFF).

- **Communications Stack**

It is a layered software supporting communication between devices. A Communications Stack is device communications software, which provides encoding and decoding of User Layer messages, deterministic control of message transmission, and message transfer.

- **Device Coupler**

A device coupler is a physical interface between a trunk and spur, and a device.

- **Device Description (DD)**

A Device Description (DD) provides an extended description of each object in the Virtual Field Device (VFD), and includes information needed for a control system or host to understand the meaning of data in the VFD.

- **EDDL**

Electronic Device Description Language (see www.eddl.org)

- **FISCO**

Fieldbus Intrinsic Safe COncept. Allows more power to an IS segment for approved FISCO devices, allowing for more devices per IS segment.

- **FNICO**

Fieldbus Non-Incendive COncept. Allows more power to a fieldbus segment in a Zone 2 Area, thus enabling more devices per segment than is possible with a FISCO solution

- **H1**

H1 is a term used to describe a FOUNDATION fieldbus network operating at 31.25 kbit/second.

- **H1 Field Device**

An H1 Field Device is a fieldbus device connected directly to an H1 FOUNDATION fieldbus. Typical H1 Field Devices are valve positioners and transmitters.

- **Interchangeability**

Interchangeability is the capability to substitute a device from one manufacturer with that of another manufacturer on a fieldbus network without loss of functionality or degree of integration.

- **Instantiable**

The ability of Function Blocks (FBs) to create multiple tagged FBs of different types from a library as required by the application. Quantity per device is restricted by device memory and other resources.

- **Interoperability**

Interoperability is the capability for a device from one manufacturer to interact with that of another manufacturer on a fieldbus network without loss of functionality.

- **Intrinsic safety** (**IS**)

Intrinsic Safety is a protection method for safe operation of electronic equipment in explosive atmospheres even under irregular operating conditions. It assures that the available electrical and thermal energy in the system is always lower than the amount that could cause ignition of the hazardous atmosphere.

- **ITK**

Interoperability Test Kit used by the Fieldbus Foundation to register devices and confirm compliance with the relevant FOUNDATION fieldbus standards. This is a pass/fail test. Only devices passing the full suite of tests receive the official FOUNDATION registration "tick mark."

- **Link Active Scheduler (LAS)**

A Link Active Scheduler (LAS) is a deterministic, centralized bus scheduler that maintains a list of transmission times for all data buffers in all devices that need to be cyclically transmitted. Only one Link Master (LM) device on a FOUNDATION fieldbus H1 Fieldbus Link can be functioning as that link's LAS.

- **Link Master (LM)**

A Link Master (LM) is any device containing Link Active Scheduler (LAS) functionality that can control communications on a FOUNDATION fieldbus H1 Fieldbus Link. There must be at least one LM on an H1 Link; one of those LM devices will be elected to serve as LAS.

- **Multi-bit Alert Support**

The capability to use the multi-bit alarms format. Multi-bit alarms are generated when multiple alerts or alarms occur within the same field device.

- **Mode**

Control block operational condition, such as manual, automatic, or cascade.

- **Regulatory Control**

The functions of process measurement, control algorithm execution, and final control device manipulation that provide closed loop control of a plant process.

- **Resource Block (RB)**

A Resource Block (RB) describes characteristics of the fieldbus device such as the device name, manufacturer and serial number. There is only one Resource Block (RB) in a device.

- **Schedules**

Schedules define when Function Blocks (FBs) execute and when data and status is published on the bus.

- **Segment**

A Segment is a section of a FOUNDATION fieldbus H1 fieldbus terminated in its characteristic impedance. Segments can be linked by Repeaters to form a longer H1 fieldbus. Each segment can include up to 32 H1 devices.

- **Spur**

A Spur is an H1 branch line connecting to the Trunk that is a final circuit. A Spur can vary in length from 1 m (3.28 ft.) to 120 m (394 ft.).

- **Standard Function Block (FB)**

Standard Function Blocks (FBs) are built into fieldbus devices as needed to achieve the desired control functionality. Automation functions provided by Standard FBs include Analog Input (AI), Analog Output (AO) and Proportional/Integral/Derivative (PID) control. The Fieldbus Foundation has released specifications for 21 types of Standard FBs. There can be many types of FBs in a device. The order and definition of Standard FB parameters are fixed and defined by the specifications.

- **Trunk**

A Trunk is the main communication highway between devices on a FOUNDATION fieldbus H1 network. The Trunk acts as a source of main supply to Spurs on the network.

- **User Application**

The User Application is based on "blocks," including Resource Blocks (RBs), Function Blocks (FBs) and Transducer Blocks (TBs), which represent different types of application functions

- **Virtual Communication Relationship (VCR)**

The VCRs are a set of configured application layer channels which are provided for the transfer of data between applications. FOUNDATION fieldbus describes three types of VCRs:

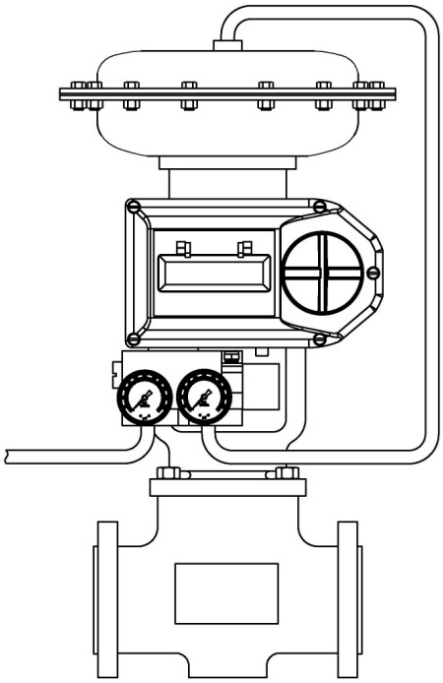
  - Publisher/Subscriber,
  - Client/Server and
  - Source/Sink.

- **Virtual Field Device (VFD)**

A Virtual Field Device (VFD) is used to remotely view local device data described in the object dictionary. A typical device will have at least two Virtual Field Devices (VFDs).

1.2. *Description*

The ICoT 5400 (ICoT FF) provides intelligence for the control valve through a microprocessor-based system utilizing the FOUNDATION Fieldbus™ protocol. Accurate measurement of valve stem position, input signal, actuator pressure, cycle time and cycle count data can be recorded during normal operation.



The positioner has a local LCD display, which indicates valve position, set-point in percentage open, calibration status, alarms status and whether the ICoT is in local or fieldbus control. If a failure condition occurs, an error message is displayed on the local LCD display and communicated to the Host system via fieldbus.

The ICoT FF is an electro-pneumatic servo system that continuously controls the position of a valve based on the fieldbus input signal. The ICoT senses valve position via a non-contact Hall Effect sensor and controls valve position through a current to pressure transducer

The ICoT FF is a two wire, **polarity insensitive** instrument that receives both signal and power from the bus. Current consumption of the ICoT is 12.5mA with an operating voltage of 9 – 32 Vdc.

The ICoT-FF version allows calibration and access to on-line diagnostic information via hand-held terminal or through software.

A set of hermetically sealed non-contact limit switches is an option that can be integrally supplied with the ICoT-FF.

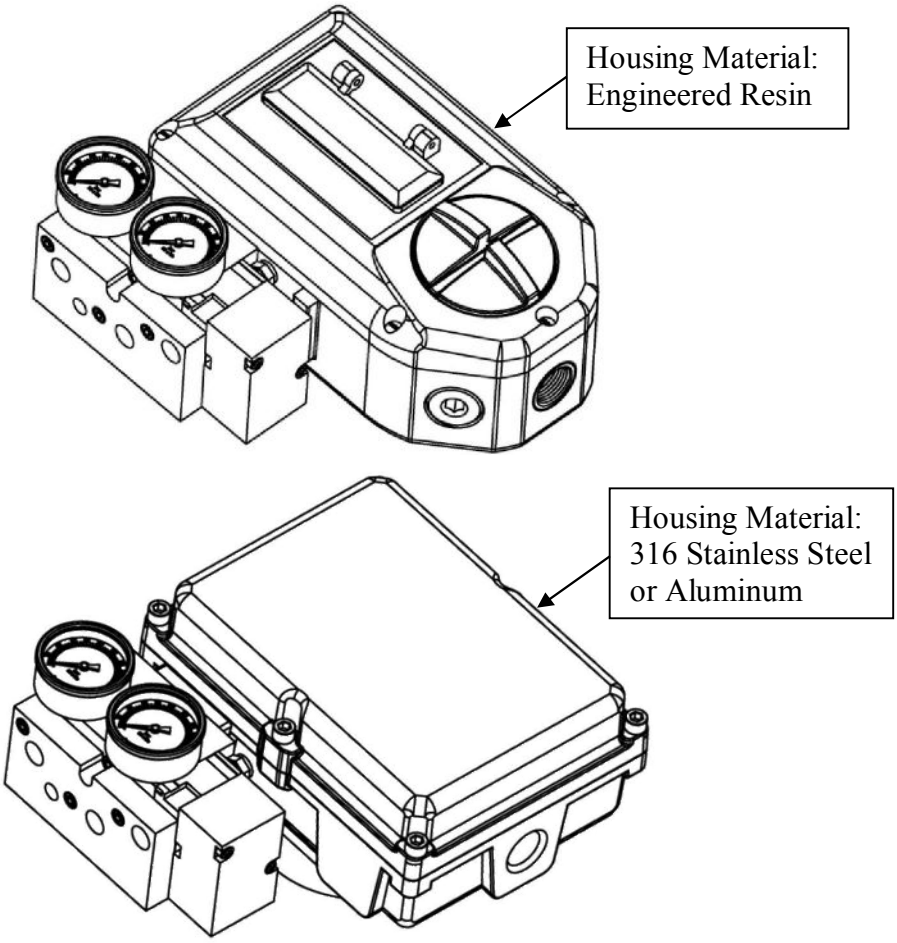
1.3. *Product Certification.*

IEC Ex FMG 06.0002x Ex ia IIC T4 (Tamb = -40°C to +80°C) II 1 G	Ex ia IIC T4 II 1 G (Ta = -40°C to +80°C) FM09 ATEX 0028 CE	IS / I,II,III / 1 / ABCDEFG / T4 Ta = 85°C WD-11704; Entity; Type 4, 10/AEx ia/Ex ia/IIC/T4 Ta= 80°C WD-11704; Entity; Type 4X NI/I /2 /ABCD;S/II, III/2/FG/ Ta= 85°C Type 4

This product is designed for use in intrinsically safe systems when connected through the correct barriers.

1.4. *Enclosures*

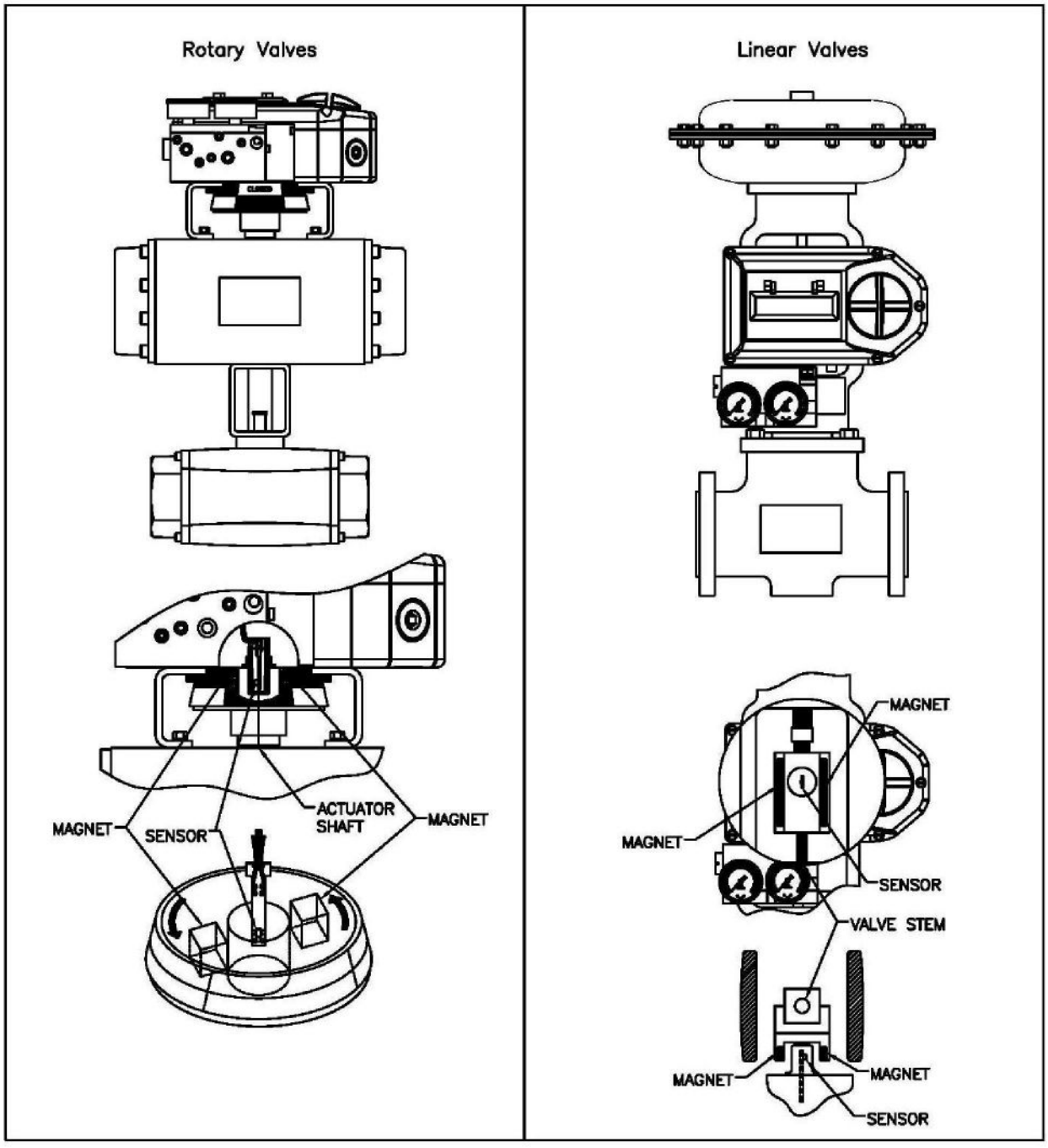
The ICoT-FF Positioner can be built in three different enclosure materials: engineered resin, 316 stainless steel and aluminum.



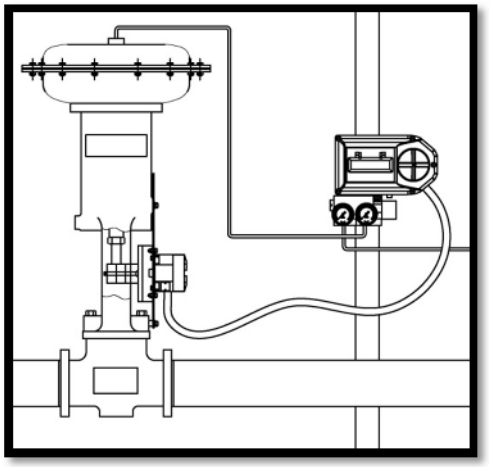
1.5. *Position Feedback*

Non-Contact Position Feedback

To provide consistently accurate performance information, all linkages, levers and connecting rods, from the positioner to the control valve have been eliminated from the design. Valve position sensing is performed totally by non-contacting means based upon characterization of magnetic flux strength as a function of position.

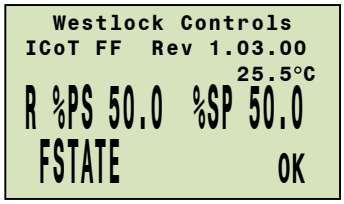


Remote Position Control
Since valve position feedback to the ICoT-FF positioner is accomplished by non-contacting means, the ICoT-FF has the unique ability to be mounted remotely (up to a distance of 50 feet, optionally 150 feet) from the device it is controlling. In the event the control valve is located in a high vibration or extremely corrosive environment, the non-contact position feedback feature allows for isolated placement of the positioner.



1.6. *Local Graphic LCD*

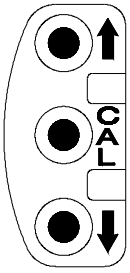
The ICoT-FF positioner is supplied with a digital communication interface FF or a 3-button keypad interface. Both versions are furnished with a graphic LCD, and allow for automated calibration of the positioner. The local LCD provides a multitude of onsite diagnostic information. The LCD shows input current, set-point and current position. The values displayed range from 0.0% to 100.0%. Displayed resolution is in 0.1% increments, however, internal calculations are maintained at higher precision.



1.7. *Other Features*

On-Board Sensors
The ICoT-FF positioner has the capability to monitor its operation. If an error or failure condition occurs, it will be displayed on the local LCD, or if the positioner is supplied with a FF interface, the error codes will be displayed on a hand held terminal or a PC maintenance station. Note: Error codes are denoted on a label affixed to the LCD flip-up protective cover.

Local Keypad
The positioner is provided with a ruggedized 3-button keypad. The keypad can be used for zero and span adjustments, as well as valve characterization and gain adjustments.



Intelligent Calibration via FF
The parameters of the FF ICoT-IS positioner are fully accessible via Fieldbus. Manual or Automatic calibration can be initiated via the bus and parameters for altering internal servo loop tuning are fully configurable. In this manner, positioner performance may be optimized with a wide combination of valves and actuators via Fieldbus.

Negligible Bleed
Designed to consume the least possible amount of control air at steady state, the ICoT-FF 5400 Series positioner can greatly reduce the air consumption of your process and reduce the demand on instrument air compressors. To increase reliability, the ICoT-FF employs a patented lapped spool and floating sleeve design. This balanced construction relies on an air bearing which eliminates any metal to metal contact.

2. **Ordering**

The ICoT FF positioner is designed to handle a wide range of control valve applications. Please use the following ordering guide to help choose the ICoT positioner that best suits the application.

ICoT 5400 (ICoT FF) Positioner Ordering Guide

INTELLIGENT POSITIONERS FOUNDATION FIELDBUS
ICOT 5400

SEE BELOW FOR HAZARDOUS RATINGS

Base Model
54 Foundation Fieldbus positioner (standard with IS)

Actuator Type
1 Linear* (Free magnet assy. Include up to 2-1/2" stroke; strokes>2-1/2", consult factory)
3 Rotary

Mounting Style
0 Direct Mount (ICoT mounted on actuator)
5 Remote Mount (ICoT mounted remote from actuator)
7 NAMUR Mount (order with stainless NAMUR mounting kit separately)
8 ModMount (for Morin MRP and 79U actuators only; supplied with mounting kit)

Hazardous Rating
NI Non-incendive (Class I, Div. 2, Groups A, B, C, D Class II, Div. 2, Groups F, G)
IS Intrinsically Safe (Class I, Div. 1 & 2, Groups A, B, C, D Class II, Div. 1, Groups E, F, G with approved I.S. barrier)
AI ATEX Ex ia IIC T4
II IEC Ex ia IIC T4

Housing Material
E Engineered Resin
S 316 Stainless Steel (Not listed for Hazardous Rating. Pending Approvals) (Mounting Style 0 & 5 only)
A Aluminum (Not listed for Hazardous Rating. Pending Approvals) (Mounting Style 0 & 5 only)

Supply Pressure
H High Pressure (40-120 psi)
L Low Pressure (15-45 psi)
V High Flow (40-120 psi, for larger actuators)

Calibration/Communication
F 3-button on-board keypad & Fieldbus Protocol

Conduit Entry
A One 1/2" NPT (F)
B One M20 (F)

Limit Switch Options
0 None
2 Two SPST hermetically Sealed switches** (NOT available w/ Mounting Style 7 or 8)

Position Transmitter Output
A None

Pneumatic connections
N 1/4" NPT (3/8" NPT with High Flow Option)
B 1/4" BSP (3/8" BSP with High Flow Option)
F 1/4" NPT w/ Filter-Regulator Assembly (3/8" NPT with High Flow Option)

54	3	5	IS	E	H	F	A	2	A	N	= Model Number **5435ISEHFA2AN**

* Linear valve stroke and fail position must be specified at time of quotation.
** Not available with "Linear" Actuators type or "Remote Mounting Style"

Note: When ordering a liner ICoT-FF positioner, (option "1" for the third digit in the part number) be prepared to supply the exact stroke length and fail direction of the application.

3. Initial Setup

3.1. *Mounting Positioner on a Rotary Actuator*

Step 1. Mount bracket and inner beacon coupler to actuator. If actuator shaft has a tapped hole, fasten using proper flat head screw. If actuator does not have a tapped hole, fasten using set screws on side of coupler. (See Figure 3-1)

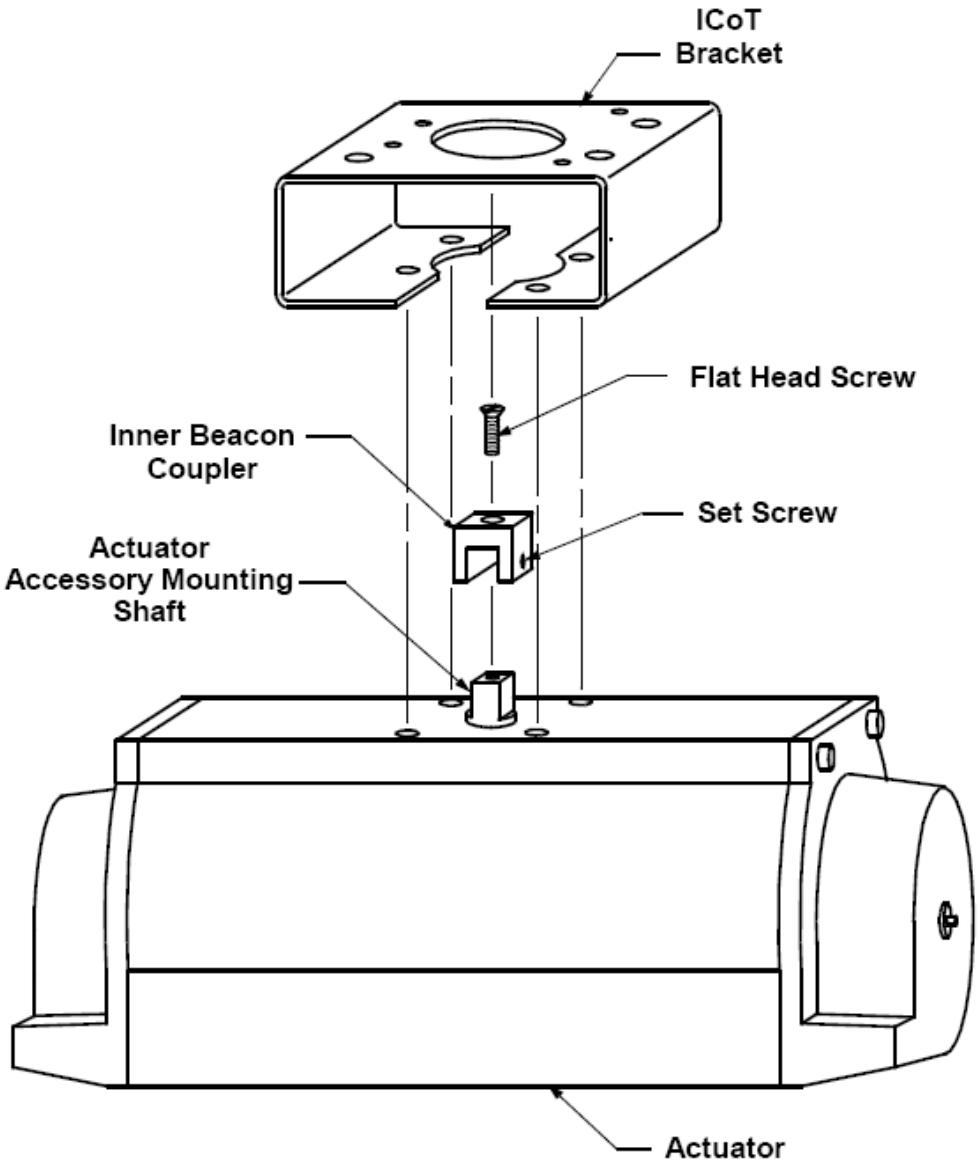


Figure 3-1

Step 2. Press fit the inner beacon to the inner beacon coupler. The inner beacon needs to be properly oriented. Use the symbols on the top of the inner beacon to mount as shown in Condition 1 or Condition 2. (see figure 3-2). Condition 1 and Condition 2 show the placement of the inner beacon with respect to the positioner housing while the actuator is in the fail position.

Step 3. Mount the positioner to the bracket. As stated in Step 2 make sure that the positioner is mounted in a fashion that properly orients it with respect to the inner beacon.

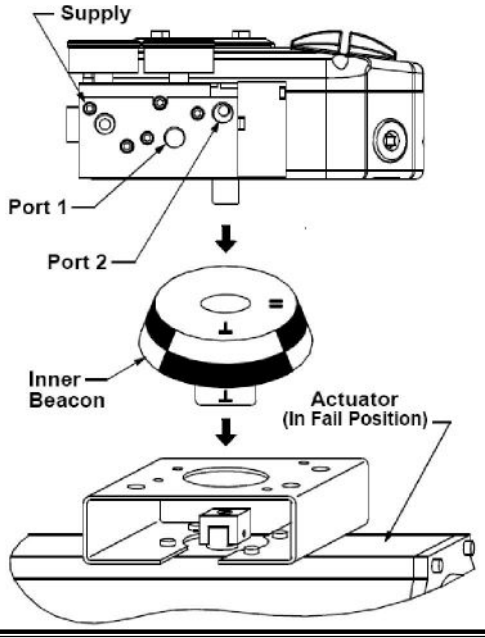
Condition 1: Actuator fails in a clockwise direction.

Spring Return
Output Port 2 is plugged
Output Port 1 is piped to turn the actuator counter clockwise

Double Acting
Output Port 2 is piped to turn the actuator clockwise
Output Port 1 is piped to turn the actuator counter clockwise

⊥ **Placed at 6:00**

‖ **Placed at 3:00**



Condition 2: Actuator fails in a counter clockwise direction.

Spring Return
Output Port 2 is plugged
Output Port 1 is piped to turn the actuator clockwise

Double Acting
Output Port 2 is piped to turn the actuator counter clockwise
Output Port 1 is piped to turn the actuator clockwise

⊥ **Placed at 9:00**

‖ **Placed at 6:00**

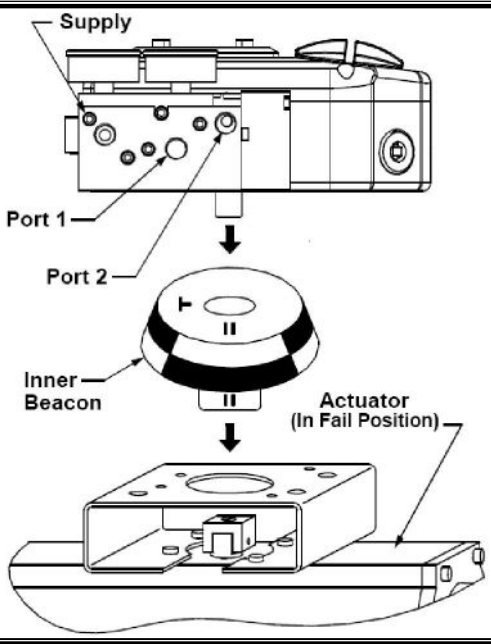


Figure 3-2

3.2. *Mounting Remote Positioner on a Rotary Actuator*

Step 1. Mount bracket and inner beacon coupler to actuator as described in Section 3.1 Step 1.

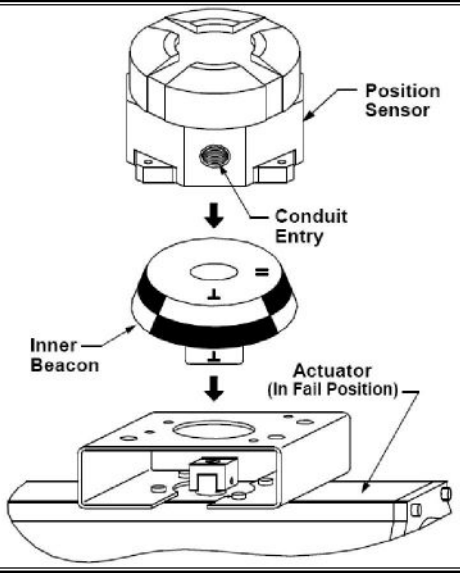
Step 2. Press fit the inner beacon to the inner beacon coupler. The inner beacon needs to be properly oriented. Use the symbols on the top of the inner beacon to mount as shown in Condition 1 or Condition 2. (See Figure 3-3). Condition 1 and Condition 2 show the placement of the inner beacon with respect to the position sensor housing while the actuator is in the fail position.

Step 3. Mount the position sensor to the bracket. As stated in Step 2 make sure that the position sensor is mounted in a fashion that properly orients it with respect to the inner beacon.

Condition 1: Actuator fails in a clockwise direction.

Spring Return
Output Port 2 is plugged
Output Port 1 is piped to turn the actuator counter clockwise
Double Acting
Output Port 2 is piped to turn the actuator clockwise
Output Port 1 is piped to turn the actuator counter clockwise

⊥ **Placed at 6:00**
II **Placed at 3:00**



Condition 2: Actuator fails in a counter clockwise direction.

Spring Return
Output Port 2 is plugged
Output Port 1 is piped to turn the actuator clockwise
Double Acting
Output Port 2 is piped to turn the actuator counter clockwise
Output Port 1 is piped to turn the actuator clockwise

⊥ **Placed at 9:00**
II **Placed at 6:00**

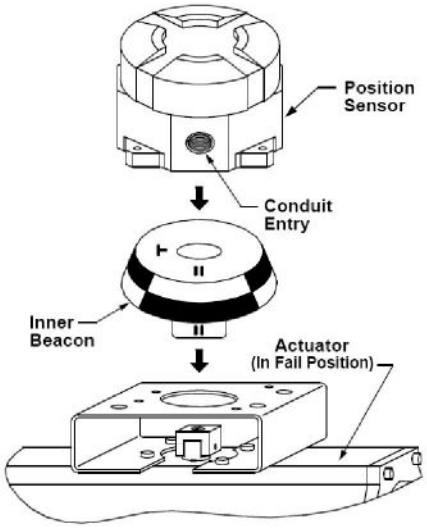


Figure 3-3

Step 4. Mount positioner at a remote location.

Step 5. Remove the electronic canister cover by unscrewing (2) mounting screws. (Appendix B: Procedure to Remove Electronics Cover and Electronic Canister)

Step 6. If necessary cut remote cable to required length, making sure to cut end opposite female connector. Wire the positioner sensor back to the positioner using the cable provided and replace cover. (See Figure 3-4).

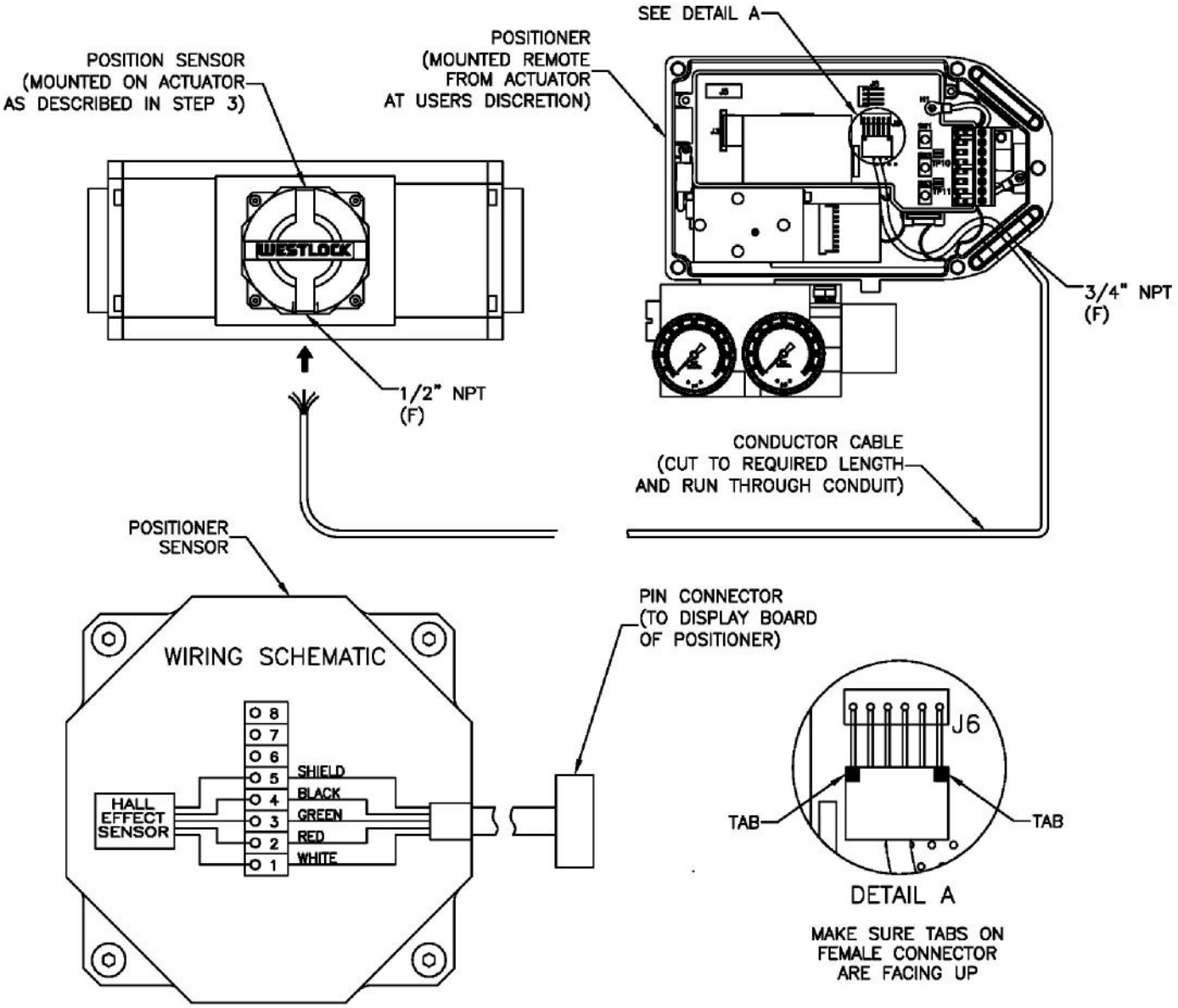


Figure 3-4

3.3. *Mounting Positioner on a Linear Actuator*

Step 1. Mount the magnet assembly to the stem of the actuator. A coupler block normally is needed to extend the magnet assembly outside the yoke area and into the sensing range of the magnetic pick-up unit.

Step 2. Fasten the mounting bracket to the actuator.

Step 3. Mount the positioner to the mounting bracket. The positioner should be mounted so the magnetic pick-up unit of the positioner is centered between the limits of the magnetic assembly's stroke. After mounting the positioner, the magnet assembly should be within 1/8" from the back of the positioner (1/16" is ideal), (See Figure 3-5)

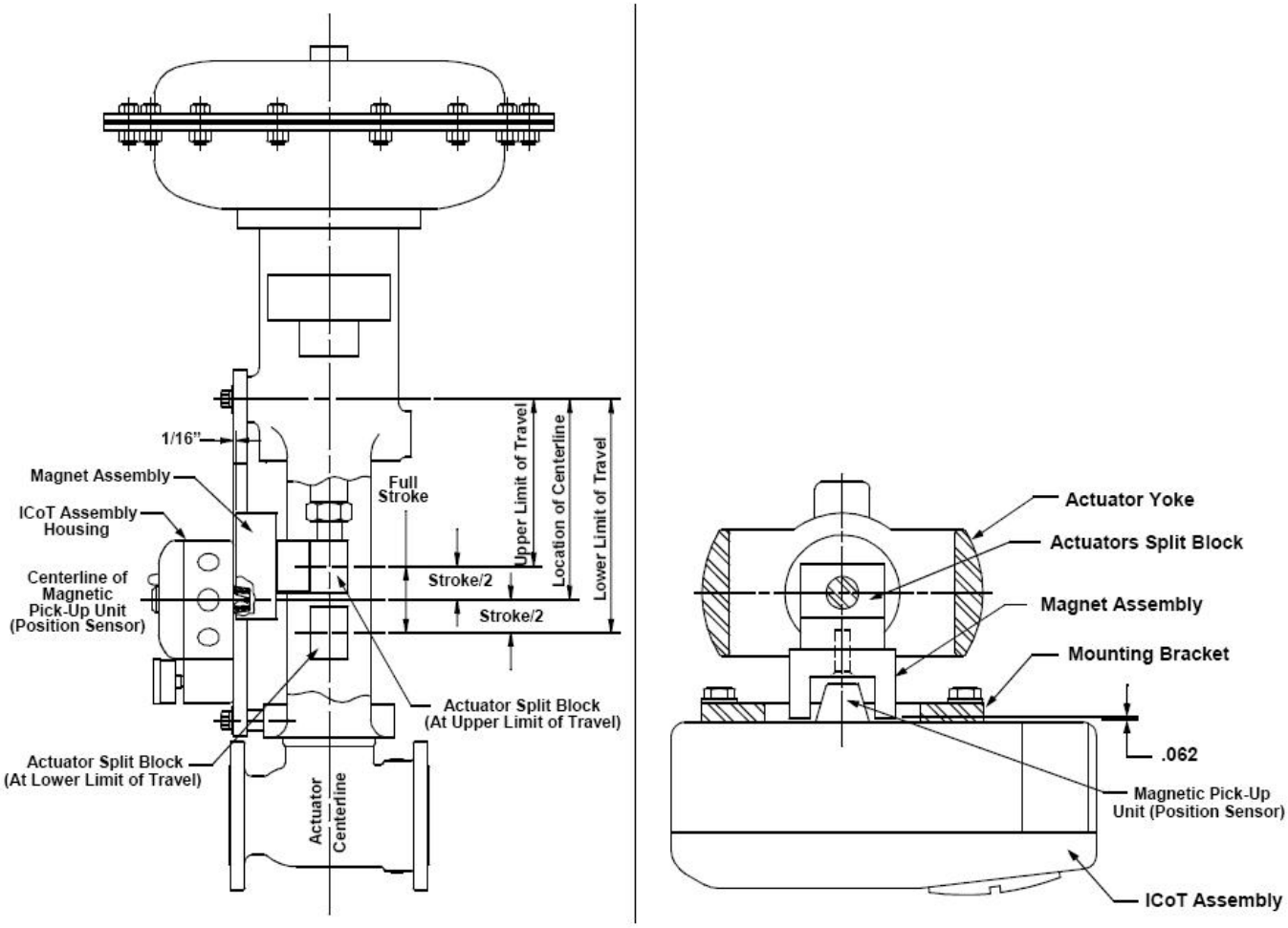


Figure 3-5

Note: For Fisher actuators model 657 & 667 sizes 34 thru 70, Westlock Controls can supply a slotted mounting kit design. This will allow the user to easily center the positioner sensor between the limits of the magnet assembly's stroke. Other mounting kits are available upon request.

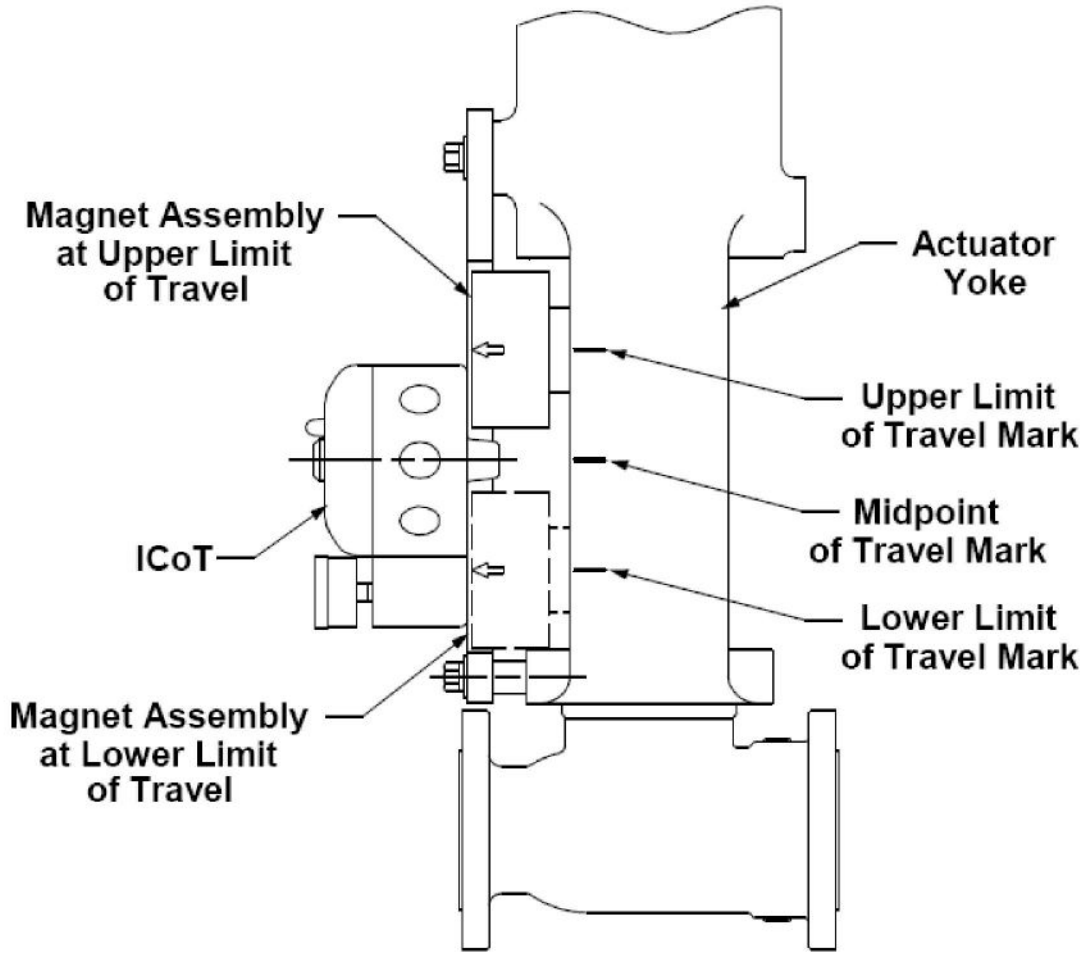


Figure 3-6

To Center the Positioner

1. Stroke the actuator to its upper limit and place a mark on the actuator's yoke that lines up with the red arrow on the magnet assembly.

2. Stroke the actuator to its lower limit and place a mark on the actuator's yoke that lines up with the red arrow on the magnet assembly.

3. Place a third mark on the yoke centered between the upper and lower limit marks.

4. Lastly, mount the positioner to the bracket so that the positioner sensor (nose) of the ICoT lines up with the midpoint mark. (See Figure 3-6).

3.4. *Mounting Remote Positioner on a Linear Actuator*

Step 1. Mount the magnet assembly and bracket to the actuator as described in Section 3.3 Step 1.

Step 2. Mount the position sensor housing so that the conduit entry faces away from the diaphragm or cylinder. (See Figure 3-7)

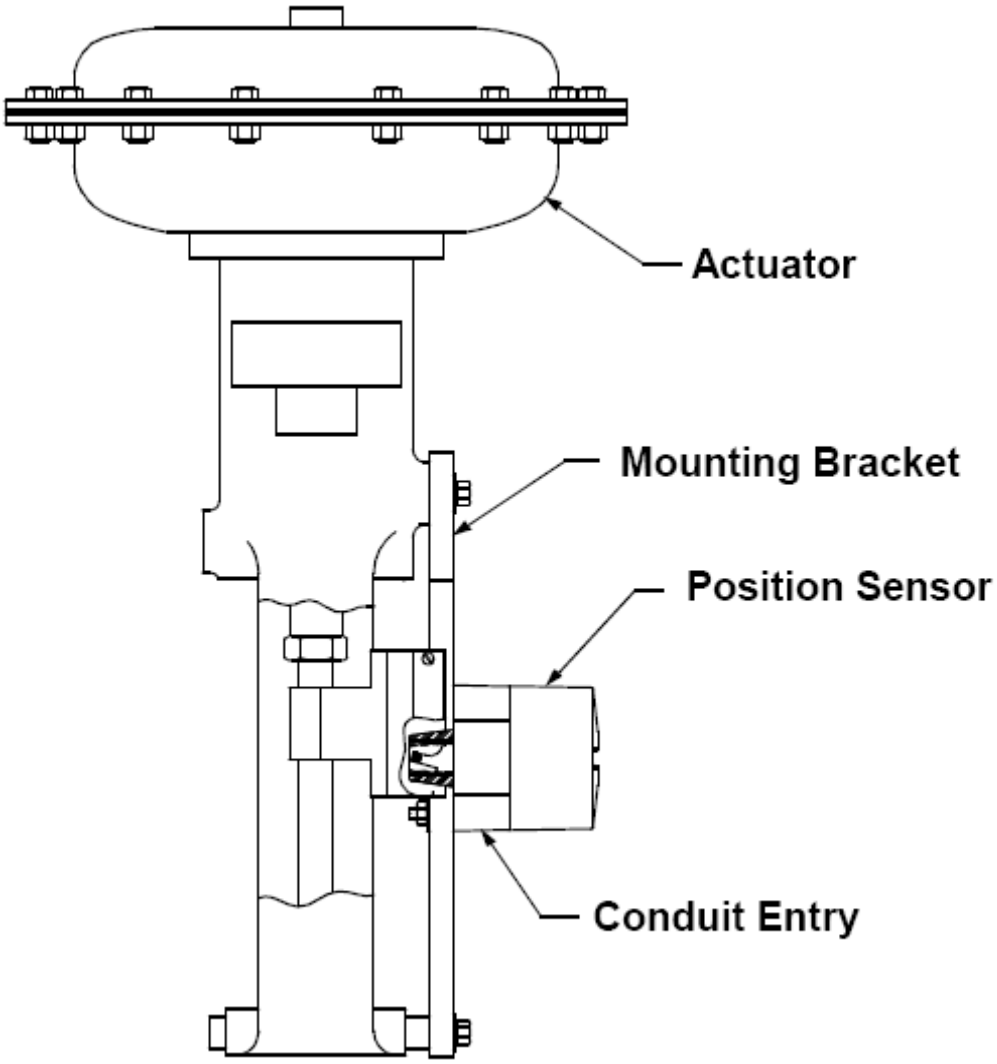


Figure 3-7

Note: For Fisher actuators model 657 & 667 sizes 34 thru 70, Westlock Controls supplies a slotted mounting kit design, to ease the mounting process. This will allow the user to easily center the positioner sensor between the limits of the magnet assembly's stroke. Other mounting kits are available upon request.

Step 3. Mount positioner at a remote location,

Step 4. Remove the electronic canister cover by unscrewing (2) mounting screws. (Appendix B: Procedure to Remove Electronics Cover and Electronic Canister)

Step 5. If necessary cut remote cable to required length, making sure to cut end opposite female connector. Wire the positioner sensor back to the positioner using the cable provided and replace cover. (See Figure 3-8).

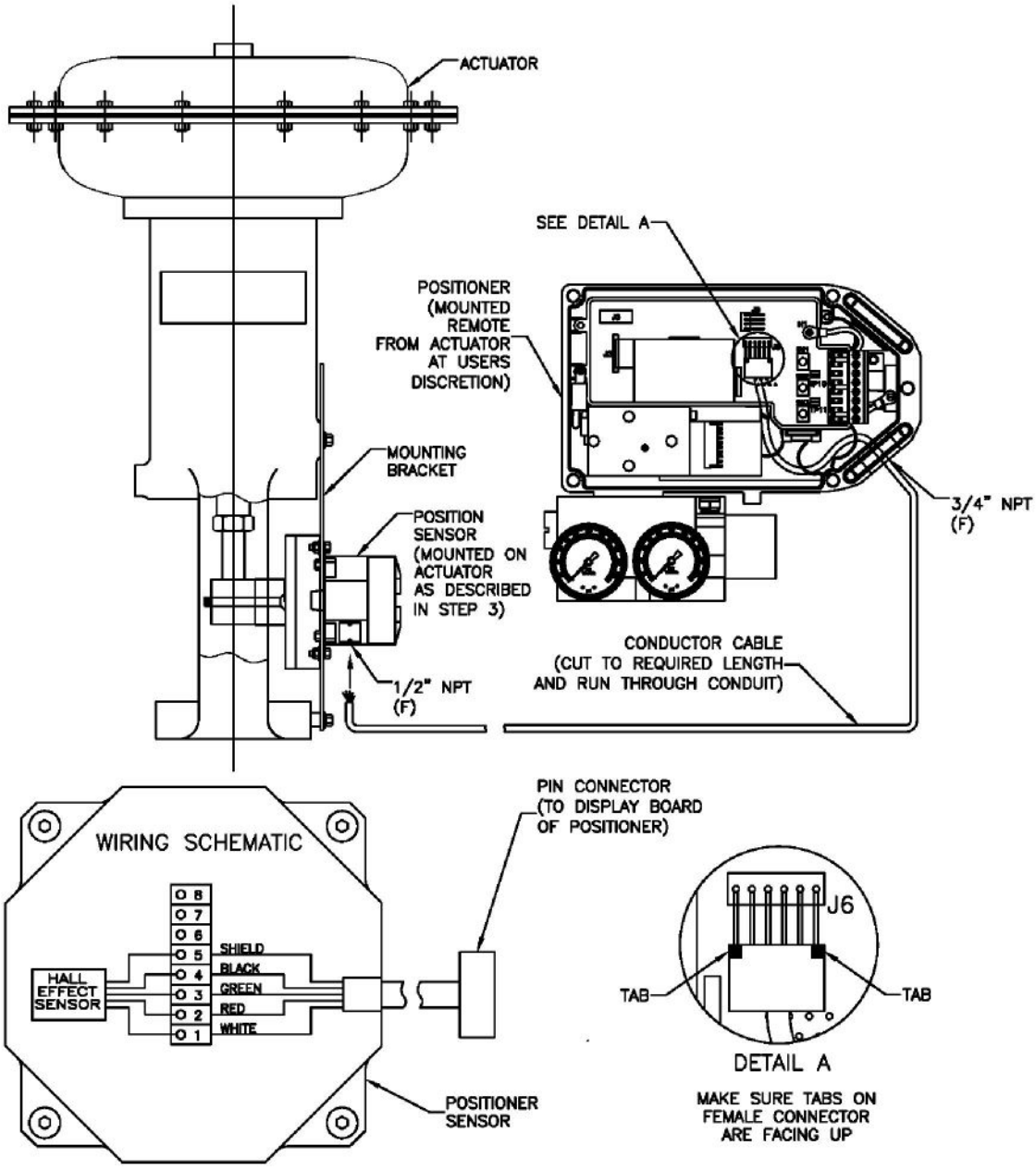


Figure 3-8

3.5. *Pneumatic Connection*

Single Acting Actuator (Spring Return):
For single acting actuators Outlet Port 2 is to be plugged. Outlet Port 1 is to be piped to the actuator inlet port that acts against the spring. (Increasing set-point signal causes pressure to increase in Outlet Port 1 of the positioner).

Double Acting Actuator (Double Return):
For double acting actuators Outlet Port 2 is piped to drive the actuator towards the fail position. Outlet Port 1 is piped to drive the actuator away from the fail position. (Increasing set-point signal causes pressure to increase in Outlet Port 1 of the positioner and pressure to decrease in Outlet Port 2 of the positioner).

Note: Air supply to the positioner must be clean, dry, oil free instrument air per ISO 8573-3.

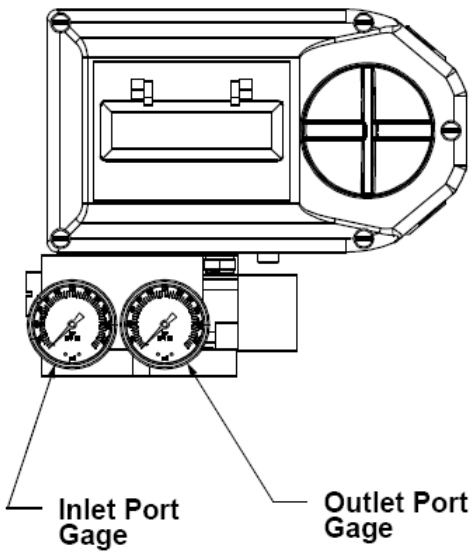
Maximum Particle Size and Concentration of Solid Contaminants

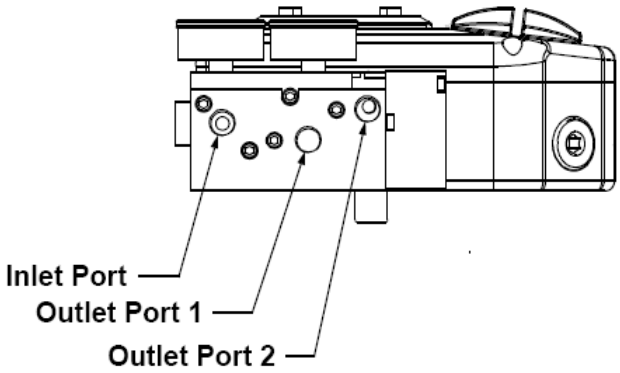
Class	Maximum Particle Size (Microns)	Maximum Concentration (mg/m^3)
3	5	5

Maximum Oil Content

Class	Maximum Concentration (mg/m^3)
3	1

Maximum supply pressure is 120 psi. All pneumatic connections are 1/4” NPT.





1. Single Acting/Spring Return (Plug Outlet Port 2) increasing signal causes pressure to increase in Outlet Port 1.
2. Double Acting/Double Return (Pipe Outlet Port 2 to drive actuator towards the desired failure direction) increasing signal causes pressure to decrease in Outlet Port 2 and pressure to increase in Outlet Port 1.

Notes:
1. On loss of electrical power Outlet Port 1 has zero pressure and Outlet Port 2 has full pressure.

Figure 3-9

3.6. *SPECIAL NOTE Flow Capacity:*

ICoT 5400 standard flow design is suitable for actuator swept volumes of a minimum 40 inch^3 (0.65 liters) to a maximum of 600 inch^3 (9.80 liters) for proper Auto Calibration functionality. It should also be noted that this is to be used as a general guideline only. The actuator/ valve package dynamics would dictate the success of the Auto calibration routine and could be compromised by the following: instrument air supply, volume capacity, actuator sizing, tubing size and actuator/valve health.

ICoT 5400 Optional High Flow design is suitable for actuator swept volumes of a minimum 200 inch^3 (3.2 liters) to a maximum of 1000 inch^3 (16.30 liters) for proper Auto Calibration functionality. It should also be noted that this is to be used as a general guideline only. The actuator/ valve package dynamics would dictate the success of the Auto calibration routine and could be compromised by the following: instrument air supply volume capacity, actuator sizing, tubing size and actuator/valve health.

3.7. *Electrical Connection*

A) The certification applies to equipment without cable glands. When mounting the enclosure in the hazardous areas, only suitably certified cable glands and blanking elements must be used to maintain ingress protection of IP66.

B) All unused cable entries must be plugged with suitably certified plugs that can maintain an ingress protection level of IP66.

C) The positioner, switches, sensors and coils shall be electrically connected suitable to the rated data via a certified isolating interface/zener barrier placed outside the hazardous areas.

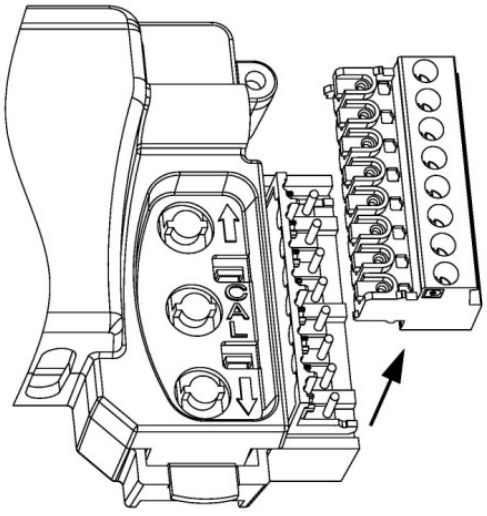
D) For ambient temperatures below -10°C and above +60°C, use field wiring suitable for both minimum and maximum ambient temperatures.

E) Electromagnetic compatibility (emissions and susceptibility) is guaranteed if, and only if, the unit and all cables are shielded and grounded as illustrated in Appendix E.

F) The ICoT FF was designed to be used according to the FF specifications. For more details of how to setup the installation of the ICoT FF as well as any other FF device please refer to the following standards:

- IEC 61158-2: 2010, Fieldbus standard for use in industrial control systems – Part 2: Physical Layer specification and service definition.
- ISA dS50.02, Part 2 Amendment; Fieldbus Standard for Use in Industrial Control Systems - Part 2: Physical Layer Specification and Service Definition, Amendment to Clause 22 (Formerly Clause 11 and 24).

1. Remove positioner cover.
2. Locate terminal strip and carefully disconnect (slide off).
3. Connect the Fieldbus signal, blue (-) to terminal point 7 and brown (+) to terminal point 8. See figure 3-10 for a wiring schematic.
5. If the positioner was ordered with switches, connect to the switches at terminal points 1 thru 4, as shown in Figure 3-10.
6. After all connections have been made reconnect the terminal strip and replace positioner cover.



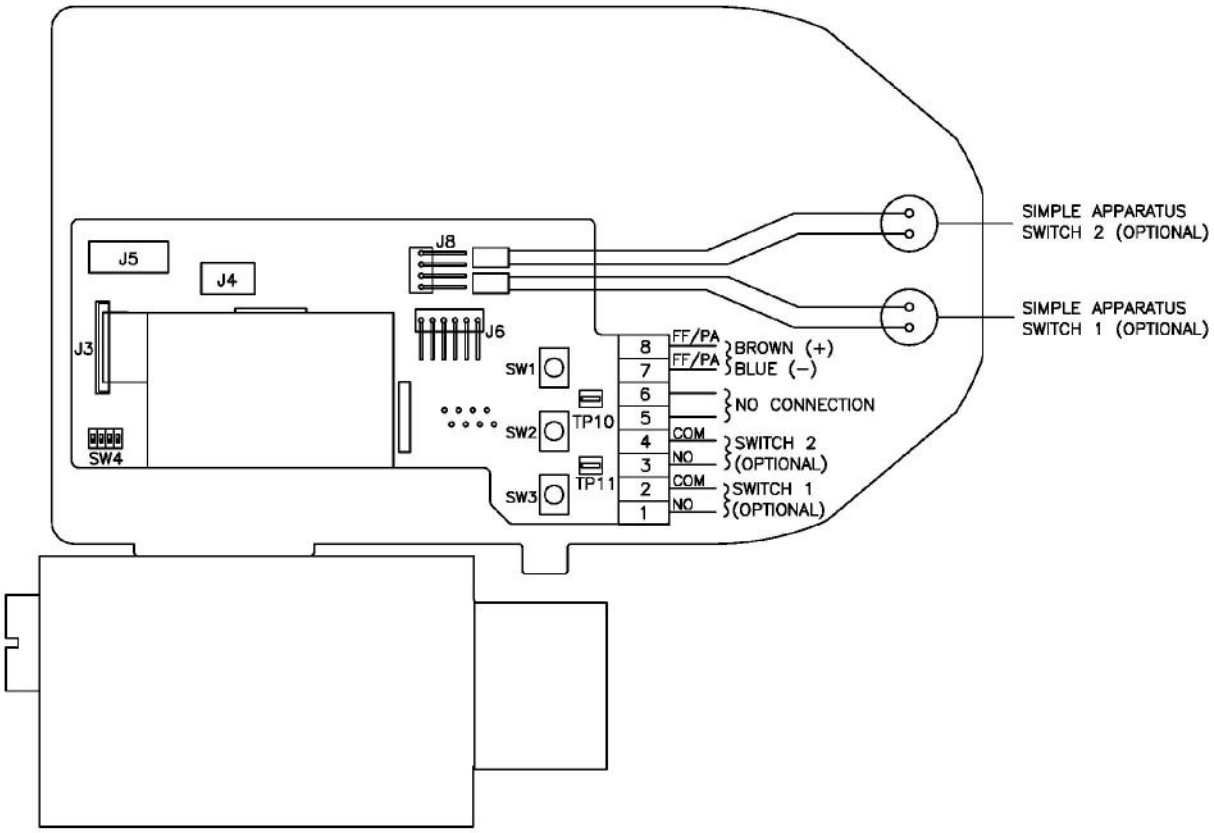


Figure3-10

3.8. *Setting of switches on a rotary ICoT*

1. Operate the actuator to the desired extreme.
2. Loosen magnetic trigger bolt #1. (See Figure 3-11)
3. Slide trigger bolt #1 beneath the first switch and tighten with wrench.
4. Operate the actuator to the opposite extreme.
5. Loosen magnetic trigger bolt #2.
6. Slide trigger bolt #2 beneath the second switch and tighten with wrench.

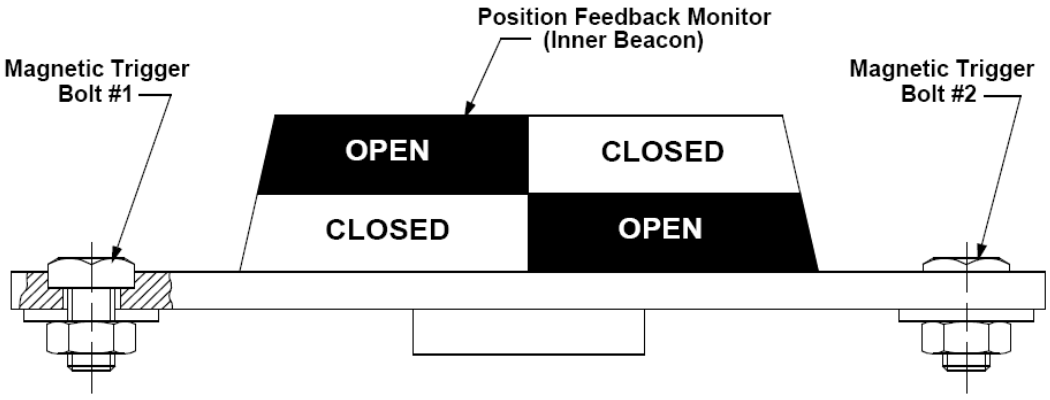
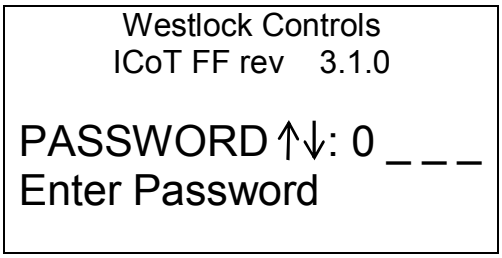


Figure 3-11

4. Calibration and Configuration

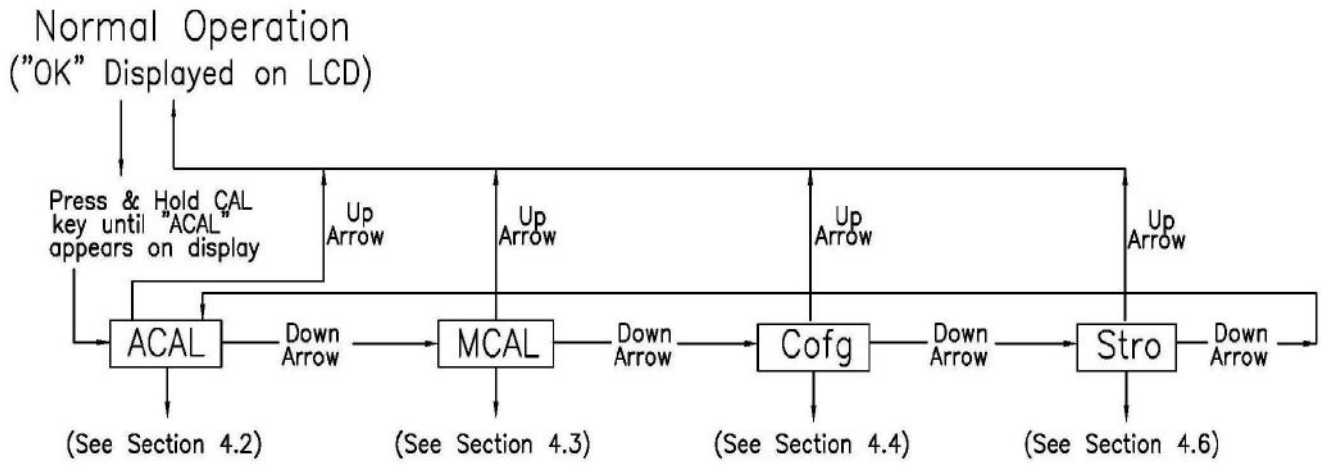
The ICoT-FF positioner has an on-board menu structure that can be accessed by pressing the Cal button. Exit any function by pressing both up and down arrow buttons simultaneously, anytime during calibration.

If both up and down arrow buttons are pressed while in the main screen it goes to PASSWORD screen, as shown below. This function is for internal use only and should not be used by the operator. To exit PASSWORD function press both up and down arrow buttons.



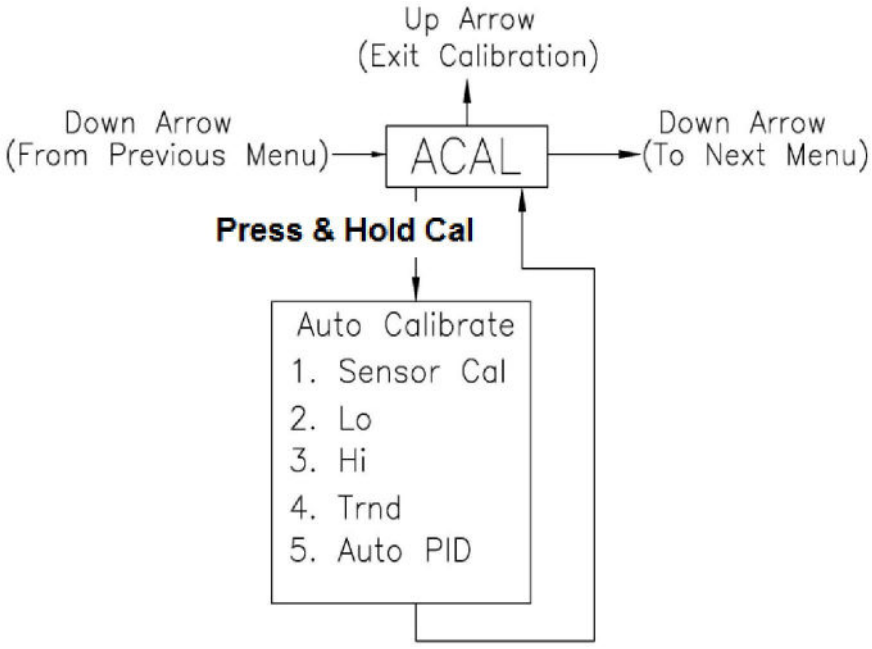
4.1. *Enter Calibration (Menu Level)*

Enter the calibration menu by pushing the CAL button. **ACAL** (Auto Cal Menu) is the first of four menus. By pressing the CAL button again takes the user to a lower level menu or starts a routine. Pushing the down arrow button can cycle through the menus. The remaining three menus are **MCAL** (Manual Cal Menu), **Cofg** (Configuration Menu), and **Stro** (Manual Position Override Menu). Pushing the up arrow exits the menu or takes the user to an upper level menu. The menu level is shown below.



4.2. *Automatic Calibration (ACAL)*

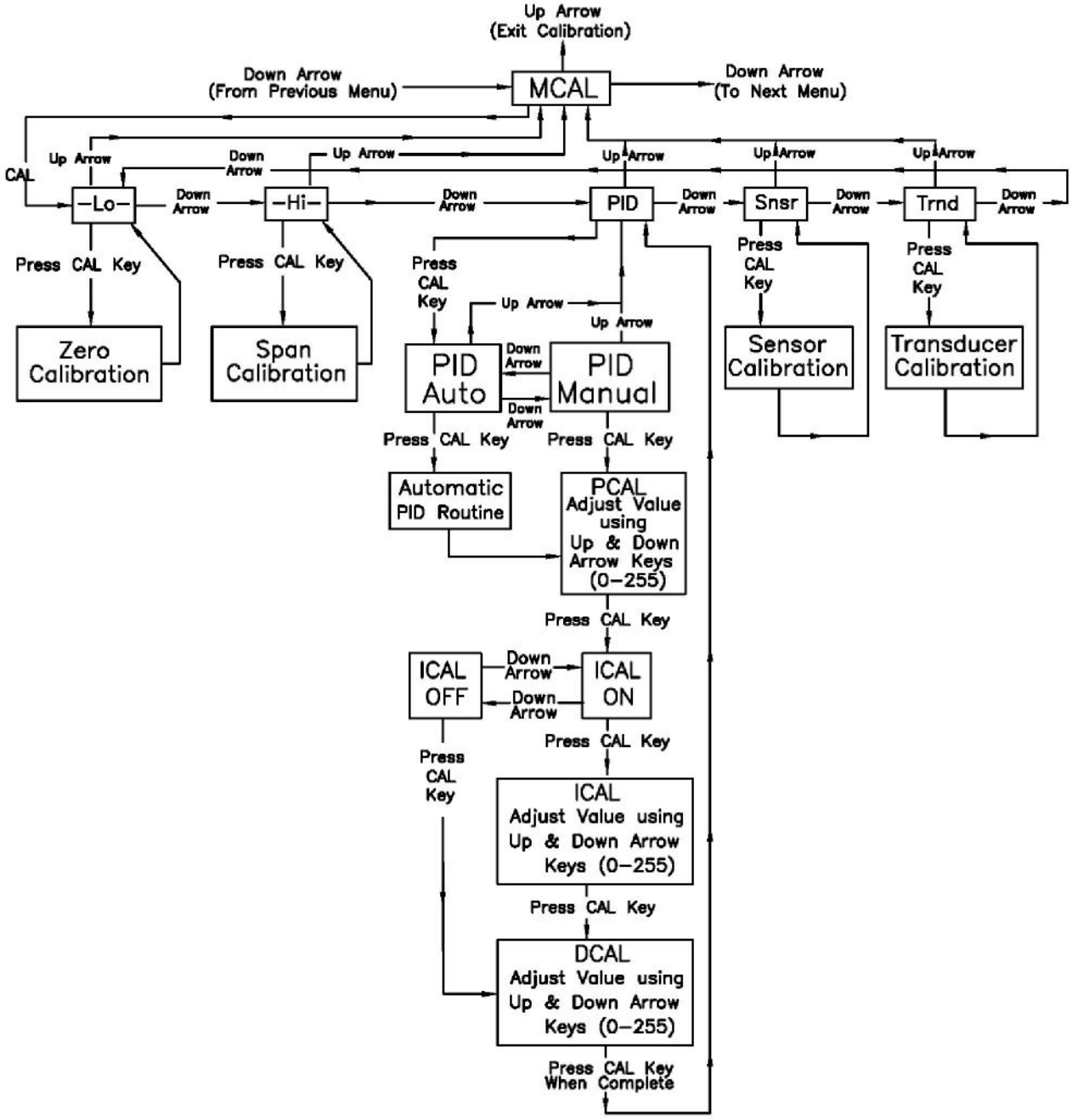
The Automatic Calibration (ACAL) performs several self-adjustments, as well as a zero calibration, a span calibration, and tunes the positioner's PID gain settings. From the normal operation screen, press the CAL button until ACAL is shown on the display (the ACAL routine is shown to the right). Press and hold the CAL button until it starts the automatic calibration



Automatic calibration goes through five sequences, when complete it goes back to ACAL Manu. This Calibration is adequate for most applications. If no advanced calibration is required proceed to Section 4.4 to exit calibration.

4.3. *Manual Calibration (MCAL)*

If advanced settings are required to fine tune the positioner, proceed with Manual Calibration Menu (MCAL). Follow MCAL routine shown below.



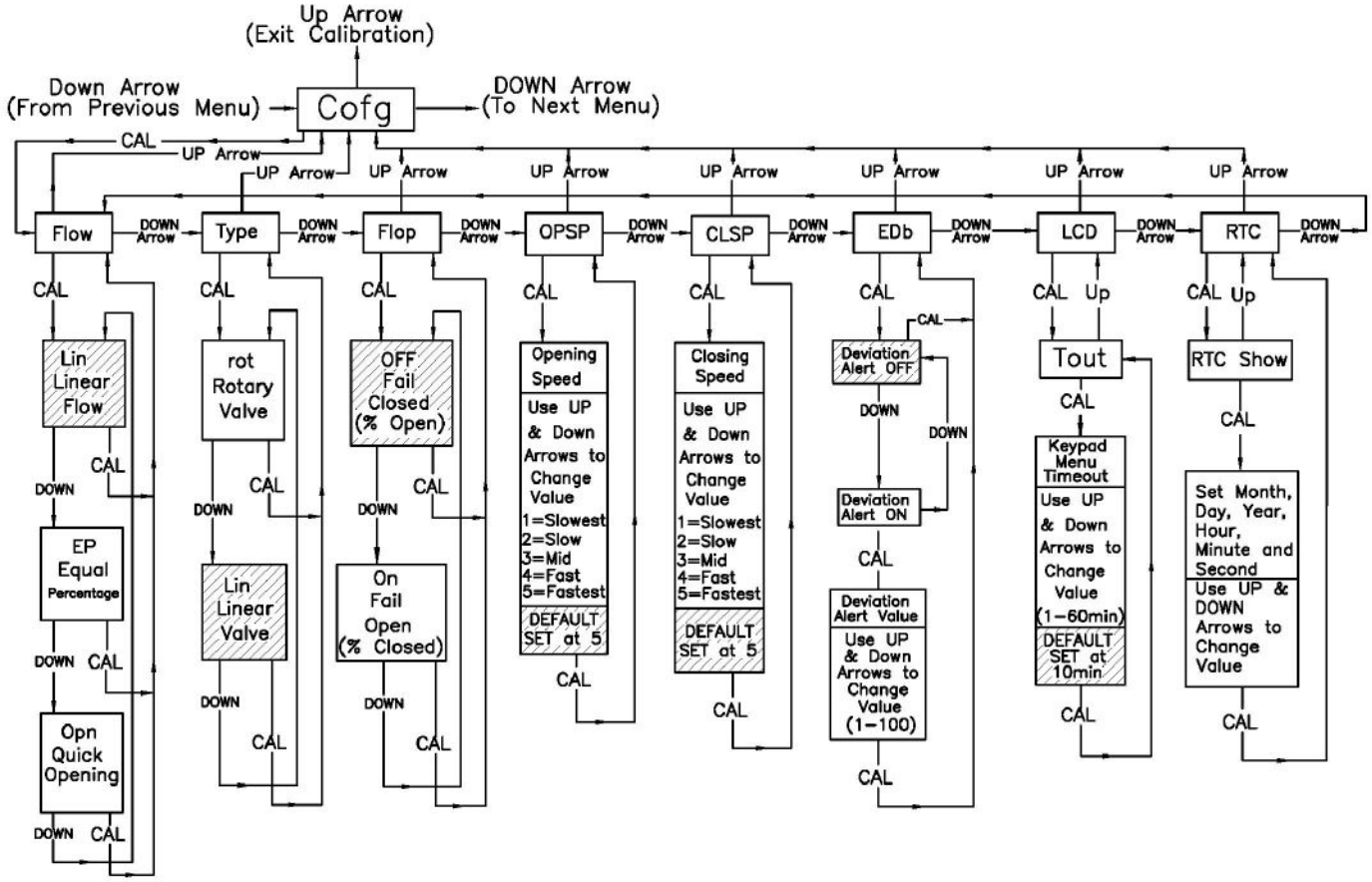
4.4. *Exiting Calibration*

To exit calibration mode and return to normal operation use the **up arrow** key as follows:

1. If the positioner is at **Menu level** in the calibration, as determined by LCD displaying a Menu name only (**MCAL**, etc.), press the **up arrow** key once to exit **CAL** mode.
2. If the positioner is at **function level** in the calibration, as determined by LCD displaying a function and Menu name only (**MCAL Lo**, etc.), press the **up arrow** key once to enter the Menu level and once more to exit **CAL** mode.
3. If the positioner is performing any calibration function (e.g., **ACAL Trnd**), press up and down key simultaneously to abort the current operation and go to the normal operation screen.
4. When the calibration mode is exited the Menu and function names will no longer be displayed by the LCD. The LCD will be displayed "OK".

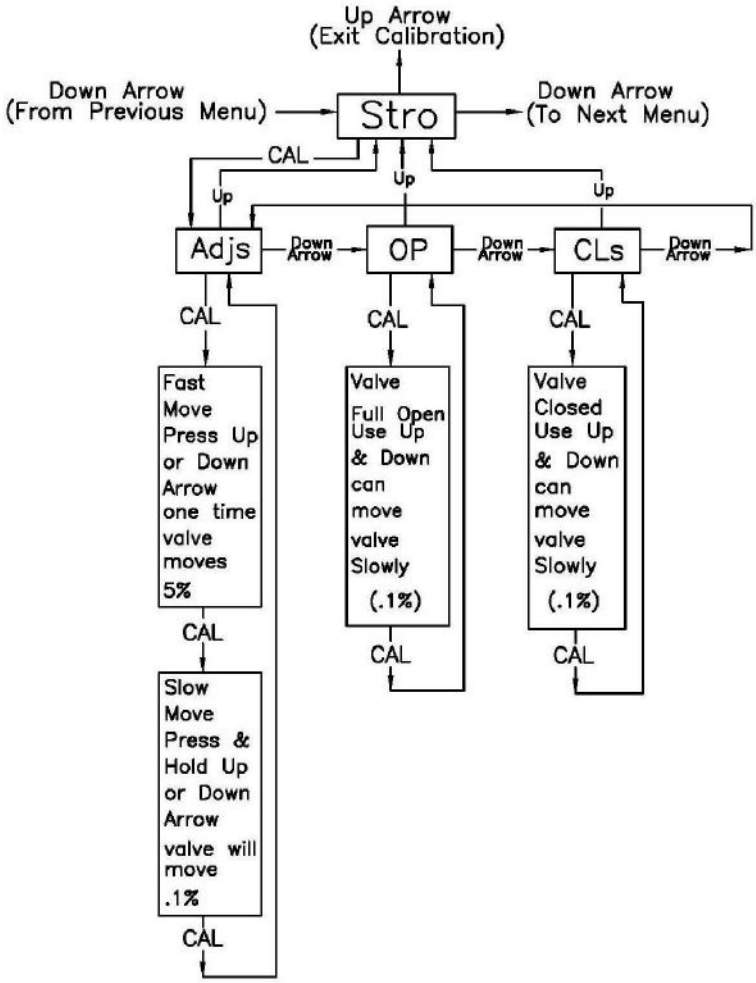
4.5. *Configure the Positioner's Parameters (Cofg)*

From the menu level press the down arrow button until the Cofg (Configuration Menu) is shown on the display (Configuration Routine Shown Below). Enter Cofg menu and change any of the parameters, if other than the factory settings are needed. The factory settings are shaded.



4.6. *Manual Override of Input Signal Via On-Board Keypad (Stro)*

The positioner has a feature which allows the operator to override the analog set-point signal and change valve position from the keypad. This is done from the **Stro (Manual Override-Stroke Menu).** Enter calibration as described in section 4.1 and use the down arrow button to cycle to the **Stro** menu. Enter this menu and control the position of the valve as shown in routine to the right.



4.7. *Description of Menus*

The calibration functions of the positioner are organized into the following four menus:

Menus

- Menu 1: **ACAL (Automatic Calibration)**
- Menu 2: **MCAL (Manual Calibration)**
- Menu 3: **Cofg (Configuration)**
- Menu 4: **Stro (Manual Override of Input Signal)**

Menu descriptions are as follows:

Menu 1: ACAL (Automatic Calibration)

Entering this menu allows you to initiate an approximately seven minute self-calibration function. The positioner will automatically enter digital control mode and perform a shallow **(input current independent)** calibration in the following sequence:

Function

1. **-Snsr-** Sensor Calibration
2. **-Lo-** Low (Zero) Calibration
3. **-Hi-** High (Span) Calibration
4. **-Trnd-** Transducer Calibration
5. **-Auto-** Automatic PID Tuning

Menu 2: MCAL (Manual Calibration)

Entering this menu allows you access to the following four calibration functions via the keypad:

1. **-Lo-** Low (Zero) Calibration
2. **-Hi-** High (Span) Calibration
3. **-PID-** Proportional, Integral and Derivative Gain Adjustment
4. **-Snsr-** Sensor Calibration
5. **-Trnd-** Transducer Calibration

Menu 3: Cofg (Configuration)

Entering this menu allows you access to the following five configuration functions via the keypad:

1. **-Flow-** Positioner Output Flow Characteristics
2. **-Type-** Positioner Recognition of Magnetic Feedback, Rotary or Linear
3. **-Flop-** Positioner Fail Position, Open or Closed
4. **-OPSP-** Positioner Opening Speed Adjustment
5. **-CLSP-** Positioner Opening Speed Adjustment
6. **-EDb-** Positioner Operating Dead-band Adjustment
7. **-LCD-** LCD Menu Timeout Adjustment
8. **–RTC-** Real Time Clock Adjustment

These functions allow display, speed and valve characteristic changes from standard factory settings.

Menu 4: Stro (Manual Override of Input Signal)

Entering this menu allows you access to the following three stroking functions via the keypad:

1. **-Adjs-** Adjustment of Positioner to Any Position Using Keypad Arrows
2. **-OP-** Open, Sets the Valve to the Full Open Position
3. **-CLS-** Close, Sets the Valve to the Full Closed Position

These functions set the positioner to digital control mode (**network independent**) and therefore allow override of the network setpoint control signal.

4.8. *Description of Functions*

LO This function serves to set the fail position of the actuator/valve. Initially during this calibration the valve is driven to the fail position (hard stop). The user will notice full pressure to Outlet Port 2 and zero pressure to Outlet Port 1. After a short period of time pressure will increase in Outlet Port 1 and the valve will be driven to the fully energized position and then back to the fail position. At this point the user has the option to select the hard stop as low (zero) position or to select an arbitrary position as low (zero) position.

HI This function serves to set the fully energized (full travel) position of the actuator/valve. initially during this calibration the valve is driven to the fully energized (full travel) position (hard stop). The user will notice full pressure to Outlet Port 1 and zero pressure to Outlet Port 2. At this point the user has the option to select the hard stop as the high (span) position. or to select an arbitrary position as the high (span) position.

PID The PID function allows the user to modify the PID settings of the positioner so the user can optimize the dynamic response of the positioner **regarding the** speed of response, overshoot and **steady-state** error by varying the appropriate gain settings. This function is often used to fine tune the PID values obtained from the automatic calibration function (**ACAL**). The PID entry allows the user to modify the tuning parameters in two different ways:

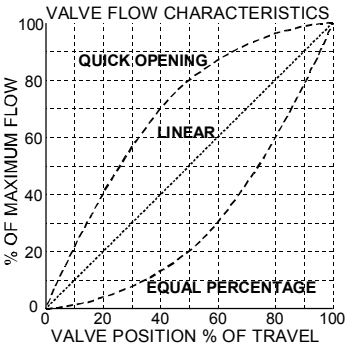
1. **Auto PID:** this option triggers the Auto PID procedure. It will override the positioner control and will modulate the valve in order to automatically find out the best P, I and D parameters.

2. **Manual Tuning:** the Fine Tune Proportional (PCAL), Derivative (DCAL) and Integral (ICAL) gain settings can be varied incrementally on a scale from 1-255. The fine tuning values are directly related to the PID mathematical formula time constant values (Ti or Td) and the Proportional gain value (Kc). The proportional gain (Kc) has a direct effect on the system response time. As Kc is increased the valve movement response time becomes faster and the error between setpoint and actual position becomes less. The drawback of increasing the value of the Kc is that the overshoot and settling time will increase. If Kc is increased too much the valve's position control becomes unstable, oscillating for ever around the set point. The integrative term (Ti) affects the dynamic response of the position control by damping the positioner response according to the Ti value. So a lower value of Ti will have less damping of the dynamic response. This means the lower the Ti the more oscillations are observed before the stabilization of the position and vice-versa. However, the higher the value of Ti the longer will be the settling time. Regarding the Derivative term (Td), the greater its value the greater will be the derivative effect. Different from the proportional gain and integrative term, the derivative term is not proportional to the error but to the rate of change of the position. The effect of increasing Td is to decrease the overshoot and the control reaction to the rate of change of the position. The drawback of increasing the Td too much is that the control system can become more unstable.

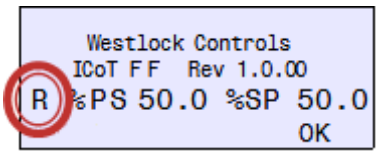
Snsr The sensor calibration is a self-adjustment that sets the positioner's Hall-Effect circuitry. This is automatically done during the **ACAL (Automatic Calibration)** routine. The sensor calibration also shows up under the **MCAL** menu. This calibration only needs to be performed under the **MCAL** routine when the positioner is set-up on a new application and only if the **ACAL** routine is not performed.

Trnd The purpose of this function is to calibrate the positioner's pressure transducer. It should be performed only after a manual sensor calibration.

Flow This function allows for the setting of the flow characteristic of the positioner. This allows you to adjust the "positioner-setpoint" to "actual-valve-position" ratio to compensate for non-linear valve flow characteristics. This can be used so the "positioner-setpoint" will represent a closer approximation to the actual process flow. The options are **Lin (Linear)**, **EP (Equal Percentage)** and **Opn (Quick Opening)**. When Equal Percentage and Quick Opening are used the Setpoint and valve Position will display a modified value, not the actual Setpoint sent to the ICOT2-FF. For instance if Quick Opening is selected and a Setpoint of 20% is sent to the ICOT2-FF the LCD will display %SP 36.9 and when it reaches position (at 36.9% open) it will display %PS 36.9. The **Lin (Linear)** positioner characteristic duplicates the inherent characteristic of the valve and is the most often used setting.



Type This function configures the positioner for the type of valve. The options are **rot (Rotary)** and **lin (Linear)**. This setting needs to be done in order to configure the positioner to recognize the type of magnetic feedback being given to the positioner. This setting is shown on the left side of the LCD.



FLOP This function allows the user to configure the positioner to match the failure method of the valve/actuator. The options are **"off"** or **"on"**. The **"off"** option is for fail closed applications and the "on" option is for fail open application. When **"off"** is chosen the LCD will read 0% at the **zero (Lo Calibration)** and 100% at the **span (Hi Calibration)**. When **"on"** is chosen the LCD will read 100% at the **zero (Lo Calibration)** and 0% at the **span (Hi Calibration)**.

OPSP This function allows for the setting of the opening speed of the actuator/valve. The range is 1 thru 5. Setting 5 is the fastest opening speed and setting 1 is the slowest opening speed.

Setting	Approx.% Dynamic Speed
5	100%
4	80%
3	60%
2	40%
1	20%

CLSP This function allows for the setting of the closing speed of the actuator/valve. The range is 1 thru 5. Setting 5 is the fastest closing speed and setting 1 is the slowest closing speed.

Setting	Approx.% Dynamic Speed
5	100%
4	80%
3	60%
2	40%
1	20%

EDb This feature configures the positioner's operating dead-band. When the actual position is within the setpoint by less than the deadband amount no position correction will be applied. The configuration options are **"off"** and **"on"**. The positioner is factory set as **"off"**. When the dead-band feature is **"off"** it operates with nominal value of ± 0.3% of full scale for dead-band. When the feature is turned **"on"**, the dead-band can be set using the up and down arrow buttons to a value from 1 to 20. The value 1 **(lowest dead-band when turned "on")** has a dead-band range of 1%, which is equivalent to a dead-band of ± 0.5%. The value 20 **(highest dead-band value)** has a range of 20%, which is equivalent to a dead-band of ± 10%.

LCD This feature configures LCD menu timeout. The range is 1 to 60 minutes. It measures the amount of time there is no activity on the keypad and returns the system to the main screen after the configured timeout. The default value is 10 minutes.

RTC This function allows the user to set current date (Month/Day/Year) followed by time (Hour:Minute:Second).

Adjs This function allows for the adjustment of the positioner to any position via the keypad. This function places the positioner in digital control mode **(input current independent)** and therefore allows override of the control signal. Within this function there are **Fast** and **Slow move** modes. In **Fast move** mode the valve is opened or closed in 5% increments via the keypad. In **Slow move** mode the valve is opened or closed slowly via the keypad.

OP This function sets the valve to the fully energized position via the keypad **(Outlet Port 1 = Supply psi & Outlet Port 2 = 0 psi)**. This function places the positioner in digital control mode **(network independent)** and therefore allows override of the network setpoint control signal.

CLS This function sets the valve to the fully de-energized position via the keypad **(Outlet Port 1 = 0 psi & Outlet Port 2 = Supply psi).** This function places the positioner in digital control mode **(network independent)** and therefore allows override of the network setpoint control signal.

5. Fieldbus Network

5.1. *FOUNDATION Fieldbus™ Overview*

5.1.1. About FOUNDATION Fieldbus™

FOUNDATION™ fieldbus is an open architecture for information integration.
A FOUNDATION fieldbus system is a distributed system composed of field devices and control/monitoring equipment integrated into the physical environment of a plant or factory. FOUNDATION fieldbus devices work together to provide I/O and control for automated processes and operations. FOUNDATION fieldbus systems may operate in manufacturing and process control environments. Some environments require intrinsic safety.
Also, FOUNDATION fieldbus is an all-digital, serial, two-way communication system. H1 (31.25 kbit/s) interconnects “field” equipment such as sensors, actuators and I/O. HSE (100 Mbit/s) (High Speed Ethernet) provides integration of high speed controllers (such as PLCs), H1 subsystems (via a linking device), data servers and workstations.
FOUNDATION fieldbus is the only protocol with the built-in capability to distribute the control application across the network[2]

The Fieldbus Foundation™ organization oversees the FOUNDATION Fieldbus specification and conformance testing of FOUNDATION Fieldbus products. It is open to any manufacturer or user of this protocol with a worldwide membership of over 100 companies.

The FOUNDATION Fieldbus communications protocol is an industry proven international standard (IEC 61158). Features include multi-drop capabilities (as many as 32 devices per segment), extended trunk length, single loop integrity, "control in the field", power and communication on a shielded twisted pair network, and compatibility with intrinsically safe networks. A key feature of the FF protocol is the ability to select where control of the process is situated - in the host, in the field, or in various combinations of both locations.

5.2. *The Function Blocks Application Process (FBAP)*

As mentioned before, a Fieldbus network is a distributed system composed of a number of field devices along with control and monitoring equipment integrated into the physical arrangement of a plant or factory. Fieldbus devices operate together to provide Input, Output and control of automated processes and operations. The Foundation Fieldbus protocol provides a framework for defining these systems as an assortment of physical devices interconnected by a Fieldbus network. The way the physical devices perform their proper role as a portion of the total system operation is by assigning their physical inputs and outputs to one or more software defined function blocks. A specific layer of the FF specification, called Function Block Application Process (FBAP) contains all the definitions and interaction rules for the Function Blocks.[3]

[2] See FF document FD-043
[3] See FF specification FF-890 and FF-891

Function Blocks are structures with defined behavior used to represent different types of functions that the device performs. FF has defined a standard set of function block classes, such as input, output, control, and computation function blocks. Figure 1 below illustrates a simple control loop with an AI FB linked to a PID FB whose signal is controlling the position of the control valve via the AO FB. Both the PID and AO may reside within the control valve.

5.2.1. **Function Block Linkages**

One function block output can be logically connected to another function block input using a tool where you can drag and drop virtual wired connections, called Function Block Linkages, or ***links***, like the diagram shown in the figure 1.

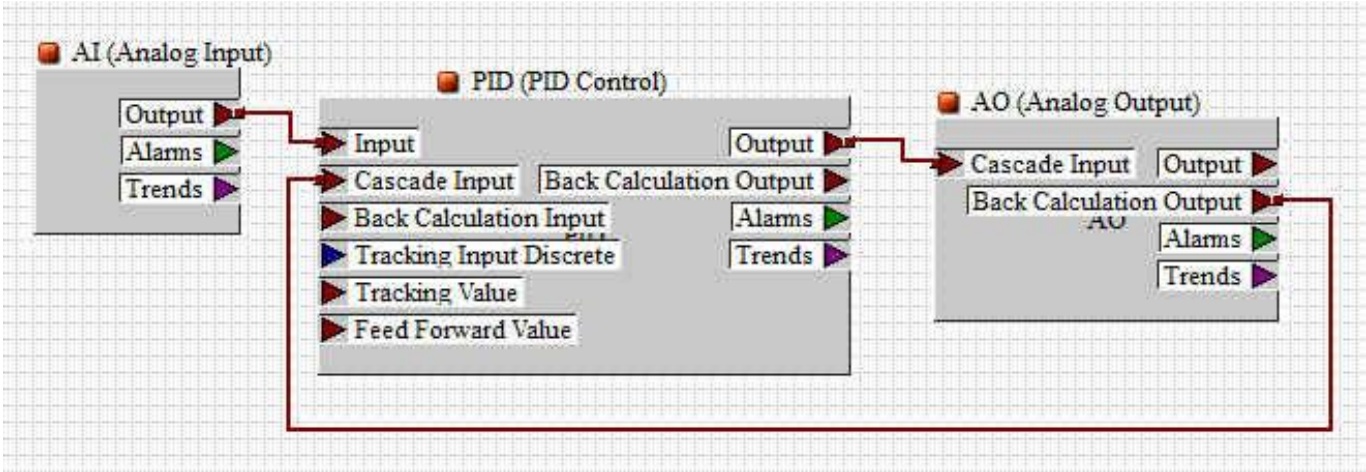


Figure 1 – Function Block Application: AI-PID-AO

Once all the connections are made this configuration is downloaded to the individual devices and a Communications Master (LAS) controls the data communication messages necessary to accomplish this configuration.
Thus, a basic FBAP as shown in the Figure can be built as following:

- Select the blocks required by the application. In the example we selected the AI (to get the PV), the AO (to actuate on the MV) and a PID block.
- Make sure that each block is assigned to run in a device or to a host system (each block is in the 'right place') as required by the application. For instance, in flow control system, the AI block is assigned to run in a flow transmitter, the PID is assigned to run in the controller (or in any other field device capable of running a PID block), and the AO is assigned to run in the valve positioner, like the **Westlock ICoT.**
- Connect the blocks as you would when configuring any control system: The AI output is connected in the PID input and the PID output is connected in the AO block input.
- Make sure that the feedback link is connected too. Most of the control systems allow the user to do it manually, where you can select the Feedback parameter, called

BKCAL_OUT (or Back Calculation Output) and draw a line (drag and drop) up to the Feedback Input parameter of another block, called **BKCAL_IN** (or Back Calculation Input). See Figure 1

- Configure each block used in the configuration. As a minimum, make sure that mode (MODE_BLK.TARGET), scaling (PV_SCALE, OUT_SCALE, XD_SCALE) and channel (for input and output blocks) are configured. Obviously, other parameters may have to be configured to match the application requirements.
- Download the configuration. This step may vary from Host (like a DCS) to host system. Download processes consist of a series of read and write requests commanded automatically by the host system to the device(s) that are going to receive the configuration.

5.2.2. **Block Modes**

Each Block will have a manner, or **mode**, of operation associated with it. The mode parameter (called MODE_BLK) has four separate fields:

- **Target Mode –**Writing to this field instructs the device to change to that specified mode. The device will attempt to change to that mode. If it is successful, the ACTUAL field changes to reflect the TARGET field.
- **Actual Mode –** This field displays the current operating mode of the function block of this device.
- **Permitted Mode(s) –** This field displays a list of all allowable target modes for this function block.
- **Normal Mode –** This field displays the mode that the function block is expected to be in during normal use.

The supported modes are:

- Remote-Output (Rout) – In Remote Output mode the remote host application directly sets the output of the block and not the setpoint. In the case of an analog output block, this bypasses setpoint rate and absolute limiting.
- Remote-Cascade (RCas) - In Remote Cascade mode the setpoint of the block comes from an outside data source. The setpoint is sourced from the RCAS_IN parameter, which is written by a host application and not by another function block.
- Cascade (Cas) - The setpoint for the block is taken from the CAS_IN parameter, which is typically connected to the output of another block. This mode cannot be entered before cascade initialization takes place. When Cascade is selected as a target mode, the Auto bit is also set in the target.
- Automatic (Auto) - The output value of the block is set by the block algorithm, and the block is using a local value for its setpoint.
- Manual (Man) - The output value of the block is set by the user.
- Local Override (LO) - Faultstate or an interlock is active and causing the output value of the block to be overridden. This is not a valid target mode, but is a valid actual mode.
- Initialization Manual (IMan) - The block is in the process of initializing a cascade. This is used for upstream (control) blocks when they are initializing for smooth transfer into Automatic mode. This is not a valid target mode, but it is a valid actual mode.

- Out Of Service (OOS) - The block is out of service, block execution is stopped, and all output parameters take a status of Bad::OutOfService.

Each function block has different mode setting available for its target mode as shown in the table below.

Table 2

Mode Description & Numeric Value		Block Modes Available				
		Resource Block	Transducer Block	AI	AO	PID
Remote-Output (Rout)	0x01					√
Remote-Cascade (RCas)	0x02				√	√
Cascade (Cas)	0x04				√	√
Automatic (Auto)	0x08	√	√	√	√	√
Manual (Man)	0x10		√[A]	√	√	√
Local Override (LO)	0x20					
Initialization Manual (IMan)	0x40					
Out Of Service (OOS)	0x80	√	√	√	√	√

Notes: **A** – When the Transducer Block is in Man mode the AO channel is not processed and the valve position can be set by the Transducer parameter Final_Value (**FINAL_VALUE.Value**)

NOTE: Some host systems handle enumerations differently than others. Please note that these tables may be very useful for those using host systems that are unable to display the appropriate text strings.

5.2.3. **Common Parameters**

Every block has a set of common, standard parameters. They are[4]:

- ST_REV
- TAG_DESC
- STRATEGY
- ALERT_KEY
- MODE_BLK
- BLOCK_ERR

5.2.4. **Quality and Status**

Function Block Input and Output parameters have a value, and status. The value is the actual numerical measurement or data reading of that parameter (such as valve 53% Open).

[4] For a complete reference see the FF-891

The status tells the condition or quality of that measurement or data reading, whether the data is Bad, Uncertain, Good (cascade), or Good (non-cascade). A sub-status tells even more detail, such as possible reasons for the status. Status can assist in diagnosing issues in the overall system operation and is used for validating data sent between function blocks.

5.2.5. **ReadBack**

FOUNDATION Fieldbus output blocks have a **READBACK** parameter which will monitor the actual state of the element being controlled. For different Channels it may show different values.
To enable **READBACK** in any standard FOUNDATION fieldbus output block two options must be verified.

- In the Resource Block, the Feature Selection (**FEATURE_SEL)** parameter must include bit 5-"Out ReadBack" (**FEATURE_SEL** enumeration 0x20). To change **FEATURE_SEL**, the Resource Block must be in OOS.
- In the Analog Output block, in the I/O Options (**IO_OPTS)** parameter, Bit 9-"PV for **BKCAL_OUT**" must be selected to enable **READBACK**. Make sure the AO block is in OOS before modifying **IO_OPTS**.

5.2.6. **Fault State**

The Fault State is a special state that allows the output blocks to go to a safe state when an abnormal condition has been detected. The abnormal condition occurs if there is an unusable input (bad or uncertain data) or the loss of the communication between function blocks and either condition remain active longer than the user specified time (FSTATE_TIME in the output block). The blocks that support cascade control (such as PID) propagate the fault state status forward to the output block. When the condition that activated the Fault State is no longer present, the Fault State is cleared and the block returns to the normal operation.
The individual Fault State parameters, located in output function blocks, define the action taken by that block when stale data or communication failure is detected. The Fault State parameter is also used when **bad** or **uncertain** quality is specified for each block.
The AO block "**Fault State to value**" bit in the parameter **IO_OPTS** determines whether the action is simply to hold the current state, or move to **FSTATE_VAL**. If the "**Fault State to value**" is 0, the value will hold the current value (freeze) if a fault is detected. If the "**Fault State to value**" is 1, the output will go to the preset **FSTATE_VAL** value, if a fault is detected.

The overall device **FAULT_STATE** parameter is included in the RB since it is common to all function and transducer blocks. The **FAULT_STATE** parameter indicates if a Fault State condition exists within the device. There is a Resource Block option when enabled (see SET_FSTATE and FEATURE_SEL) which creates a software generated Fault State condition which will force all output function blocks (AO) to immediately go to fault state.

Writing the **SET_FSTATE** parameter of the RB will also put the AO block into the predefined **FAULT_STATE**. To clear the fault state, either the condition clears, or the user may write the **CLR_FSTATE** parameter in the RB.

The AO block "**Target to Manual**" bit in **IO_OPTS** may be used to latch the **FAULT_STATE**. Setting this **IO_OPTS** will cause a **FAULT_STATE** block alarm and cause the target mode to automatically change to manual when a fault is detected. **The target mode needs to be manually changed from manual when the fault conditions are corrected**

5.2.7. **The Resource Block**

The Resource block contains hardware and firmware specific characteristics associated with the ICoT-FF. The Resource block contains no direct input or output parameters but it affects other blocks. The processes within the Resource block monitor and control the general operation of the physical device hardware. For instance, if the mode of a resource block is set to "Out Of Service" it affects all of the other blocks. The Resource Block describes characteristics of the fieldbus device such as the device name and manufacturer, as well as the ITK version that the device was tested against. There is only one Resource Block in a device.
The Resource Block also contains status information and parameter options that apply to the overall operation of the device.

The resource Block Parameter table contains all the parameters of the Resource Block of the ICoT. All the standard parameters were designed according to the standards FF-891 (FBAP-Part 2) and the FF-912 (Field Diagnostics).
The resource block was also enhanced with the following Westlock-specific parameters:

- [65] = FI_KEY
- [66] = REVISION_ID
- [67] = REVISION_DATE
- [68] = STACK_REVISION
- [69] = STACK_DATE
- [70] = FBAPP_REVISION
- [71] = FBAPP_DATE
- [72] = SUPPORTED_MODES

The parameters 65, 68, 69, 70, 71 and 72 are for Westlock usage only. The parameters 66 and 67 are used to know what revision and release date of the ICoT internal embedded software (also called "firmware").
The following Resource parameters are highlighted in this manual for the user's convenience but are defined in the from the FF specifications:

5.2.7.1. Resource State (RS_STATE)

The Resource state (**RS_STATE**) parameter, located in the RB, reflects the overall status of the function block application. There are 6 resource state enumerations. The **RS_STATE** can be used to determine hardware and resource conditions that effect operation of the device.

Table 3

• Resource State (RS_STATE) Enumerations		
Numeric Value	**Enumeration**	**Description**
0x01	Restart	The resources are restarting and are unavailable at this time.
0x02	Init	Block resources are initializing. All Alarms are acknowledged and cleared automatically.
0x03	Linking	Links are being established, blocks are not yet ready for control.
0x04	Online	Operational, all systems functional. Links established and parameters evaluated.
0x05	Standby	Block mode is OOS.
0x06	Failure	Memory or other hardware failure that prevents reliable operation.

5.2.7.2. Feature Selection (FEATURE_SEL)

The Feature Selection (**FEATURE_SEL**) parameter contains bits that enable and disable options that affect other function blocks in the device.

Table 4

Feature Selection (FEATURE_SEL)

BIT	Value	Text	Description
0	0x0001	Unicode	Allows the use of Unicode octet strings
1	0x0002	Reports	Enable alert reporting in the resource block.
2	0x0004	Faultstate	Setting this bit enables fault state activation via a software selection. When enabled this allows the setting the resource block SET_FSTATE parameter to force all output function blocks (AO and DO) to immediately go to fault state. Individual output function block will go to Fault State due to a loss of communication to CAS_IN or IFS status in CAS_IN, regardless the selection of this feature.
3	0x0008	Soft W lock	Setting this bit enables write protection via a software selection. The WRITE_LOCK parameter prevents modification of parameters within the device except to clear the WRITE_LOCK parameter. During this time, the block will function normally, updating inputs and outputs and executing algorithms. When the WRITE_LOCK condition is cleared, a WRITE_ALM alert is generated with a priority that corresponds to the WRITE_PRI parameter.
4	0x0010	Hard W lock	Setting this bit enables write protection via a hardware switch (SW4-1)
5	0x0020	Out Readback	Setting this bit enables READBACK in the appropriate function blocks..
6	0x0040	Direct Write	This feature is not supported.
7	0x0080	Change Bypass in Auto	Setting this bit enables the ability to write to the BYPASS parameter in an automatic mode, otherwise allowed only in Man or OOS modes.
8	0x0100	MVC Report Distribution supported	This option allows optimize communication performance by transferring grouped data as a single variable list in either publisher/subscriber transactions for function block links, or report distribution to a host device.
9	0x0200	MVC Publishing/ Subscribing supported	This option allows publisher/subscriber transactions for function block links when transferring grouped data as a single variable list.
10	0x0400	Multi-bit Alarm (Bit-Alarm) Supported	Allows multiple alarms to be sent without waiting for individual alarm acknowledgement.
11	0x0800	Restart/Relink after FB_Action	
12	0x1000	Defer Inter-Parameter Write Checks	With this bit set, the process variable is used as the value for BKCAL_OUT. With bit clear the working setpoint is used.

5.2.7.3. Fault State Parameters

This is a list of the Fault parameters in the Resource Block. There is also a Fault state enable/disable in the Feature Selection parameter.

Table 5

Fault State Parameters		
Parameter	**R/W**	**Description**
FAULT_STATE1	R	Indicates if there is an active Fault State condition with the device, either a software generated condition or a loss of communication to CAS_IN or IFS status in CAS_IN.
SET_FSTATE	R/W	When enabled (see FEATURE_SEL) this creates the software generated Fault State condition which will force all output function blocks (AO and DO) to immediately go to fault state.
CLR_FSTATE	R/W	This clears the software generated Fault State condition.

5.2.7.4. Manual Restart (RESTART)

If during configuration or commissioning an invalid setup is entered and you cannot recover, the Restart parameter can provide a method to reset the device. This is to be used only as a last resort when all other options have failed. Several modes are available. After the reset process is finished this returns back to Run.

Table 6

Restart (RESTART)		
BIT	**Text**	**Description**
1	Run	This is the normal operating state of the device.
2	Restart resource	Used to clear up problems for example the memory management resource.
3	Restart default	Used to clear configuration memory back to factory defaults.
4	Restart processor	This begins program execution over again, like hitting a reset button

5.2.7.5. Complete list of parameters of the Resource Block

Table 7

RESOURCE BLOCK PARAMETERS	
[0] = ST_REV	[37] = ACK_OPTION
[1] = TAG_DESC	[38] = WRITE_PRI
[2] = STRATEGY	[39] = WRITE_ALM
[3] = ALERT_KEY	[40] = ITK_VER
[4] = MODE_BLK	[41] = FD_VER
[5] = BLOCK_ERR	[42] = FD_FAIL_ACTIVE
[6] = RS_STATE	[43] = FD_OFFSPEC_ACTIVE
[7] = TEST_RW	[44] = FD_MAINT_ACTIVE
[8] = DD_RESOURCE	[45] = FD_CHECK_ACTIVE
[9] = MANUFAC_ID	[46] = FD_FAIL_MAP
[10] = DEV_TYPE	[47] = FD_OFFSPEC_MAP
[11] = DEV_REV	[48] = FD_MAINT_MAP
[12] = DD_REV	[49] = FD_CHECK_MAP
[13] = GRANT_DENY	[50] = FD_FAIL_MASK
[14] = HARD_TYPES	[51] = FD_OFFSPEC_MASK
[15] = RESTART	[52] = FD_MAINT_MASK
[16] = FEATURES	[53] = FD_CHECK_MASK
[17] = FEATURE_SEL	[54] = FD_FAIL_ALM
[18] = CYCLE_TYPE	[55] = FD_OFFSPEC_ALM
[19] = CYCLE_SEL	[56] = FD_MAINT_ALM
[20] = MIN_CYCLE_T	[57] = FD_CHECK_ALM
[21] = MEMORY_SIZE	[58] = FD_FAIL_PRI
[22] = NV_CYCLE_T	[59] = FD_OFFSPEC_PRI
[23] = FREE_SPACE	[60] = FD_MAINT_PRI
[24] = FREE_TIME	[61] = FD_CHECK_PRI
[25] = SHED_RCAS	[62] = FD_SIMULATE
[26] = SHED_ROUT	[63] = FD_RECOMMEN_ACT
[27] = FAULT_STATE	[64] = BLOCK_ERR_DESC_1
[28] = SET_FSTATE	[65] = FI_KEY
[29] = CLR_FSTATE	[66] = REVISION_ID
[30] = MAX_NOTIFY	[67] = REVISION_DATE
[31] = LIM_NOTIFY	[68] = STACK_REVISION
[32] = CONFIRM_TIME	[69] = STACK_DATE
[33] = WRITE_LOCK	[70] = FBAPP_REVISION
[34] = UPDATE_EVT	[71] = FBAPP_DATE
[35] = BLOCK_ALM	[72] = SUPPORTED_MODES
[36] = ALARM_SUM	

5.2.8. **Transducer Block –**

The Transducer block contains configuration parameters that are used when connecting function blocks to the ICOT-FF physical input and output values. The Transducer block also performs functions, such as calibration, linearization, and scaling on I/O data to convert it to a form that will be usable on the Fieldbus network.
Although the ICoT's Transducer Block Is not a standard block, it is based on the FF standard positioner transducer block defined in the specifications FF-902 (Common Transducer Block Parameters) and FF-906 (Positioner Transducer Block)

5.2.8.1. Configuration Option Parameters

Many of the configuration option available on the local LCD & pushbutton menu are also available over the Fieldbus network by changing parameters in the Transducer Block (see table below).

Table 8

Configuration Options				
LCD & Key Menu			**Transducer Block Parameter**	**From DD Transducer Block**
ACAL	**PID Auto**		PSNR_COMMAND=9[A]	CALIBRATION COMMANDS=Start Auto Cal[B]
MCAL	**Lo**		PSNR_COMMAND=11[A]	CALIBRATION COMMANDS=Start Lo/Zero Cal[B]
	Hi		PSNR_COMMAND=12[A]	CALIBRATION COMMANDS=Start Hi/Span Cal[B]
	PID	**PID Auto**	PSNR_COMMAND=14[A]	CALIBRATION COMMANDS=Start Auto PID Tuning[B]
		Man P	SERVO_GAIN (0.0-255.0)	SERVO_GAIN (0.0-255.0)
		Man I	SERVO_RESET (0.0-255.0)	SERVO_RESET (0.0-255.0)
		Man D	SERVO_RATE (0.0-255.0)	SERVO_RATE (0.0-255.0)
	Snsr		PSNR_COMMAND=10[A]	CALIBRATION COMMANDS=Start Hall Sensor Cal[B]
	Trnd		PSNR_COMMAND=13[A]	CALIBRATION COMMANDS=Start Transducer Cal[B]
Cofg	**Flow**		CHARACTERIZATION	characterization
	Type		ACT_TYPE (0=Rot, 1=Lin)	custom_curve_scaling_factor
	Flop		FLOP_ENABLE (0,1)	FLOP_ENABLE (0,1)
	OPSP		VALVE_OPEN_SLEW_LIMIT (1-5)	VALVE_OPEN_SLEW_LIMIT (1-5)
	CLSP		VALVE_CLOSE_SLEW_LIMIT (1-5)	VALVE_CLOSE_SLEW_LIMIT (1-5)
	Edb		DEVIATION_DEADBAND	Deviation Deadband
	LCD			
	RTC			
Stro	**Adjs**		FINAL_VALUE[C]	Final Value[D]
	Op		FINAL_VALUE=100[C]	Final Value (Value=100)[D]
	Cls		FINAL_VALUE=0[C]	Final Value (Value=0)[D]

Notes: A – Must be preceded by PSNR_COMMAND=8 (Arm command)
B – Must be preceded by CALIBRATION COMMANDS=Arm
C – Transducer MODE_BLK must be at 0x10 (Manual)
D – Transducer Mode must be in Man

5.2.8.2. General Device Parameters

Some general device parameters are also available for viewing in the Transducer Block

Table 9

General Device Parameters	
Parameter	**Description**
Final Value (FINAL_VALUE)	The target valve position as written by the Analog Output block
Final Position Value (FINAL_POSITION_VALUE)	The actual measured valve position
Pressure Port A (PRESSURE_PORT_A)	This displays the air pressure from port A of the manifold (as a percentage of the air pressure measured during calibration)
Internal Temperature (INTERNAL_TEMP)	The ICOT-FF module internal temperature as measured by an on-board temperature sensor (°C)

5.2.8.3. Complete list of parameters of the Transducer Block

Rel. Index	Parameter Name	Description
1	1 ST_REV	The revision level of the static data associated with the function block. To support tracking changes in static parameter attributes, the associated block's static revision parameter will be incremented each time a static parameter attribute value is changed. Also, the associated block's static revision parameter may be incremented if a static parameter attribute is written but the value is not changed.
2	2 TAG_DESC	The user description of the intended application of the block.
3	STRATEGY	The strategy field can be used to identify grouping of blocks.. This data is not checked or processed by the block.
4	ALERT_KEY	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.
5	MODE_BLK	The actual, target, permitted, and normal modes of the block.
6	BLOCK_ERR	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.
7	UPDATE_EVT	This alert is generated by any change to the static data.
8	BLOCK_ALM	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the sub code field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the sub code has changed.
9	TRANSDUCER_DIRECTORY	A directory that specifies the number and starting indices of the transducers in the transducer block.
10	TRANSDUCER_TYPE	Identifies the transducer that follows.
11	TRANSDUCER_TYPE_VER	The version of the transducer identified by TRANSDUCER_TYPE in the form 0xAABB where AA is the major revision of the transducer specification on which the transducer is based, and BB is a revision number assigned and controlled by the manufacturer of the device.
12	XD_ERROR	One of the error codes of XD_ERROR and Block Alarm Sub codes
13	COLLECTION_DIRECTORY	A directory that specifies the number, starting indices, and DD Item IDs of the data collections in each transducer within a transducer block.
14	FINAL_VALUE	The requested valve position and status written by an analog Function Block.

Rel. Index	Parameter Name	Description
15	FINAL_VALUE_ RANGE	The High and Low range limit values, the engineering unit code and the number of digits to the right of the decimal point to be used to display the Final Value.
16	FINAL_VALUE_ CUTOFF_HI	If the FINAL_VALUE is more positive than this value, the valve is forced to its maximum high value (fully opened).
17	FINAL_VALUE_ CUTOFF_LO	If the FINAL_VALUE is more negative than this value, the valve is forced to its maximum low value (fully closed).
18	FINAL_POSITION _ VALUE	The actual valve position and status, could be used at the READBACK_VALUE in an AO block.
19	WORKING_POS	The actual measured feedback position before de-characterization.
20	WORKING_SP	The final command value to the positioning algorithm after characterization This parameter will be used to override the FINAL_VALUE when the trd is in Man.
21	DEVIATION_ DEAD BAND	The user defined allowable deviation before alert.
22	DEVIATION_TIME	The user defined allowable duration in seconds of deviation before alert.
23	DEVIATION_ VALUE	Difference between working setpoint and working position
24	POS_ALERT_HI	User defined high position threshold that when FINAL_VALUE is more positive will trigger a position high alert.
25	POS_ALERT_LO	User defined low position threshold that when FINAL_VALUE is more negative will trigger a position low alert.
26	RATED_TRAVEL	Nominal travel of actuator/valve in travel units (TRAVEL_UNITS).
27	STOP_HI_POS	User defined high limit for valve position that when reached will set a stop hi position limit bit.
28	STOP_LO_POS	User defined low limit for valve position that when reached will set a stop lo position limit bit.
29	TRAVEL_ACCUM	Totalized travel value since last reset. Configured with TRAVEL_ACCUM_LIM and TRAVEL_ACCUM_DEADBAND. This parameter is reset by the RESET_COUNTERS parameter
30	TRAVEL_UNITS	Travel units as defined in standard table in TN-016.
31	PSNR_FSTATE_ VAL	User defined position in case of fault state of transducer.
32	PSNR_FSTATE_ OPT	Defines an action to be taken on a transducer fault state. Enumerations defined in Standard Tables (TN-016).
33	CYCLE_CNTR	Totalized cycle counts since last reset. CYCLE_CNTR: Configured by Cycle dead band (CYCLE_CNTR_DEADBAND), Cycle Limit (CYCLE_CNTR_LIM)and Cycle alert enable. This parameter is reset by the RESET_COUNTERS parameter (and not writing 0 in the CYCLE_CNTRL parameter)

Rel. Index	Parameter Name	Description
34	SIGNAL_ACTION	Defines actuator movement relative to increasing command. This option is part of the characterization of the FB output. It should be inserted after the characterization and before the de-characterization.
35	READBACK_ SELECT	Selects whether working position or final position value is passed back to connected function block.
36	PSNR_ COMMAND	Command to start device-specific procedure. Command value will reset to zero after execution of procedure regardless of value of PSNR_COMMAND_STATE. 0: Normal Operation 1-7: Reserved 8-65535: Mfg Specific
37	PSNR_ COMMAND_ STATE	The state of the procedure initiated by PSNR_COMMAND 0: Normal Operation 1-7: Reserved 8-65535: Mfg Specific
38	PSNR_OOS_OPT	Defines an action to be taken whenever the Transducer Block transitions to
39	POS_FEATURES	Out of Service mode. *Note: not all options are required to be supported.
40	ACT_FAIL_ ACTION	Specifies the final failure position of the actuator as defined in the Standard Tables (TN-016). It is a recommendation that only the first four enumerations of the table be used.
41	ACT_MAN_ID	The actuator manufacturer identification.
42	ACT_MODEL_ NUM	The actuator model number.
43	ACT_SN	The actuator serial number.
44	ACT_TYPE	Actuator Type (Rotary or Linear)
45	VALVE_MAN_ID	The valve manufacturer identification
46	VALVE_MODEL_ NUM	The valve model number.
47	VALVE_SN	The valve serial number.
48	VALVE_TYPE	The type of the valve as defined in the Standard Tables (TN-016): 0: Undefined 1: Linear 2: Rotary 255: Other
49	PSNR_CAL_LOC	The location of last positioner calibration. This describes the physical location at which the calibration was performed. (ex. “NIST”, “Acme Labs”).
50	PSNR_CAL_ DATE	The date of the last positioner calibration.
51	PSNR_CAL_WHO	The name of the person responsible for the last positioner calibration.
52	VST_COMMAND	Not available
53	VST_MODE	Not available
54	VST_PAUSE	Not available
55	VST_RESULT	Not available

Rel. Index	Parameter Name	Description
56	VST_DETAILED_ RESULT	Not available
57	CLOSED_POS_ DEADBAND	User defined dead-band for the closed position
58	CLOSED_POS_ SHIFT	Closed position change since last calibration
59	CUSTOM_CURVE _DESCRIPTION	Describes size and data type of the curve.
60	CUSTOM_CURVE _XY_NUM_PTS	Not available
61	CUSTOM_CURVE _SCALING_ FACTOR	Not available
62	CUSTOM_CURVE _X	Not available
63	CUSTOM_CURVE _Y	Not available
64	CUSTOM_CURVE _X_FLOAT	Not available
65	CUSTOM_CURVE _Y_FLOAT	Not available
66	CYCLE_CNTR_ DEADBAND	This is the user defined minimum movement before incrementing cycle counter. CYCLE_CNTR: Configured by Cycle dead band (CYCLE_CNTR_DEADBAND), Cycle Limit (CYCLE_CNTR_LIM)and Cycle alert enable. The common understanding of cycle counting is derived from the definition of a cycle (used by most (if not all) the positioners manufacturers): A valve cycle starts at the point where the valve stroke changes direction until the point where it changes direction again.
67	FRICTION_UNITS	Not available
68	FRICTION	Not available
69	HYSTERISIS	Maximum measured amount of difference between desired and actual position after a signal reversal.
70	POS_DEADBAND	Configurable deadband for the control algorithm. It will be applied in the WORKING_POS only
71	STROKE_TIME_ CLOSED	Measured stroke time in seconds to close.
72	STROKE_TIME_ OPEN	Measured stroke time in seconds to open.
73	TRAVEL_ACCUM _DEADBAND	User defined allowable movement before incrementing travel accumulator. Configured with TRAVEL_ACCUM_LIM and TRAVEL_ACCUM_DEADBAND. This parameter is reset by the RESET_COUNTERS parameter
74	TRIP_TIMEOUT	Not Available

Rel. Index	Parameter Name	Description
75	PSNR_ COMMAND_ FLAGS	Manufacturer specific enumerated procedures: 0: Normal Operation 1-7: Reserved 8-65535: Mfg Specific
76	CYCLE_CNTR_ LIM	User defined limit of cycle counter value that will trigger alert. CYCLE_CNTR: Configured by Cycle dead band (CYCLE_CNTR_DEADBAND), Cycle Limit (CYCLE_CNTR_LIM)and Cycle alert enable. This parameter is reset by the RESET_COUNTERS parameters (and not writing 0 in the CYCLE_CNTRL parameter)
77	PST_BREAKOUT _TIME	Not available
78	PST_BREAKOUT _TIMEOUT	Not available
79	PST_INITIAL_ START_TIME	Not available
80	PST_INTERVAL	Not available
81	PST_OPTIONS	Not available
82	PST_RAMP_ RATE	Not available
83	PST_STRK_TRAV	Not available
84	PST_STRK_TRAV _TIMEOUT	Not available
85	PST_ COMPLETION_ TIMEOUT	Not available
86	FST_BREAKOUT _TIME	Not available
87	FST_BREAKOUT _TIMEOUT	Not available
88	FST_RAMP_ RATE	Not available
89	FST_STRK_ TRAV_TIMEOUT	Not available
90	FST_ COMPLETION_ TIMEOUT	Not available
91	PRESSURE_ PORT_A	Pressure values of the output port A (1) in user defined pressure units.
92	PRESSURE_ PORT_B	Pressure values of the output port B (2) in user defined pressure units. (not used by ICoT2)
93	PRESSURE_UNIT S	Pressure units as defined in standard table in TN-016.
94	PRESSURE _SUPPLY	Available supply pressure in user defined pressure units (not used by ICoT2)

Rel. Index	Parameter Name	Description
95	CHARACTERIZA-TION	Desired characterization operation. 0: Linear 1: Equal Percent 2: Quick Opening 3: Custom 4-7: Reserved 8-255: Mfg Specific
96	STROKE_TIME_ CLOSE_LIM	The user defined time of a full span travel in closing direction in seconds, used to slow down valve movement."
97	STROKE_TIME_ OPEN_LIM	The user defined time of a full span travel in closing direction in seconds, used to slow down valve movement.
98	TRAVEL_ACCUM _LIM	User defined limit of accumulator value that will trigger alert. Configured with TRAVEL_ACCUM_LIM and TRAVEL_ACCUM_DEADBAND. This parameter is reset by the RESET_COUNTERS parameter.
99	TRAVEL_ACCUM _UNITS	Travel accumulator units as defined in standard table in TN-016 (m, km, mi, etc).
100	INTERNAL_TEMP	Internal device temperature in user defined temperature units.
101	INTERNAL_TEMP _MIN	Minimum internal device temperature in user defined temperature units over operation lifetime of device.
102	INTERNAL_TEMP _MAX	Maximum internal device temperature in user defined temperature units over operation lifetime of device.
103	INTERNAL_TEMP _UNITS	Internal temperature units as defined in standard table in (TN-016).
104	BLOCK_ERR_ DESC_2	These parameters are used by a device to report more specific details regarding persistent errors that are reported through BLOCK_ERR. The BLOCK_ERR parameter reflects the error status associated with the hardware or software components associated with a block.
105	BLOCK_ERR_ DESC_3	These parameters are used by a device to report more specific details regarding persistent errors that are reported through BLOCK_ERR. The BLOCK_ERR parameter reflects the error status associated with the hardware or software components associated with a block.
106	COMM_DIAG_ TPTO	Not Available
107	FLOP_ENABLE	Fail position: open or closed via key pad or FF block. This option is part of the characterization of the FB output. It should be inserted after the characterization and before the de-characterization.
108	SERVO_GAIN	Existing parameter.
109	SERVO_RESET	Existing parameter.
110	SERVO_RATE	Existing parameter.
111	VALVE_OPEN_ SLEW_LIMIT	speed limit control (in % of the opening time)
112	VALVE_CLOSE_ SLEW_LIMIT	speed limit control (in % of the closing time)

Rel. Index	Parameter Name	Description
113	PSNR_RESET_ COUNTERS	0: RESET_ALL_COUNTERS, 1: CYCLE_CNTR, 2: TRAVEL_ACCUM, 3: TEMP_MAX_MIN, 4: TPTO, 5: REQ_SENT, 6: CAL_ERROR, 7: RUN_TIME_ERROR
114	XD_ALERT_ ENABLE	0:CYCLE_CNTR, 1:TRAVEL_ACCUM, 2:TEMP_MAX_MIN, 3:DEVIATION
115	XD_ALERT_ SUMMARY	0:CYCLE_CNTR, 1:TRAVEL_ACCUM, 2:TEMP_MAX_MIN, 3:DEVIATION, 4:LOW PRESSURE
116	WSN_PASSWORD	Reserved
117	WSN_CONTROL_ FLAG	Reserved
118	WSN_SERIAL_ NUMBER,	Reserved
119	SIGN_AND_CAL_ PASSWORD	Not Available
120	GEN_VALVE_SIGNAT URE	Not available
121	CURVE_SELECTION	Not available
122	CURVE_ENTRY	Not available
123	OPEN_SIGNATURE_ TIME	Not available
124	OPEN_SIGNATURE_ POS	Not available
125	OPEN_PRES_S_SIGN ATURE_POS	Not available
126	OPEN_PRES_A_SIGN ATURE_POS	Not available
127	OPEN_PRES_B_SIGN ATURE_POS	Not available
128	CLOSE_SIGNATURE_ TIME	Not available
129	CLOSE_SIGNATURE_ POS	Not available
130	CLOSE_PRES_S_ SIGNATURE_POS	Not available
131	CLOSE_PRES_A_ SIGNATURE_POS	Not available
132	CLOSE_PRES_B_ SIGNATURE_POS	Not available
133	TIME_AND_DATE	Not available

Rel. Index	Parameter Name	Description
134	RESERVED1	Not available
135	RESERVED2	Not available
136	RESERVED3	Not available
137	SUPPORTED_MODE	Reserved

5.2.9. **Analog Input Block –**

The Analog Input (AI) function block reads an ICoT-FF input measurement via a specified I/O channel (in this case the actual measured valve position) and makes that data available to other Fieldbus function blocks.
The AI Function Block Parameter table contains all the parameters of the Block. All the standard parameters were designed according to the standard FF-891.

5.2.9.1. AI Channel

The channel parameter must be set for the block to work properly.

Table 10

• Analog Input Channels			
Option #	**Channel**	**Channel Name**	**Channel Description**
0	0	No Transducer Connection	
1	1	Actual Position	Feedback of actual valve position
2	2	Not Used	

5.2.9.2. AI Scaling

When using the ICoT, the Analog Input units of measure must be % (of full span valve position).

Table 11

• Analog Input Scaling	
Transducer Scale (XD_SCALE) EU at 100% (EU_100) =100 EU at 0% (EU_0)=0 Units Index (UNITS_INDEX)=% (0x53E) Decimal (DECIMAL)=3	Output Scale (OUT_SCALE) EU at 100% (EU_100) =100 EU at 0% (EU_0)=0 Units Index (UNITS_INDEX)=% (0x53E) Decimal (DECIMAL)=3

5.2.9.3. Complete list of parameters of the AI Block

Table 12

AI Block Parameters	
[0] = ST_REV	[20] = BLOCK_ALM
[1] = TAG_DESC	[21] = ALARM_SUM
[2] = STRATEGY	[22] = ACK_OPTION
[3] = ALERT_KEY	[23] = ALARM_HYS
[4] = MODE_BLK	[24] = HI_HI_PRI
[5] = BLOCK_ERR	[25] = HI_HI_LIM
[6] = PV	[26] = HI_PRI
[7] = OUT	[27] = HI_LIM
[8] = SIMULATE	[28] = LO_PRI
[9] = XD_SCALE	[29] = LO_LIM
[10] = OUT_SCALE	[30] = LO_LO_PRI
[11] = GRANT_DENY	[31] = LO_LO_LIM
[12] = IO_OPTS	[32] = HI_HI_ALM
[13] = STATUS_OPTS	[33] = HI_ALM
[14] = CHANNEL	[34] = LO_ALM
[15] = L_TYPE	[35] = LO_LO_ALM
[16] = LOW_CUT	[36] = XDUCER_VAL
[17] = PV_FTIME	[37] = XDUCER_UNITS
[18] = FIELD_VAL	[38] = BLOCK_ERR_DESC_1
[19] = UPDATE_EVT	[39] = SUPPORTED_MODES

5.2.10. Analog Output Block

The Analog Output (AO) function block assigns a Fieldbus output value to the ICOT-FF via a specified I/O channel (in this case it is the setpoint for the target position of the valve). The channel parameter must be set for the block to work properly.

5.2.10.1. AO Channel

Table 13

• Analog Output Channels			
Option	**Channel**	**Channel Name**	**Channel Description**
0	0	No Transducer Connection	
1	1	Valve Position	Drives the Valve to the specified setpoint position
2	2	Not Used	

5.2.10.2. AO Scaling

The Analog Output units of measure must be % (of full span valve position).

Table 14

Analog Output Scaling	
Process Value Scale (PV_SCALE) EU at 100% (EU_100) =100 EU at 0% (EU_0)=0 Units Index (UNITS_INDEX)=% (0x53E) Decimal (DECIMAL)=3	Transducer Scale (XD_SCALE) EU at 100% (EU_100) =100 EU at 0% (EU_0)=0 Units Index (UNITS_INDEX)=% (0x53E) Decimal (DECIMAL)=3

5.2.10.3. AO I/O Options (IO_OPTS)

The following Input / Output options are used in the AO block.

Table 15

Block I/O Options (IO_OPTS)			
BIT	**Value**	**Text**	**Description**
1	0x0002	SP tracks PV if Man	Causes the setpoint to track the process variable when the target mode of the block is Man.
3	0x0008	SP tracks PV if LO	Causes the setpoint to track the process variable when the actual mode of the block is LO. IMan is not possible in an I/O block.
4	0x0010	SP tracks Rcas or Cas if LO or Man	Causes the set point to track the Rcas or Cas parameter based on the retained target mode when the actual mode of the block is LO or Man.
5	0x0020	Increase to close	Remaps the block's scaling so that as the input increases, the output decreases.
6	0x0040	Fault State to value	With bit set, the block's Fault State behavior sets the output value to the FSTATE_VAL setting. With bit clear, the block's Fault State behavior is to keep the output value (freeze it) at its current setting.
7	0x0080	Faultstate restart	With bit set, the blocks output will to go to Fault State value immediately after a device restart (Fault State is not actually activated just the value is used). With bit clear, the blocks output will go to the value in nonvolatile memory.
8	0x0100	Target to Man	With bit set, sets the target mode of the block to Manual mode when Fault State goes active. The mode remains in Manual until changed by the user.
9	0x0200	PV for BKCal_Out	With bit set, the process variable is used as the value for BKCAL_OUT. With bit clear the working setpoint is used.

5.2.10.4. Fault State Parameters

The following Fault State parameters are used in the AO block. See also "Fault State to value", "Faultstate restart" and "Target to Man" bits in IO_OPTS.

Table 16

• Analog Output Fault State Parameters	
Parameter	**Description**
FSTATE_TIME	Time in seconds from detection and persistence of the Fault State condition until the output goes to the Fault State action.
FSTATE_VAL	The setpoint in % that is to be used when a Fault State condition is activated (if "Fault State to value" bit is set in IO_OPTS).

5.2.10.5. Complete list of parameters of the AO Block

Table 17

AO Block Parameters	
[0] = ST_REV	[17] = SP_RATE_DN
[1] = TAG_DESC	[18] = SP_RATE_UP
[2] = STRATEGY	[19] = SP_HI_LIM
[3] = ALERT_KEY	[20] = SP_LO_LIM
[4] = MODE_BLK	[21] = CHANNEL
[5] = BLOCK_ERR	[22] = FSTATE_TIME
[6] = PV	[23] = FSTATE_VAL
[7] = SP	[24] = BKCAL_OUT
[8] = OUT	[25] = RCAS_IN
[9] = SIMULATE	[26] = SHED_OPT
[10] = PV_SCALE	[27] = RCAS_OUT
[11] = XD_SCALE	[28] = UPDATE_EVT
[12] = GRANT_DENY	[29] = BLOCK_ALM
[13] = IO_OPTS	[30] = XDUCER_VAL
[14] = STATUS_OPTS	[31] = BLOCK_ERR_DESC_1
[15] = READBACK	[32] = SUPPORTED_MODES
[16] = CAS_IN	

5.2.11. Proportional/Integral/Derivative (PID) Function Block –

The PID function block is used for process control. It combines all of the necessary logic to perform Proportional-Integral-Derivative (PID) control. The PID block must have a setpoint from another function block, an input process variable from an upstream function block and an output variable that will go to a downstream function block. This is an independent Fieldbus function block that is available to the user if he desires to use it.

This PID Function Block **is not related** to the ICOT-FF internal servo PID which is hard wired for valve position control using a target setpoint (usually set through the AO channel) which is compared to actual measured valve position and then generates an output to the ICOT-FF pneumatic transducer motor which will force the valve toward the desired setpoint.

5.2.11.1. Complete list of parameters of the PID Block – Part 1

Table 18

PID Block Parameters	
[0] = ST_REV -	[34] = RCAS_OUT -
[1] = TAG_DESC -	[35] = ROUT_OUT -
[2] = STRATEGY -	[36] = TRK_SCALE -
[3] = ALERT_KEY -	[37] = TRK_IN_D -
[4] = MODE_BLK -	[38] = TRK_VAL -
[5] = BLOCK_ERR -	[39] = FF_VAL -
[6] = PV -	[40] = FF_SCALE -
[7] = SP -	[41] = FF_GAIN -
[8] = OUT -	[42] = UPDATE_EVT -
[9] = PV_SCALE -	[43] = BLOCK_ALM -
[10] = OUT_SCALE -	[44] = ALARM_SUM -
[11] = GRANT_DENY -	[45] = ACK_OPTION -
[12] = CONTROL_OPTS -	[46] = ALARM_HYS -
[13] = STATUS_OPTS -	[47] = HI_HI_PRI -
[14] = IN -	[48] = HI_HI_LIM -
[15] = PV_FTIME -	[49] = HI_PRI -
[16] = BYPASS -	[50] = HI_LIM -
[17] = CAS_IN -	[51] = LO_PRI -
[18] = SP_RATE_DN -	[52] = LO_LIM -
[19] = SP_RATE_UP -	[53] = LO_LO_PRI -
[20] = SP_HI_LIM -	[54] = LO_LO_LIM -
[21] = SP_LO_LIM -	[55] = DV_HI_PRI -
[22] = GAIN -	[56] = DV_HI_LIM -
[23] = RESET -	[57] = DV_LO_PRI -
[24] = BAL_TIME -	[58] = DV_LO_LIM -
[25] = RATE -	[59] = HI_HI_ALM -
[26] = BKCAL_IN -	[60] = HI_ALM -
[27] = OUT_HI_LIM -	[61] = LO_ALM -
[28] = OUT_LO_LIM -	[62] = LO_LO_ALM -
[29] = BKCAL_HYS -	[63] = DV_HI_ALM -
[30] = BKCAL_OUT -	[64] = DV_LO_ALM -
[31] = RCAS_IN -	[65] = BLOCK_ERR_DESC_1 -
[32] = ROUT_IN -	[66] = SUPPORTED_MODES -
[33] = SHED_OPT -	[67] = LAMDA -

5.3. *References*

- FOUNDATION™ Fieldbus Technical Overview - FD-043 Rev 3.0
- FOUNDATION™ Fieldbus System Engineering Guidelines - AG-181 Rev 3.1
- FOUNDATION™ Fieldbus Technical Specifications - FF-007 – Version 2011.1
- EMC (Electro Magnetic Compatibility) Directive 2004/108/EC, harmonized standards EN / IEC 61000
- Performance of intelligent valve positioners IEC 61514-2
- Vibration and Environmental testing - IEC 60068-2
- IEC 61158-2: 2010, Fieldbus standard for use in industrial control systems – Part 2: Physical Layer specification and service definition.
- ISA dS50.02, Part 2 Amendment; Fieldbus Standard for Use in Industrial Control Systems - Part 2: Physical Layer Specification and Service Definition, Amendment to Clause 22 (Formerly Clause 11 and 24).

6. **Trouble Shooting**

6.1. ***Preliminary Checks***

Before operating the positioner check the following:

6.1.1. Voltage

The positioner requires a Foundation Fieldbus source, with a minimum voltage of 9VDC at its terminals, over-current protected up to 35VDC.

6.1.2. Electrical Connection

Check the wiring current loop. The ICoT terminal strip visually designates the positive and negative terminal points for connection with a "+" and "-", respectively.

6.1.3. Pneumatic Connection

Single Acting: Output port 1 should be piped to drive the actuator away from the valves fail position. Output port 2 should be plugged. (See Section 3.5)

Double Acting: Output port 1 should be piped to drive the actuator away from the valves fail position. Output port 2 should be piped to drive the actuator towards the valves fail position. (See Section 3.5)

6.1.4. Magnetic Position Feedback

Rotary Positioner: The magnetic beacon should
be set in the proper orientation, based on the direction of failure. (See Section 3.1)

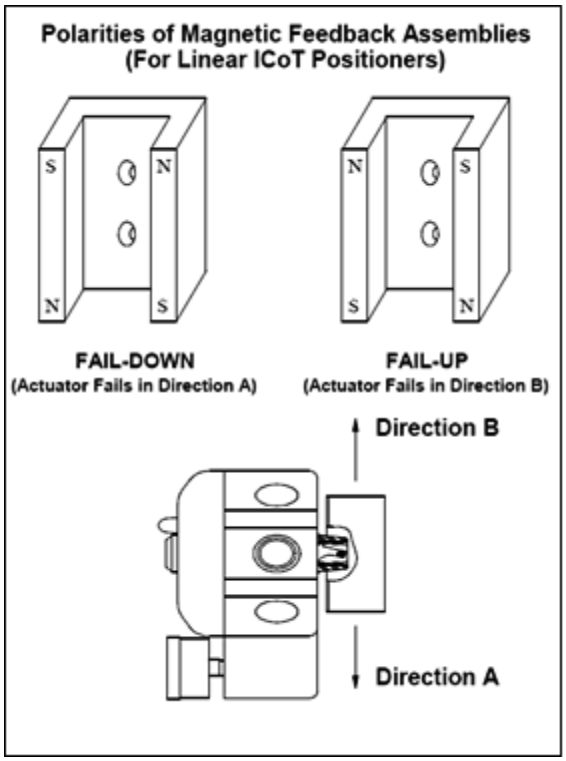
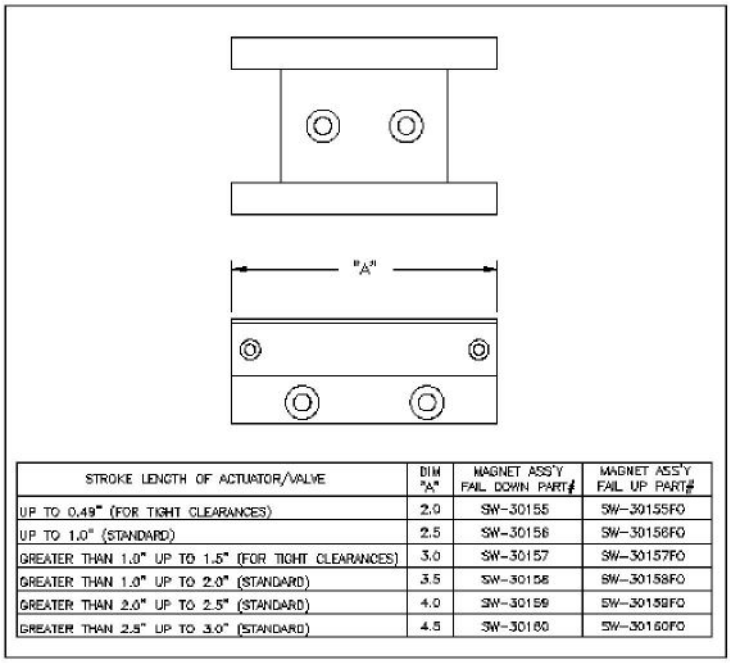


Figure 6-1



STROKE LENGTH OF ACTUATOR/VALVE	DIM "A"	MAGNET ASS'Y FAIL DOWN PART#	MAGNET ASS'Y FAIL UP PART#
UP TO 0.49" (FOR TIGHT CLEARANCES)	2.0	SW-30155	SW-30155FO
UP TO 1.0" (STANDARD)	2.5	SW-30156	SW-30156FO
GREATER THAN 1.0" UP TO 1.5" (FOR TIGHT CLEARANCES)	3.0	SW-30157	SW-30157FO
GREATER THAN 1.0" UP TO 2.0" (STANDARD)	3.5	SW-30158	SW-30158FO
GREATER THAN 2.0" UP TO 2.5" (STANDARD)	4.0	SW-30159	SW-30159FO
GREATER THAN 2.5" UP TO 3.0" (STANDARD)	4.5	SW-30160	SW-30160FO

Figure 6-2

Linear Positioner: The magnetic assembly supplied with the positioner should correspond to the stroke length and failure direction of the actuator. To make sure you have the appropriate magnet assembly, check the part. The stroke length and failure direction should be printed on the part. On the older ICoT the magnet assembly is not printed with this information, although there should be a serial number. Contact the factory with the serial number to verify that it is correctly matched to the actuator. (See Figure 6-1 & Figure 6-2).

6.1.5. Supply Pressure

The supply pressure should be regulated appropriately with regard to the actuator. If there is question as to the proper supply pressure, the actuator manufacturer should be contacted.

6.1.6. Positioner Pressure Rating

If the supply pressure is above 40 PSI a high pressure ICoT positioner must be used. If the supply pressure is below 40 PSI a low pressure ICoT positioner must be used. (See Ordering Guide - Section 2)

6.2. *FAQ's*

Listed here are some FAQ's encountered with the ICoT positioner.

6.2.1. The LCD remains blank even after power is applied to the positioner.

- Check wiring.
- The positioner should be given at least 9VDC. The voltage across the positioner can be checked by removing the electronics' cover and connecting a voltmeter across TP10 and TP11 on the display board.
- Check Foundation Fieldbus function blocks for proper mode of operation.

6.2.2. The positioner has power but the position as shown on the LCD does not seem to match the actual position of the actuator/ valve.

- May need to be calibrated. Perform a manual step by step calibration or a full automatic calibration (see sections 4.2 and 4.3).
- Beacon may be misoriented (See section 3.1 and 3.2).
- Check if it is properly configured as linear or rotary (see section 4.5 function "Type").
- The flow characteristic during calibration was set to equal percentage or quick opening, not linear. If linear is desired enter calibration and make this change (See Calibration Instructions section 4.1 & 4.2 and flow in 4.8).

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6.2.3. The positioner is properly set-up, and air is applied to the positioner. When powering up the positioner, the actuator goes into a state of constant oscillation.

- Check for air leaks and if assembly is tightly coupled: tubing, actuator, bracket, cables etc.
- The gain settings are probably too high for the actuator/valve assembly. If not done yet, perform a full automatic calibration (see section 4.2).
- If full auto cal has not given good results, perform a manual auto PID (see section 4.3, function “PID”).
- If manual PID has not given good results, try to manually fine tune the PID. Enter the calibration mode and reduce the PCAL value until oscillation ceases.
- Try also to increase the ICAL setting until oscillation ceases.
- Try to adjust PCAL, ICAL and DCAL settings one at a time, until the dynamics response is satisfactory.

6.2.4. After removing power to the positioner there is full pressure to output port 1 and zero pressure to output port 2.

- On loss of power the positioner fails full air pressure to output port 2. If this does not happen the positioner is damaged. Contact factory.

6.2.5. A Calibration Error is returned during a Lo or Hi Calibration.

- In the case of a rotary application, the beacon may be misoriented or the actuator may not have enough rotation. The positioner requires the actuator to stroke a minimum of 45 degrees.
- In the case of a linear application, the feedback magnet assembly needs to be ordered specific to the stroke of the actuator and the fail direction of the actuator (See figure 6-1 & 6-2). Also, please check if the magnet center is close to the actual 50% position of the actuator stroke. If not try to align the center of the magnet to the mid-stroke point of the actuator’ stem.

6.2.6. The Integrator Overflow message is shown on the display.

- This message indicates a deviation between position and set-point.
- If this error returns, make sure that all the preliminary checks, as described earlier in this section, have been made. If the cause for the Integrator Overflow error cannot be diagnosed, please contact Westlock for support. Please make sure that the valve is not stuck or if there is no air leakage in the actuator-positioner connections or if the working pressure is too different (50%) from the calibrated pressure.

7. **Technical Specifications**

Input

Signal: Two wire FOUNDATION Fieldbus
Voltage: 9 to 32 VDC (Max 35V)
Current Consumption: 12.5 mA
Pressure: 15 - 45 psi (Low)
40 - 120 psi (High)

Instrumentation air quality must be in accordance with ISO 8573-1 “Air Quality Standards”
(See Pneumatic Connection Section 3.5 for more details)

Output

Flow Rate: 8.0 scfm @ 25 psi (Low)
16.2 scfm @ 90 psi (High)
Pressure: 0 to 45 psi (Low)
0 to 120 psi (High)
Actuator: Single Acting or
Double Acting

Performance

Resolution: ± 0.2% Full Travel
Linearity: ± 0.5% Full Scale (Rotary)
± 1.0% Full Scale (Linear)
Hysteresis: ± 0.2% Full Scale
Repeatability: ± 0.2% Full Scale

Operating Temp: -40°C to 85°C
(-40°F to 167°F)

LCD readable: -20°C to 70°C
(-40°F to 158°F)

Thermal Coefficient: ± 2% / 100°C

Air Consumption: 0.03 scfm @ 25 psi (Low)

0.08 scfm @ 90 psi (High)

Stroke: 0.25 to 24 inches (Linear)
45 to 95 degrees (Rotary)

Position Feedback: Magnetic (Non-Contact)

Diagnostics: FOUNDATION Fieldbus Protocol, Software Utilizing FOUNDATION Fieldbus Protocol

Enclosure

Material: Engineered Resin, Aluminum, Stainless Steel

IP Rating: IP 66

Weight: 3.3 Kg / 7.2 Pounds (resin, standard flow manifold)

Air Connections: 1/4” NPT or 1/4”BSP (STD Flow)
3/8”NPT or BSP (High Flow)

Conduit Connection: 1/2” NPT (Standard)
M20 (Optional)

EMC (Electromagnetic Compatibility)

IEC 61000-6-2:2005 Electromagnetic compatibility (EMC) – Immunity for industrial environments

IEC 61000-6-4:2006 Electromagnetic compatibility (EMC) – Emission standard for industrial environments

IEC 61326-2:2005 Electrical equipment for measurement, control and laboratory use - EMC requirements

8. **LCD Alert Codes and Error Messages**

8.1. ***LCD Alert codes***

FF-OOS	There is no communication in the fieldbus segment
FF-CTR	The position set point is calculated by the FF application
LO-CTR	The position set point is overridden by the ICoT (e.g.: Calibration)
FSTATE	The ICoT is in Fault state
NO RUN	The SP is not being calculated.
WRG_CH	The configured channel is not valid
UNDEF	The channel is undefined

8.2. *LCD Error Messages*

The ICoT positioner has built-in diagnostics that allow the user to identify and resolve most of the common installation and operation problems. The following table lists the available messages, their meaning and recommended solutions:

Message	Meaning	Solution
Valve position unstable	Position is unstable or oscillating too much during calibration	Check: • Hall sensor connector and cable, especially if remote (see Figure 3-4, connector J8) • Pressure supply stability • Actuator and tubing leaks • Magnet assembly in correct position and tightly coupled • Set-point stability • Actuator/Valve assembly integrity • Sources of electromagnetic noise too close to the sensor or to the positioner cables, like AC cables for motors, inverters etc • Perform a full auto CAL • Call factory for additional support
HALL sensor rail error	Position error during PID calibration	Check: • Hall sensor connector and cable, especially if remote (see Figure 3-4, connector J8) • Pressure supply stability • Actuator and tubing leaks • Perform a full auto CAL • Call factory for additional support
PID gain error	PID calibration was not able to find proper gain values and control the valve position	Check: • Hall sensor connector and cable, especially if remote (see Figure 3-4, connector J8) • Pressure supply stability • Actuator and tubing leaks • Actuator/Valve assembly integrity • Perform a full auto CAL • Remove power for at least 1 minute, perform a factory default (see Appendix I) and retry a full auto CAL • Call factory for additional support
Transducer PWM error	During calibration an error occurred with the PWM signal that control the spool-valve driver	Check: • Cable between the inner canister and the pneumatic transducer assembly is tightly connected • Cable and connector between the transducer board and the spool-valve coil • Perform a full auto CAL • Remove power for at least 1 minute, perform a factory default (see Appendix I) and retry the calibration • Call factory for additional support

Message	Meaning	Solution
Input pressure unstable	Pressure was unstable during calibration	Check: • Pressure supply stability • Actuator and tubing leaks • Manifold and transducer assembly are tightly coupled to the enclosure and there are no leaks • Check if the cable between the inner canister and the pneumatic transducer assembly is tightly connected • Actuator/Valve assembly integrity • Perform a full auto CAL • Call factory for additional support
Low Pressure	The input pressure is below the minimum input pressure specified.	• Check if the input pressure gauge is measuring the expected pressure value • In case you are expecting to use a lo pressure ICoT, Check if the motor assembly is suitable for Lo pressure
HALL span too small	Hall sensor used to read position is unstable	Check: • Hall sensor connector and cable, especially if remote (see Figure 3-4, connector J8) • Air pressure supply • Can actuator move the valve full span • Check if the cable between the inner canister and the pneumatic transducer assembly is tightly connected • Check the connector and cable between the transducer board and the spool valve coil • Magnet assembly: o For rotary magnets check if it is not rotated 90 degrees (see figures 3.2, 3.3 and 3.4). o For linear magnets, check if the magnet assembly center is matching the actuator mid position (see figures 3.5, 3.6 and 3.7) • Remove power for at least 1 minute, perform a factory default (see Appendix I) and retry the calibration • Grounding issues, cable shield is properly grounded; positioner ground is properly connected to a clean ground reference. • Sources of electromagnetic noise too close to the sensor or to the positioner cables, like AC cables for motors, inverters etc • Try to replace the Hall sensor and/or the magnet • Call factory for additional support

Message	Meaning	Solution

Hall Sensor out of range	One or more of the analog variables (position, pressure or loop current) does not have enough span to calibrate accordingly	Check:
		• Hall sensor connector and cable, especially if remote (see Figure 3-4, connector J8)
		• Magnet assembly:
		  ○ For rotary magnets check if it is not rotated 90 degrees (see figures 3.2, 3.3 and 3.4).
		  ○ For linear magnets, check if the magnet assembly center is matching the actuator mid position (see figures 3.5, 3.6 and 3.7)
		• Set-point stability, current generator, grounding issues, cable shield is grounded properly, cables entry ground is properly connected to a clean ground reference.
		• Pressure supply stability, actuator and tubing leaks
		• Remove power for at least 1 minute, perform a factory default (see Appendix H) and retry a full auto CAL
		• Grounding issues, cable shield is properly grounded; positioner ground is properly connected to a clean ground reference.
		• Sources of electromagnetic noise too close to the sensor or to the positioner cables, like AC cables for motors, inverters etc
		• Call factory for additional support

Comp range error	An unknown error has occurred during calibration	Check: • Remove power for at least 1 minute and retry • Remove power for at least 1 minute, perform a factory default (see Appendix H) and retry a full auto CAL • Call factory for additional support

Valve stuck	Problems in the movement detection during calibration	Check:
		• Hall sensor connector and cable, especially if remote (see Figure 3-4, connector J8)
		• Magnet assembly.
		  ○ For rotary magnets check if it is not rotated 90 degrees (see figures 3.2, 3.3 and 3.4).
		  ○ For linear magnets, check if the magnet assembly center is matching the actuator mid position (see figures 3.5, 3.6 and 3.7)
		• Pressure supply stability
		• Actuator and tubing leaks
		• Manifold and transducer assembly are tightly coupled to the enclosure and there are no leaks
		• Check if the cable between the inner canister and the pneumatic transducer assembly is tightly connected
		• Actuator/Valve assembly integrity
		• Try to repeat a full auto CAL
		• Call factory for additional support

Message	Meaning	Solution

Not possible to set down gain
Not possible to set up gain
	The calibration of the position sensor could not find a proper gain to work with the current Hall sensor and magnet assembly	Check:
		• Hall sensor connector and cable, especially if remote (see Figure 3-4, connector J8)
		• Magnet assembly is in correct position.
		  ○ For rotary magnets check if it is not rotated 90 degrees (see figures 3.2, 3.3 and 3.4).
		  ○ For linear magnets, check if the magnet assembly center is matching the actuator mid position (see figures 3.5, 3.6 and 3.7). Check if the proper fail-down or fail-up magnet is being used (figure 5.1)
		• Try to repeat a full auto CAL
		• Try to replace the Hall sensor and/or the magnet
		• Remove power for at least 1 minute and retry
		• Remove power for at least 1 minute, perform a factory default (see Appendix I) and retry a full auto CAL
		• Call factory for additional support

Wrong delta value	An unknown error has occurred during calibration	Check: • Remove power for at least 1 minute and retry • Remove power for at least 1 minute, perform a factory default (see Appendix H) and retry a full auto CAL • Call factory for additional support

PWM overflow	During calibration an error occurred with the PWM signal that control the spool-valve driver and the position is not following the control signal	Check:
		• Hall sensor connector and cable, especially if remote (see Figure 3-4, connector J8)
		• Magnet assembly is in correct position.
		  ○ For rotary magnets check if it is not rotated 90 degrees (see figures 3.2, 3.3 and 3.4).
		  ○ For linear magnets, check if the magnet assembly center is matching the actuator mid position (see figures 3.5, 3.6 and 3.7). Check if the proper fail-down or fail-up magnet is being used (figure 5.1)
		• Check if the cable between the inner canister and the pneumatic transducer assembly is tightly connected
		• Check the cable and connector between the transducer board and the spool-valve coil.
		• Try to replace the Hall sensor and/or the magnet
		• Remove power for at least 1 minute and retry
		• Remove power for at least 1 minute, perform a factory default (see Appendix H) and retry a full auto CAL
		• Call factory for additional support

Message	Meaning	Solution
HALL sensor out of range	(SEN, LO, HI, T) Hall sensor used to read position is unstable	Check: • Hall sensor connector and cable, especially if remote (see Figure 3-4, connector J8) • Magnet assembly. For rotary magnets check if it is not rotated 90 degrees (see figures 3.2, 3.3 and 3.4).For linear magnets, check if the magnet assembly center is matching the actuator mid position (see figures 3.5, 3.6 and 3.7) • Remove power for at least 1 minute, perform a factory default (see Appendix H) and retry the calibration • Grounding issues, cable shield is grounded properly, positioner ground is properly connected to a clean ground reference. • Sources of electromagnetic noise too close to the sensor or to the positioner cables, like AC cables for motors, inverters etc • Try to replace the Hall sensor and/or the magnet • Call factory for additional support
Illegal calibration code	An unknown error has occurred during calibration	Check: • Remove power for at least 1 minute and retry • Remove power for at least 1 minute, perform a factory default (see Appendix I) and retry a full auto CAL • Call factory for additional support
Too few bytes received	An unknown error has occurred during calibration	Check: • Remove power for at least 1 minute and retry • Remove power for at least 1 minute, perform a factory default (see Appendix H) and retry a full auto CAL • Call factory for additional support
Generic error	An unknown error has occurred during calibration	Check: • Remove power for at least 1 minute and retry • Remove power for at least 1 minute, perform a factory default (see Appendix I) and retry a full auto CAL • Call factory for additional support
Unknown error code	An unknown error has occurred during calibration	Check: • Remove power for at least 1 minute and retry • Remove power for at least 1 minute, perform a factory default (see Appendix H) and a full auto CAL • Call factory for additional support
Calibration aborted	Calibration aborted by the user	No action

Appendix A

Procedure to Adjust the Low Pressure Setting

Note: The Low Pressure message threshold is pre-set from the factory. For a low pressure positioner it is set to 15 psi and for a high pressure positioner it is set at 30 psi. If these settings come out of calibration or if it is necessary to change these settings, the following instructions can be followed.

1. Before adjusting the Low Pressure threshold setting the positioner must be mounted and set-up. See section 3 of this manual.

2. To adjust the setting of the Low Pressure threshold message to indicate low input pressure, there is an adjustment screw located on the top of the pneumatic transducer (see figure below).

3. To set the Low Pressure threshold for an explicit pressure value, loosen the lock nut on the adjustment screw and **gently** turn the screw clockwise as far as it will go. Do not force the screw past its limit or diaphragm assembly may be damaged.

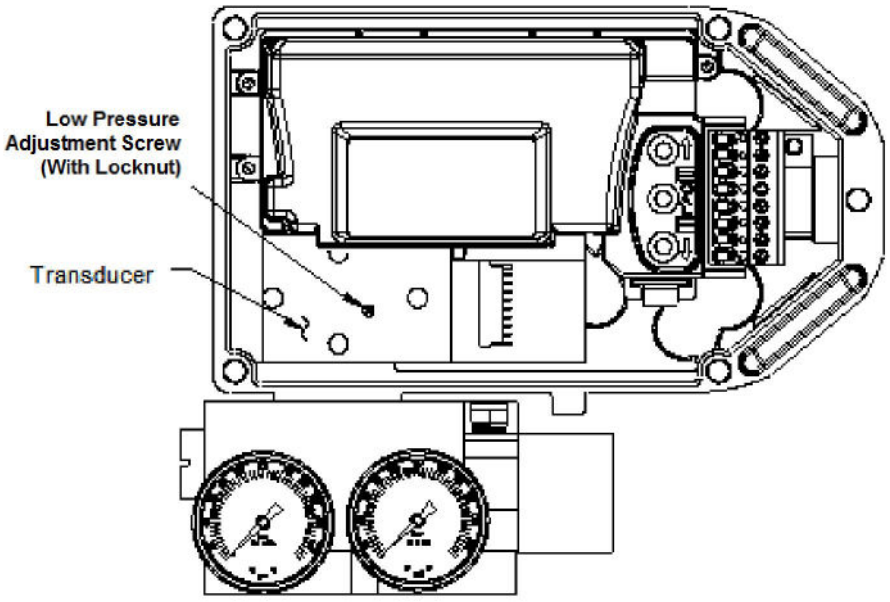
4. Regulate the supply pressure to the pressure you would like to set as a low input pressure flag.

5. Turn the adjustment screw slowly counter-clockwise to the point where the Low Pressure message appears on the LCD.

6. Set this point by tightening the lock nut. Be careful not to affect the adjustment screw setting.

7. Vary air pressure around low pressure setting and observe LCD to test if setting is correct.

8. Re-regulate the supply air to the normal operating pressure.

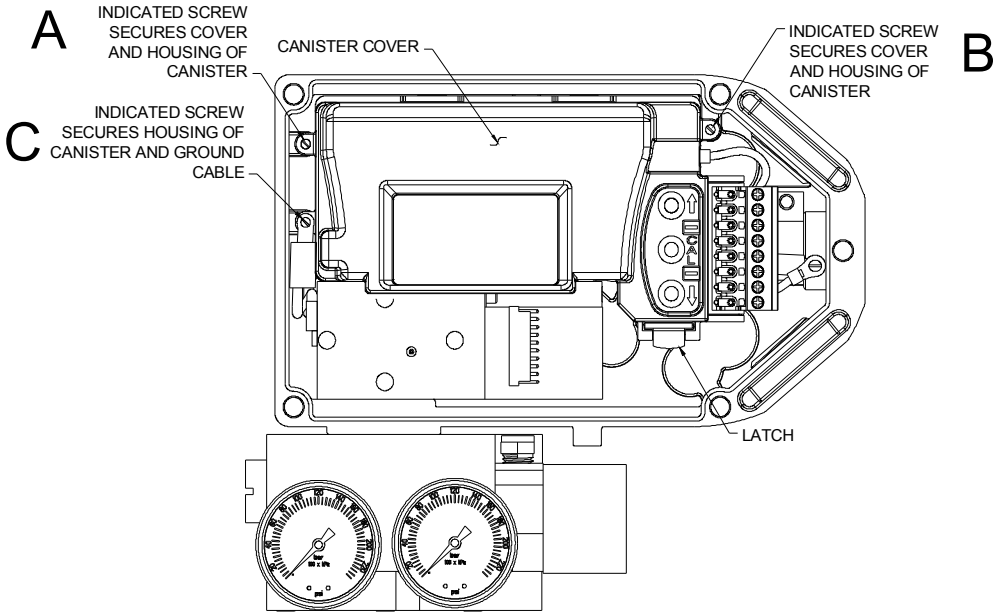


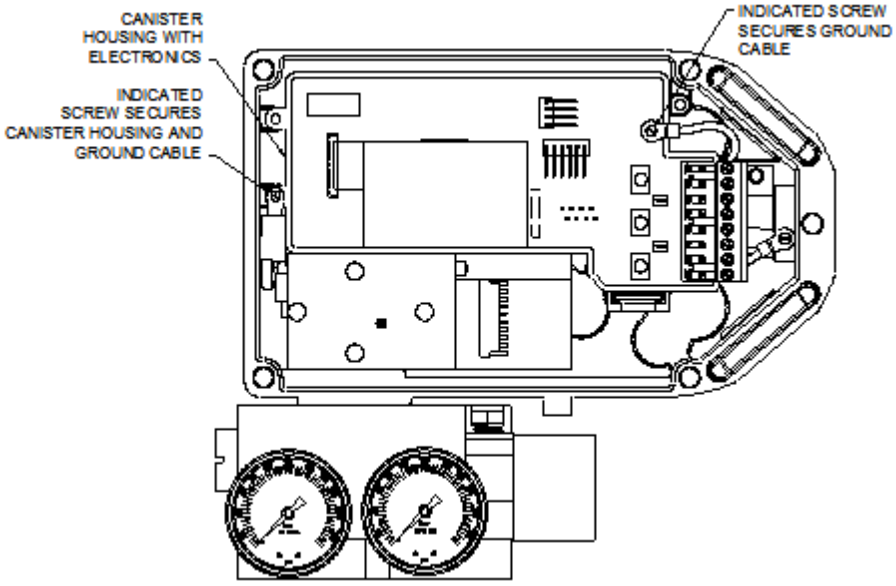
Appendix B
Procedure to Remove Electronics Cover and Electronic Canister

1. Remove the two screws (A & B) that secure the inner canister cover, unlock the latch by pulling it up and remove the canister cover (see figures below).

2. Disconnect all connectors from electronics canister; make sure to note connector locations. Remove the screw that secures canister housing and ground cable (C). Remove the screw that secures ground cable (see figures below).

3. Remove the canister with electronics from ICoT enclosure.



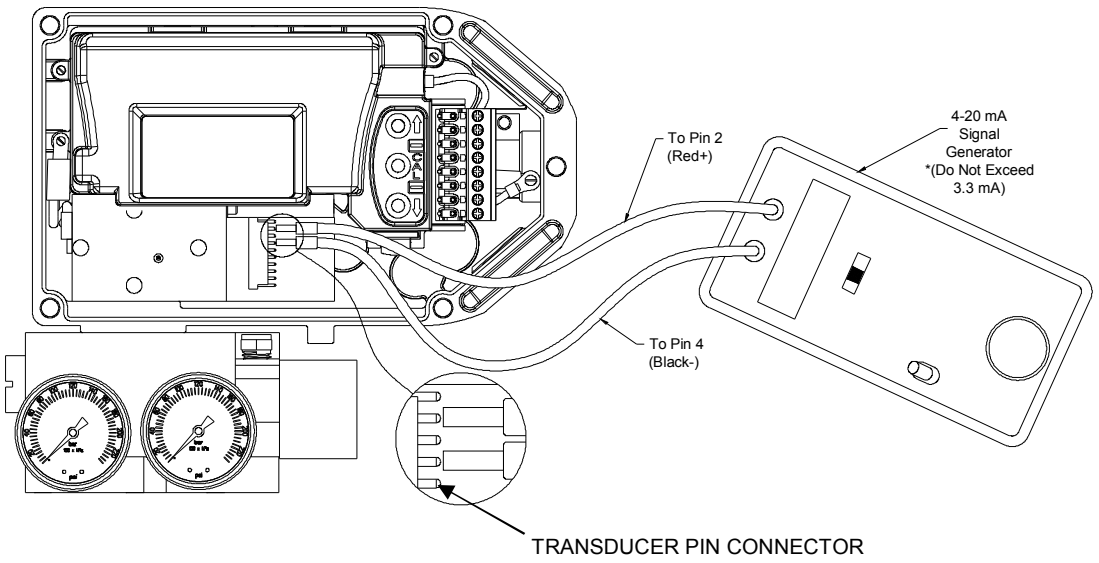


Appendix C
Procedure to Check Transducer Operation

<u>This procedure should only be used for trouble shooting</u>

This procedure requires a 4-20mA current generator.

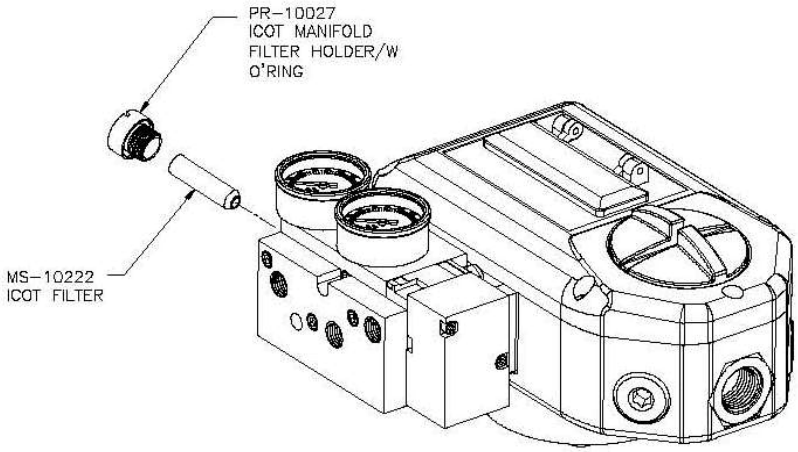
1. Mount the positioner and connect the pneumatics as described in section 3 of this manual.
2. Remove the cable that connects the inner canister to the pneumatic transducer assembly. The electronic canister does not need to be removed.
3. Locate Pin 2 & Pin 4 on transducer pin connector (see figure below).
    a. **Ref.:** Pin 1 is furthest from the pressure gages, Pin 10 is nearest to the to the pressure gages.
4. Connect positive lead of the current generator to Pin 2 and negative lead to Pin 4.
    a. **Note:** make sure power on the current generator is turned off before connecting it to the pins. Make sure the two leads are not shorting by both coming in contact with Pin 3.
5. Turn the 4-20 mA generator on.
    a. **Note:** the transducer operates between 0 and 3.3 mA. Therefore, make sure when turning on the current generator the current is turned down within this range. Applying a current greater than 3.3 mA can permanently damage the transducer.
6. Apply enough air supply to the positioner.
7. The transducer consists of a spool that will channel air between the two output ports of the positioner. As the current is raised air is removed from Output Port 2 and applied to Output Port 1 of the positioner.
8. To check the operation of the positioner, raise and lower the current between 0 and 3.3 mA. This should allow you to fully open and fully close the actuator. You should also be able to control the position of the actuator by slowly adjusting the current supply at an intermediary (idle) current somewhere between 0 and 3.3 mA.



The positioner's onboard filter should be replaced regularly or whenever it gets clogged. See diagram below for location of the filter. **Note:** the following instructions are for Standard Flow. For High Flow please contact the factory.

Important: The positioner's onboard filter is not a substitute for normal instrument air preparation. Supply air to the positioner should conform to ISA Standard S7.3 - Quality for Instrument Air.

Important: The filter's original color is chalk white. If the filter is discolored, its replacement should be performed more often. A discolored filter may also indicate the need for an evaluation of the air-supply quality. A filter/regulator with a 5 micron or better element, just prior to the positioner, is therefore recommended.



Spool valve cleaning

In favorable conditions (i.e. high quality supply air, healthy actuator) there will be minimal if any maintenance necessary on the spool valve. If unfavorable conditions exist (i.e. poor supply air quality or if lubrication and sediment from the actuator is being exhausted through the spool valve) it may become necessary to clean the spool valve to avoid operational failures due to valve sticking and to maintain optimum positioner performance.

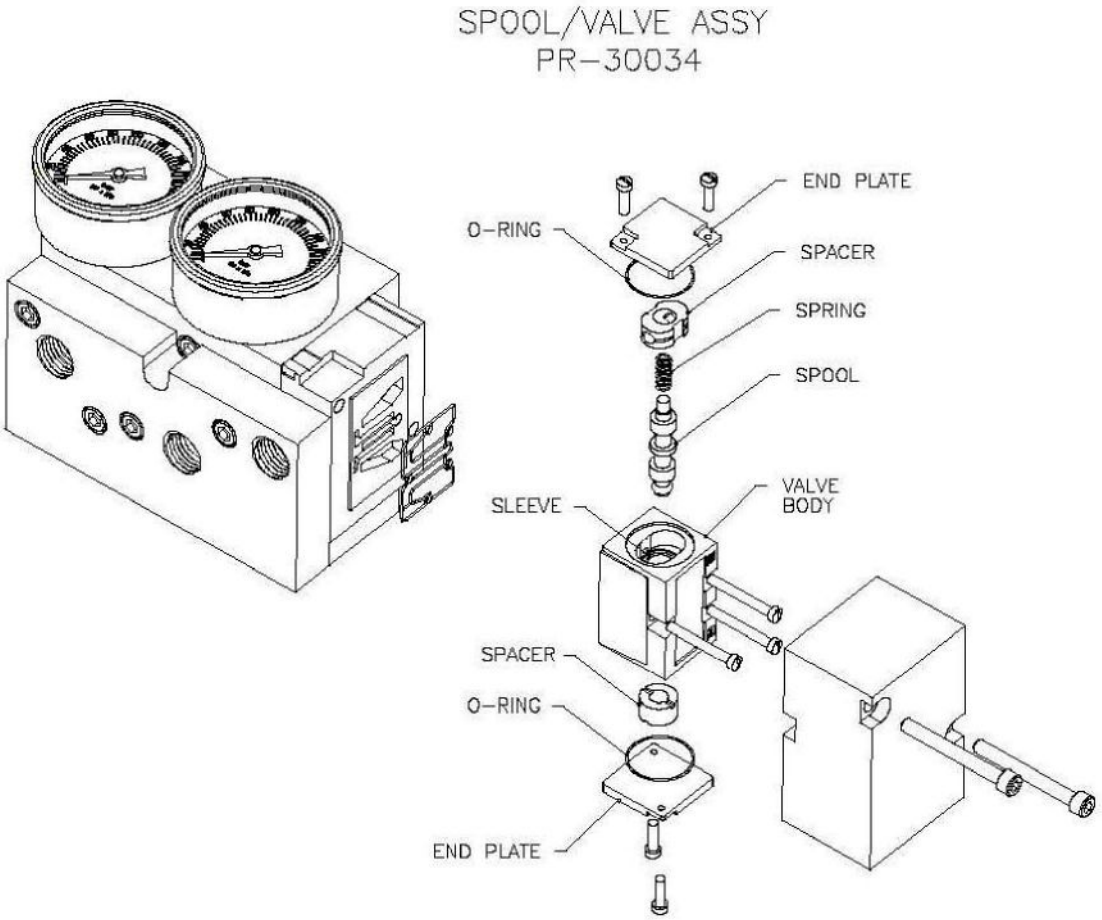
To clean the spool valve, the spool piece needs to be removed (see following diagram). Prior to removing the spool, make sure the positioner is out of service and all air pressure has been bled-off the positioner and the actuator. The spool piece and sleeve can be cleaned using any non-chlorinated cleaning solvent (such as Stoddard solution or volatile mineral spirits). To clean the spool, use a clean lint free cloth. To clean the I.D. of the sleeve a polyester lint free clean

room swab is recommended. These items can be obtained from most industrial supply companies or catalogs.

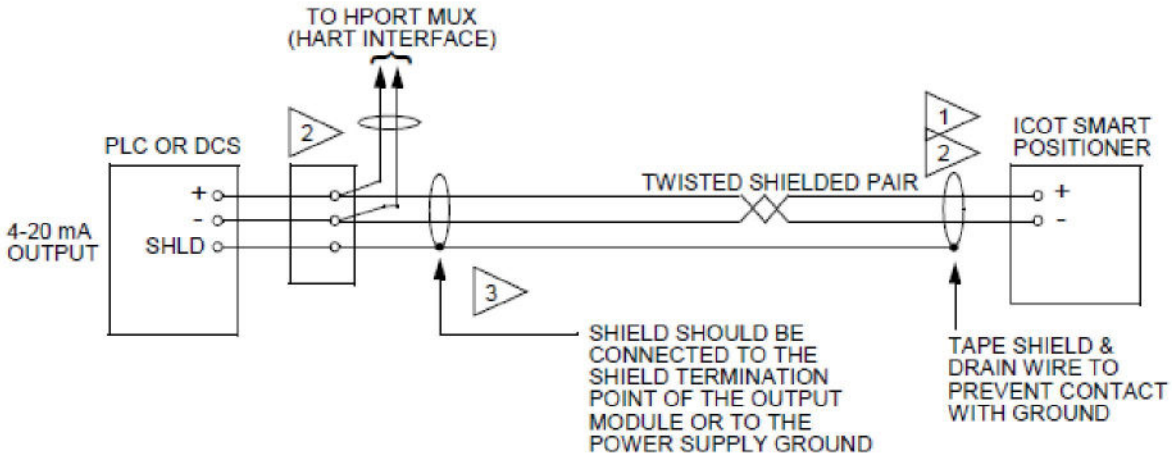
Important: do not use an abrasive cleaner on the spool or sleeve. Never buff the spool or sleeve or use crocus cloth, and never attempt to remove the sharp edges from the spool lands. These practices will permanently damage the spool assembly and will affect the fit and action of the spool sleeve assembly.

Important: the spool and sleeve assembly are sold as a precision matched set. Spools are not interchangeable. To prevent mix-ups it is recommended that only one assembly be cleaned at a time. In case mix-up happen contact factory for additional support.

Important: after cleaning, gently insert the spool into the sleeve. Insert straight with a slight rotating motion. Do not cock the spool. Make sure the spool spins and moves freely. After the spool valve is cleaned and reassembled the positioner should recalibrated using the auto CAL function.



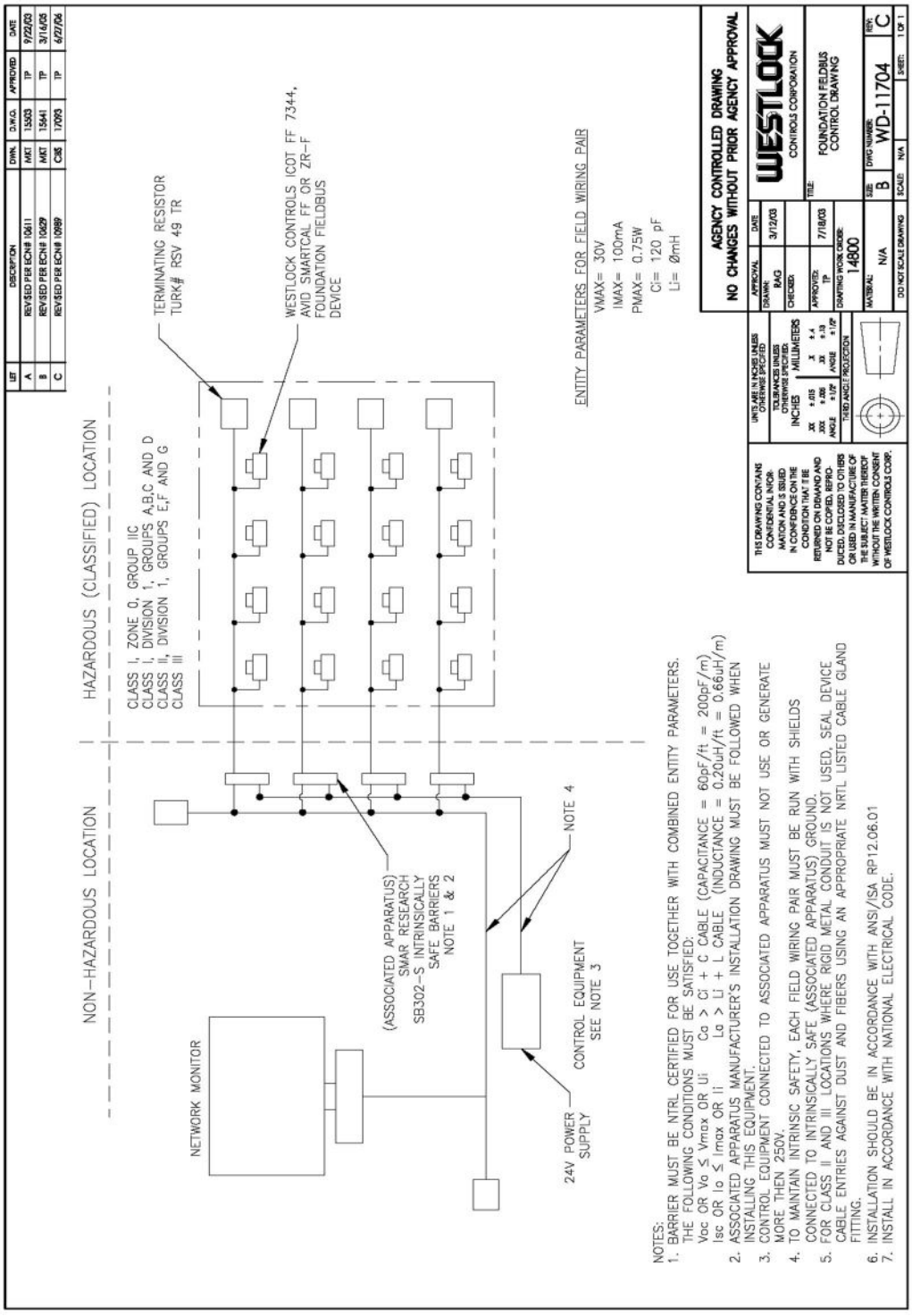
Appendix E
Grounding Schematic

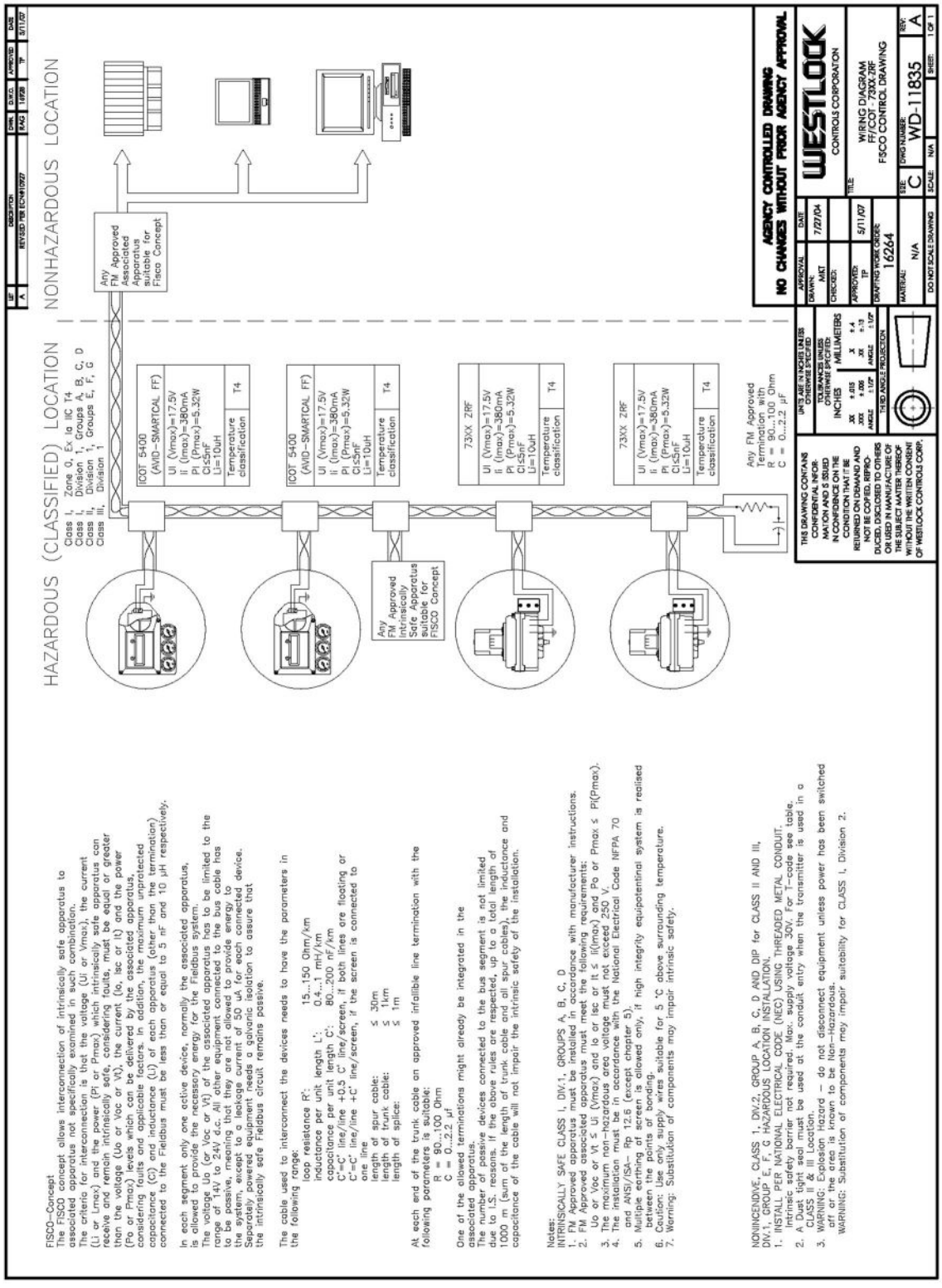


1. CONNECTION FROM DCS OR PLC TO POSITIONER IS 20 GAUGE SHIELDED TWISTED PAIR (BELDEN 8762 OR EQUIVALENT). MAXIMUM DISTANCE IS 5000 FEET.
2. CONNECTION FROM HART MULTIPLEXER TO POSITIONER IS 20 GAUGE SHIELDED TWISTED PAIR (BELDEN 8762 OR EQUIVALENT). MAXIMUM DISTANCE FROM HART MULTIPLEXER TO POSITIONER IS 6000 FEET.
3. SHIELD SHALL BE CONNECTED TO GROUND AT ONE POINT ONLY IN ORDER TO AVOID GROUND LOOPS AND NOISE INTERFERENCE.
4. THE FOLLOWING TABLE, PER IEEE STD 518-1982, INDICATES THE MINIMUM DISTANCE BETWEEN CABLE TRAYS AND CONDUITS CONTAINING LEVEL 1 (THIS INCLUDES 4-20 mA SIGNALS) AND 120 VAC OR 480 VAC, IN ORDER TO MINIMIZE ELECTRICAL NOISE INTERFERENCE.

RACEWAY	480 VAC	120 VAC
TRAY	26"	6"
TRAY-CONDUIT	18"	4"
CONDUIT	12"	3"

Appendix F
Controlled Drawing Fisco





FISCO–Concept
The FISCO concept allows interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combination.
The criteria for interconnection is that the voltage (Ui or Vmax), the current (Ii or Imax) and the power (Pi or Pmax) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (Uo or Voc or Vt), the current (Io, Isc or It) and the power (Po or Pmax) levels which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance (Ci) and inductance (Li) of each apparatus (other than the termination) connected to the Fieldbus must be less than or equal to 5 nF and 10 µH respectively.

In each segment only one active device, normally the associated apparatus, is allowed to provide the necessary energy for the fieldbus system.
The voltage Uo, Voc or Vt of the associated apparatus may be limited to the range of 14 V to 24V d.c. All other equipment connected to the bus cable has to be passive, meaning that they are not allowed to provide energy to the system, except to a leakage current of 50 uA for each connected device. Separately powered equipment needs a galvanic isolation to assure that the intrinsically safe Fieldbus circuit remains passive.

The cable used to interconnect the devices needs to have the parameters in the following range:
loop resistance R': 15...150 Ohm/km
inductance per unit length L': 0.4...1 mH/km
capacitance per unit length C': 80...200 nF/km
C'=C' line/line +0.5 C' line/screen, if both lines are floating or
C'=C' line/line +C' line/screen, if the screen is connected to one line
length of spur cable: ≤ 30m
length of trunk cable: ≤ 1km
length of splice: ≤ 1m

At each end of the trunk cable an approved infallible line termination with the following parameters is suitable:
R = 90..100 Ohm
C = 0...2.2 µf

One of the allowed terminations might already be integrated in the associated apparatus.
The number of passive devices connected to the bus segment is not limited due to I.S. reasons. If the above rules are respected, up to a total length of 1000 m (sum of the length of trunk cable and all spur cables), the inductance and capacitance of the cable will not impair the intrinsic safety of the installation.

Notes:
INTRINSICALLY SAFE CLASS I, DIV.1, GROUPS A, B, C, D
1. FM Approved apparatus must be installed in accordance with manufacturer instructions.
2. FM Approved associated apparatus must meet the following requirements:
   Uo or Voc or Vt ≤ Ui (Vmax) and Io or Isc or It ≤ Ii(Imax) and Po or Pmax ≤ Pi(Pmax).
3. The maximum non–hazardous area voltage must not exceed 250 V.
4. The installation must be in accordance with the National Electrical Code NFPA 70 and ANSI/ISA– Rp 12.6 (except chapter 5).
5. Multiple earthing of screen is allowed only, if high integrity equipotential system is realised between the points of bonding.
6. Caution: Use only supply wires suitable for 5 °C above surrounding temperature.
7. Warning: Substitution of components may impair intrinsic safety.

NONINCENDIVE, CLASS 1, DIV.2, GROUP A, B, C, D AND DIP for CLASS II AND III, DIV.1, GROUP E, F, G HAZARDOUS LOCATION INSTALLATION.
1. INSTALL PER NATIONAL ELECTRICAL CODE (NEC) USING THREADED METAL CONDUIT.
   Intrinsic safety barrier not required. Max. supply voltage 30V. For T–code see table.
2. A Dust tight seal must be used at the conduit entry when the transmitter is used in a CLASS II & III Location.
3. WARNING: Explosion Hazard – do not disconnect equipment unless power has been switched off, or the area is known to be Non–Hazardous.
   WARNING: Substitution of components may impair suitability for CLASS I, Division 2.

Appendix H

Procedure to Reset the Non-Volatile Memory to Factory Settings

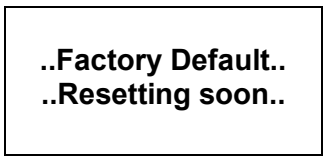
The ICoT2-FF positioner is a microprocessor controlled digital device. Its operation relies on data that is stored in the positioner's non-volatile memory. Calibration and configuration data that has been established during the positioner's setup and calibration is stored in this memory. Under certain abnormal conditions this stored information can become corrupted. If this occurs it is necessary to reset the memory and re-calibrate the positioner.

1. Remove power from the positioner. This can be done by removing the plug-in style terminal strip.

2. Press and hold the CAL button while replacing the terminal strip (returning power). The LCD will show "Starting Up…" for several seconds while holding down the CAL button.

3. Continue to hold the CAL button until the LCD shows "Factory Default Initialization." Scrolling on one line and "No?" in the bottom right hand corner. When this appears release the CAL button and use the down arrow to select "Yes" or press once more to select "All". Then press the CAL button to begin the factory default procedure.
   a. "Yes" option resets all non-volatile data to default with exception of the position calibration data.
   b. "All" option resets all non-volatile memory contents including all factory and user calibration data.

4. After choosing "Yes" or "All" within 10 seconds display will show:



5. A few seconds later the display will show:

6. When complete, the positioner will automatically return to normal operating mode.

   It is recommended then to follow the normal calibration procedure as described in the manual section 4.2.

Appendix J

Controlling the ICOT2-FF Position using the 375/475 Field Communicator

1. Power up the 375/475/475 Field Communicator, connect the 375/475 bus leads to the Fieldbus test line. Use the FF connections (not the HART) on the top of the 375/475 by sliding the connector cover to the right. The ICOT2-FF is not polarity sensitive but the 375/475 is, so observe polarity. Make sure the Fieldbus segment has power through a Fieldbus power conditioner.

Field Communicator Main Menu
HART Application
FOUNDATION Fieldbus Application
Settings
Listen For PC
ScratchPad

2. From the 375/475 Main Menu select **FOUNDATION Fieldbus Application** or the Fieldbus icon. (Up and Down arrow keys scroll through the list, the Enter key selects the highlighted item.

3. From the Fieldbus Application Main Menu select **Online**. If this device is not on an active Fieldbus Segment (communicating with a Fieldbus Host or LinkActiveScheduler) then a Warning message will appear saying: **"Connection Warning No Fieldbus communication detected. Press OK to connect to this segment anyway. Press CANCEL to go to the Fieldbus Application Main Menu".** Press **OK** to start communication.

Fieldbus Application
Main Menu
Online
Utility
Fieldbus Diagnostics

4. After the 375/475 finds all the devices on the Fieldbus network select the ICOT2-FF.

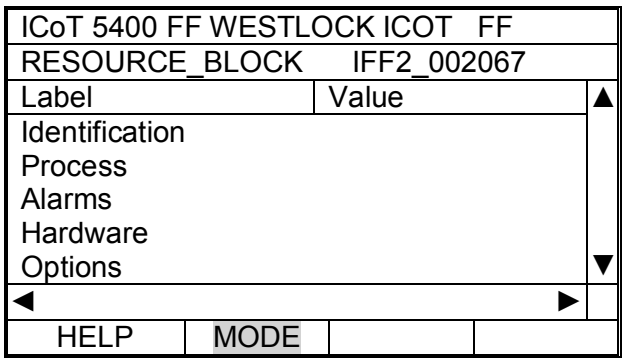
Fieldbus Live Device List	
Number of Devices Found = 2	
Tag	Address
ICOT2-FF IFF2_002067	234
LAS-> Field Communicator	253

5. Make sure that the RESOURCE_BLOCK is Auto mode. If it is not then put it into Auto mode by selecting the RESOURCE_BLOCK, by hitting the right arrow key.

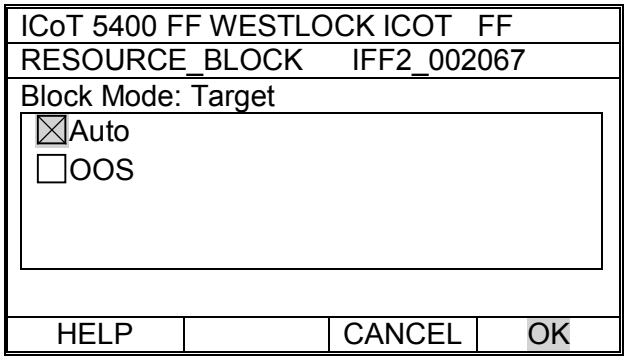
ICoT 5400 FF WESTLOCK ICOT FF			
WTVC Device Revision 3			
Block Tag	Block Type	Actual Mode	
ResourceBlo..	RES_BLO...	Auto	
XDUCER_BL.	Custom	Auto	
AI ...	AI		
PID	PID		
AO ...	AO		
Advanced			
HELP			

6. Press the MODE button to change the mode of this function block.

   Note: if a message such as **"This device description may not have been tested with this version of Fieldbus Application. Do you want to proceed with this device description anyway?"** appears then press the YES button.

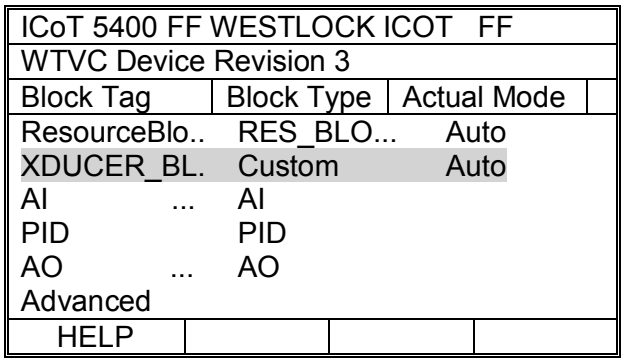


7. Select Auto (box checked), make sure OOS is not selected (box is not checked). The item is toggled from selected to not selected by touching the box on the 375/475 LCD screen. Then press the OK button. A Warning message appears: **"Process Control COULD be affected. Changing the MODE and/or Block parameters of this device COULD adversely affect the control of your process. Click the HELP button. Do you want to apply the change?"** Press the YES button. Press the Left Arrow key to return to the Main screen.

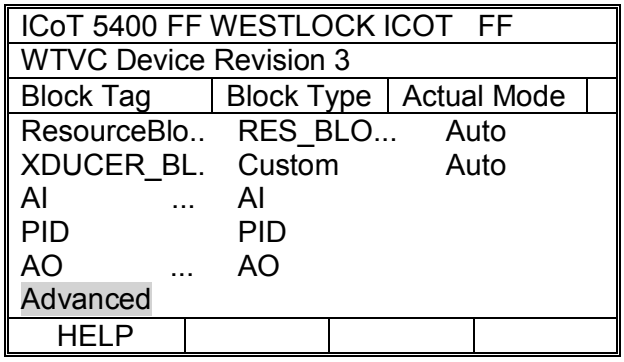


8. Make sure the **XDUCER_BLOCK_APB** is in Auto mode.

   Check Auto and uncheck Man For 475 Comunicator.

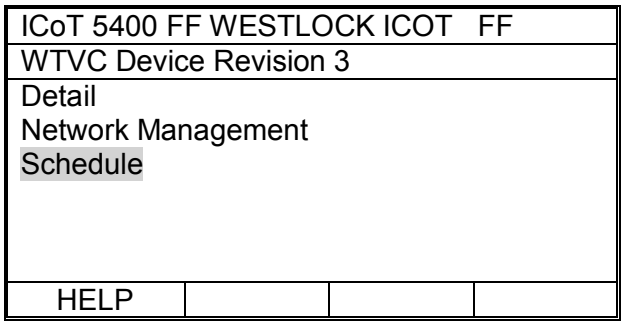


9. On the Main screen use the Down Arrow key to go to the **Advanced** block. Use the Right Arrow key to select the Advanced block...

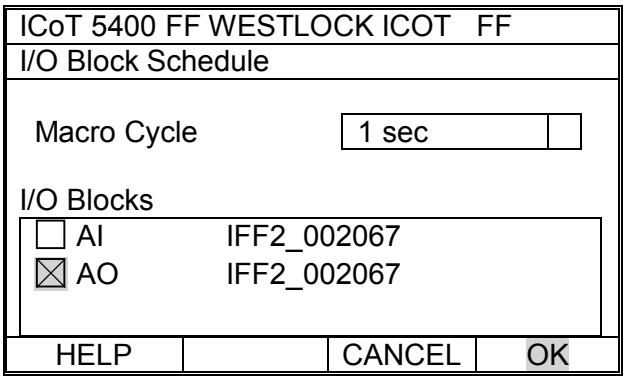


10. Use the Down Arrow key to go to the **Schedule** option. Use the Right Arrow key to select the Schedule option.

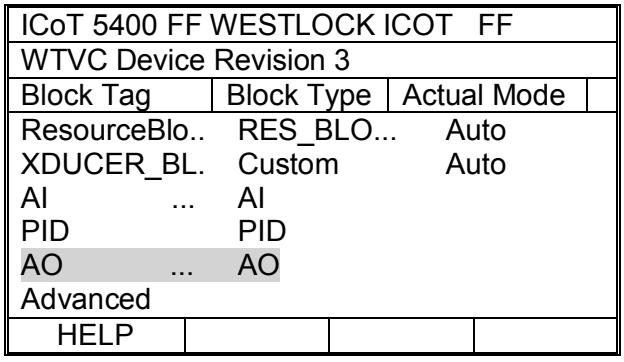
    A Warning message may appear: **"The Fieldbus Application cannot be used to schedule blocks of a commissioned device. Is this device commissioned?"** Press the NO button.



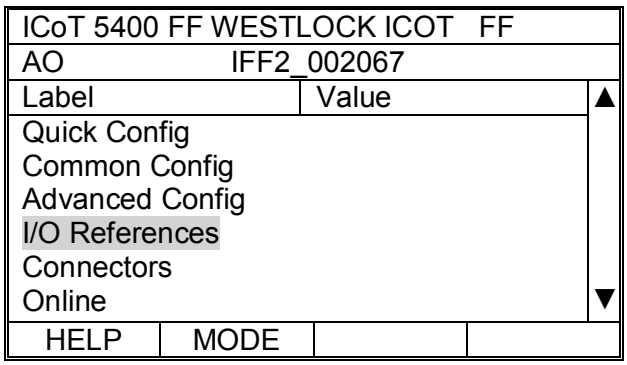
11. The I/O Block Schedule screen shows the I/O blocks available for scheduling. Check the box next to the AO block, then press the OK button. After a few seconds you should see a message that says "I/O Block schedules were successfully changed", now press the OK button then press the Left Arrow key to return to the Main screen.



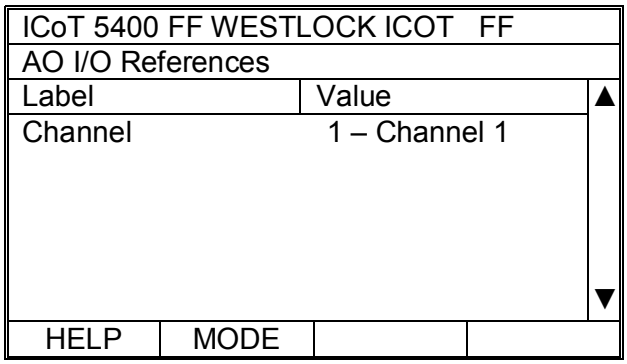
12. With the Up Arrow key scroll up to the AO block then press the Right Arrow key to select it.



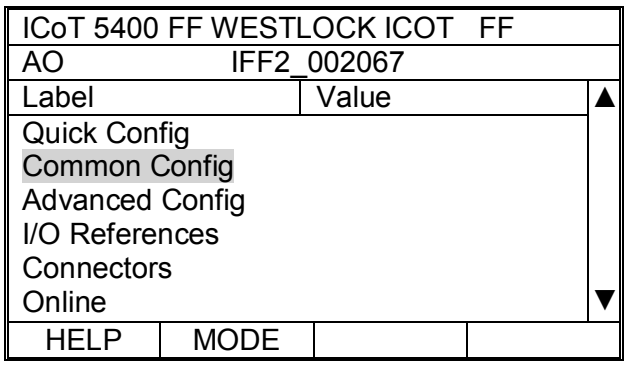
13. With the Down Arrow key go to I/O References then press the Right Arrow key to select it.



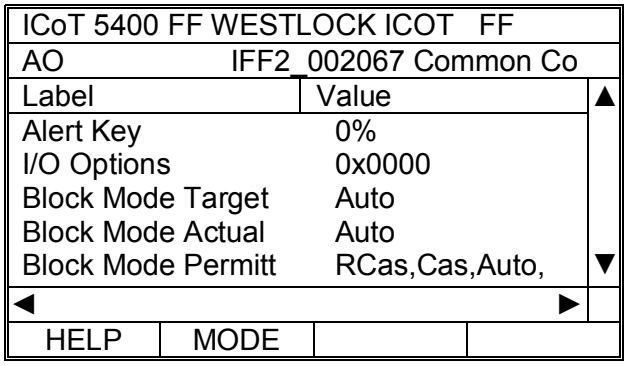
14. Make sure the Channel is set to 1 – Channel 1. If it is not hit the right arrow key to change it (note MODE must be in OOS to do changes). Hit the left arrow key to return to the AO Menu screen.



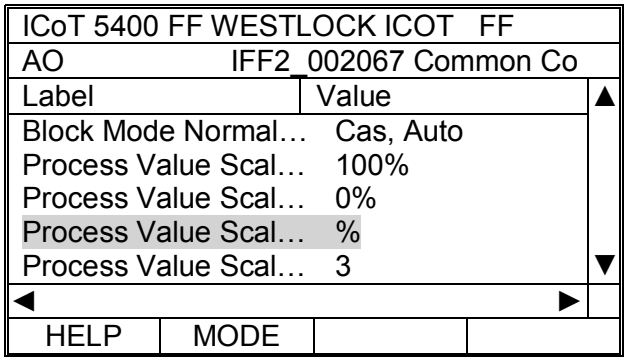
15. With the Up Arrow key go to Common Config then press the Right Arrow key to select it.



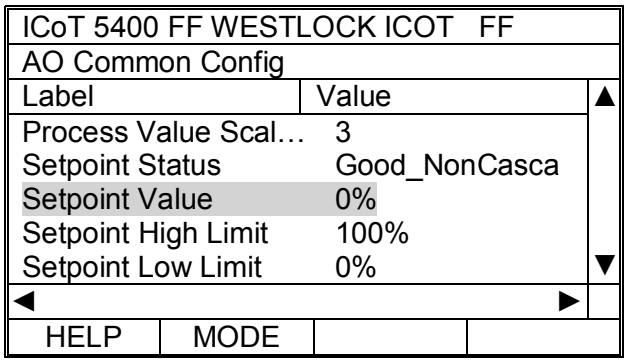
16. The AO Block Common Configuration screen shows the available parameters, it will take some time (about 7 seconds) for the 375/475 to read all the parameters, when the highlight appears on the top parameter on the 375/475 LCD screen it is done. The parameters are displayed 5 at a time on 3 pages (see Appendix D), scroll down with the Down arrow key, when you are on the bottom parameter and press the Down arrow key it moves on to the next page.



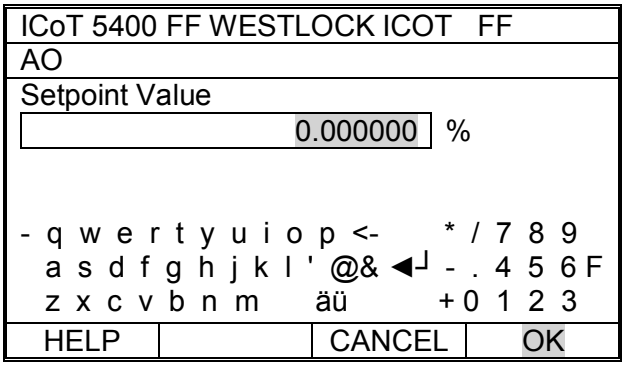
17. Scroll down to the Process Value Scale Units Index parameter (on page 2), the Value shown should be % this indicates the setpoint unit of measure is as a percentage of the fully open valve position. If it is not shown as % press the Right Arrow key to change this on the next screen which has a drop down list of unit (% is about the center of the list) mode must be in OOS to do changes.



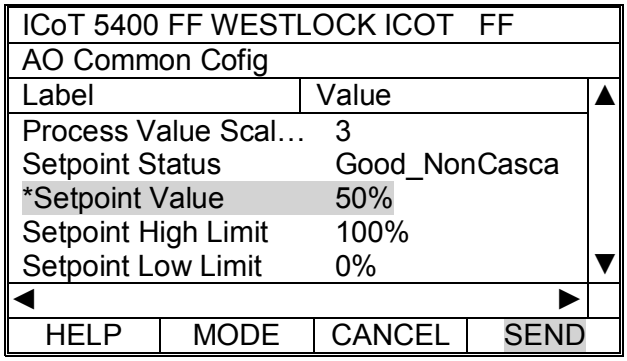
18. Scroll down to the Setpoint Value parameter (on page 3), the Value shown should be in the range of 0% to 100% this indicates the setpoint value as a percentage of the fully open valve position. Press the Right Arrow key to select this parameter.



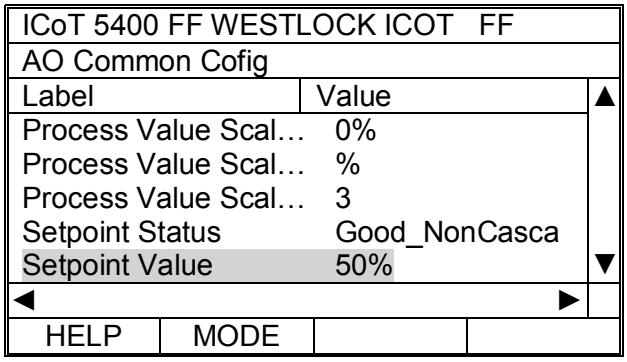
19. Enter the desired setpoint value using the numeric keys on the 375/475. Once you have entered the desired value press the "**OK**" on the screen.



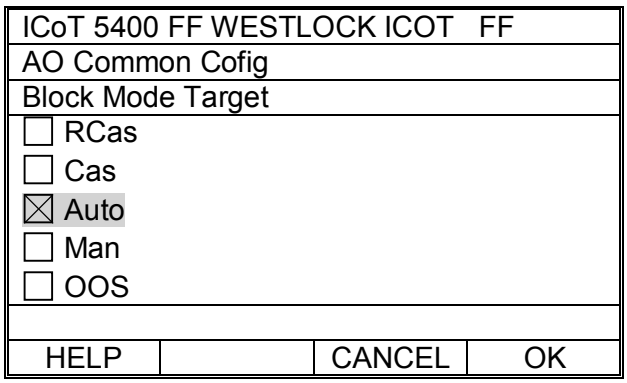
20. The screen now shows the number you entered as the value for Setpoint which has an asterisk to the left indicating the parameter value has changed but it has not yet been sent to the ICOT2-FF. Once this is updated in the ICOT2-FF the valve will move so make sure everything is ready. Then press the "**SEND**" on the screen to send the new value to the device.



21. Once this has been sent the 375/475 LCD screen will show the Setpoint Value without the asterisk. The AO block MODE must be in AUTO for the device to update the setpoint. To change to AUTO press the MODE key



22. Make sure only the Auto mode is checked then press the OK key. If changes were made then a warning message appears "Process Control COULD be affected. Changing the MODE and/or parameters of this device COULD adversely affect the control of your process. Click the HELP button. Do you want to apply the change?" Press the YES key. The %SP on the ICOT2-FF LCD should be the same as the value entered in the Setpoint Value above.



ICOT2-FF RESOURCE_BLOCK MENU TREE

Block: Resource:

---Identification

---Manufacturer Id	WTVC	
---Device Type	**********	
---Device Revision	3	
---DD Revision	1	
---Tag Description	…	
---Characteristics: Block Tag	ResourceBlock	

---Process

---Strategy	0	
---Alert Key	0	
---Block Mode: Target	Auto	
---Block Mode: Actual	Auto	
---Block Mode: Permitted	Auto, OOS	
---Block Mode: Normal	Auto	
---Resource State	Online	
---Grant Deny: Grant	0x00	
---Grant Deny: Deny	0x00	
---Shed Remote Cascade	640000	1/32 ms
---Shed Remote Out	640000	1/32 ms

---Alarms

---Fault State	Clear	
---Set Fault State	OFF	
---Clear Fault State	Off	
---Max Notify	4	
---Limit Notify	10	
---Confirm Time	640000	1/32 ms
---Alarm Summary: Current	0x0001	
---Alarm Summary: Unacknowledged	0x0000	
---Alarm Summary: Unreported	0x0000	
---Alarm Summary: Disabled	0x0000	
---Acknowledge Option	0x0000	
---Write Priority	0	

---Hardware

---Hard Types	0x000C	
---Minumum Cycle Time	3200	1/32 ms
---Memory Size	0	Kbytes
---Nonvolatile Cycle Time	0	1/32 ms
---Free Space	19.94	%
---Free Time	50	%

---Options

---Features	0x043E
---Feature Selection	0x0036
---Cycle Type	0x0001
---Cycle Selection	0x0000
---Write Lock	Not Locked

---Status

---Block Error	0x0000

---Other

---Static Revision	0
---Test Read Write: Test Boolean	FALSE
---Test Read Write: Test Integer8	0
---Test Read Write: Test Integer16	0
---Test Read Write: Test Integer32	0
---Test Read Write: Test Unsigned8	0
---Test Read Write: Test Unsigned16	0
---Test Read Write: Test Unsigned32	0
---Test Read Write: Test Float	0
---Test Read Write: Test Visible String	
---Test Read Write: Test Octet String	
---Test Read Write: Test Date	01/01/1900 00:00:00
---Test Read Write: Test Time	01/01/1984 00:00:00
---Test Read Write: Test Time Difference	0 00 00 00
---Test Read Write: Test Bit String	0000
---Test Read Write: Test Data Link Layer Time	01/01/1972 00:00:00
---DD Resource	
---Restart	Run
---Update Event: Unacknowledged	Uninitialized
---Update Event: Update State	Uninitialized
---Update Event: Time Stamp	01/01/1972 00:00:00
---Update Event: Static Rev	0
---Update Event: Relative Index	0
---Block Alarm: Unacknowledged	Uninitialized
---Block Alarm: Alarm State	Uninitialized
---Block Alarm: Time Stamp	01/01/1972 00:00:00
---Block Alarm: Subcode	Other
---Block Alarm: Value	0
---Write Alarm: Unacknowledged	Uninitialized
---Write Alarm: Alarm State	Uninitialized
---Write Alarm: Time Stamp	01/01/1972 00:00:00
---Write Alarm: Subcode	Other
---Write Alarm: Discrete Value	State 0
---Revision	0
---Fail Active	0x00000000
---Offspec Active	0x00000000
---Maintenance Active	0x00000000
---Check Active	0x00000000
---Fail Map	0x00000000
---Offspec Map	0x00000000
---Maintenance Map	0x00000000
---Check Map	0x00000000
---Fail Mask	0x00000000
---Offspec Mask	0x00000000
---Maintenance Mask	0x00000000
---Check Mask	0x00000000
---Fail Diagnostic Alarm Unacknowledged	Uninitialized
---Fail Diagnostic Alarm Alarm State	Uninitialized
--- Fail Diagnostic Alarm Time Stamp	01/01/1900 00:00:00
--- Fail Diagnostic Alarm Subcode	0
---Fail Diagnostic Alarm Value	0
---Offspec Alarm Unacknowledged	Uninitialized
---Offspec Alarm Alarm State	Uninitialized
---Offspec Alarm Time Stamp	01/01/1900 00:00:00
---Offspec Alarm Subcode	0
---Offspec Alarm Value	0
---Maintenance Alarm Unacknowledged	Uninitialized
---Maintenance Alarm Alarm State	Uninitialized
---Maintenance Alarm Time Stamp	01/01/1900 00:00:00
---Maintenance Alarm Subcode	0
---Maintenance Alarm Value	0
---Check Alarm Unacknowledged	Uninitialized
---Check Alarm Alarm State	Uninitialized
---Check Alarm Time Stamp	01/01/1900 00:00:00
---Check Alarm Subcode	0
---Check Alarm Value	0
---Fail Priority	0
---Offspec Priority	0
---Maintenance Priority	0
---Check Priority	0
---Field Diagnostic Simulate Diagnostic Sim	0x00000000
---Field Diagnostic Simulate Diagnostic Value	0x00000000
--- Field Diagnostic Simulate Diagnostic En	Disabled
---Recommended Action	No Action
---BLOCK_ERR_DESC_1	0x20000000
---Key	17
---REVISION_ID	ICoT_II_FF_Rev3.1.0
---REVISION_IDATE	08 August 2012
---STACK_REVISION	R
---STACK_DATE	3
---FBAPP_REVISION	R
---FBAPP_DATE	2
---SUPPORTED_MODES	0x88

|
|---**All**
|---Characteristics: Block Tag.....RESOURCE_BLOCK IFF2_002067
|---Static Revision.....0
|---Tag Description.....
|---Strategy.....0
|---Alert Key.....0
|---Block Mode: Target.....Auto
|---Block Mode: Actual.....Auto
|---Block Mode: Permitted.....Auto, OOS
|---Block Mode: Normal.....Auto
|---Block Error.....0x0000
|---Resource State.....Online
|---Test Read Write: Test Boolean.....FALSE
|---Test Read Write: Test Integer8.....0
|---Test Read Write: Test Integer16.....0
|---Test Read Write: Test Integer32.....0
|---Test Read Write: Test Unsigned8.....0
|---Test Read Write: Test Unsigned16.....0
|---Test Read Write: Test Unsigned32.....0
|---Test Read Write: Test Float.....0
|---Test Read Write: Test Visible String.....
|---Test Read Write: Test Octet String.....
|---Test Read Write: Test Date.....01/01/1900 00:00:00
|---Test Read Write: Test Time.....01/01/1984 00:00:00
|---Test Read Write: Test Time Difference.....0 00 00 00
|---Test Read Write: Test Bit String.....0000
|---Test Read Write: Test Data Link Layer Time..01/01/1972 00:00:00
|---DD Resource.....
|---Manufacturer Id.....WTVC
|---Device Type.....**********
|---Device Revision.....3
|---DD Revision.....1
|---Grant Deny: Grant.....0x00
|---Grant Deny: Deny.....0x00
|---Hard Types.....0x000C
|---Restart.....Run
|---Features.....0x043E
|---Feature Selection.....0x0036
|---Cycle Type.....0x0001
|---Cycle Selection.....0x0000
|---Minumum Cycle Time.....3200 1/32 ms
|---Memory Size.....0 Kbytes
|---Nonvolatile Cycle Time.....0 1/32 ms
|---Free Space.....19.93 %
|---Free Time.....50 %
|---Shed Remote Cascade.....640000 1/32 ms
|---Shed Remote Out.....640000 1/32 ms
|---Fault State.....Uninitialized
|---Set Fault State.....OFF
|---Clear Fault State.....Off
|---Max Notify.....4
|---Limit Notify.....10
|---Confirm Time.....640000 1/32 ms
|---Write Lock.....Not Locked
|---Update Event: Unacknowledged.....Uninitialized
|---Update Event: Update State.....Uninitialized
|---Update Event: Time Stamp.....01/01/1972 00:00:00
|---Update Event: Static Rev.....0
|---Update Event: Relative Index.....0
|---Block Alarm: Unacknowledged.....Uninitialized
|---Block Alarm: Alarm State.....Uninitialized
|---Block Alarm: Time Stamp.....01/01/1972 00:00:00
|---Block Alarm: Subcode.....Other
|---Block Alarm: Value.....0
|---Alarm Summary: Current.....0x0000
|---Alarm Summary: Unacknowledged.....0x0000
|---Alarm Summary: Unreported.....0x0000
|---Alarm Summary: Disabled.....0x0000
|---Acknowledge Option.....0x0000
|---Write Priority.....0
|---Write Alarm: Unacknowledged.....Uninitialized
|---Write Alarm: Alarm State.....Uninitialized
|---Write Alarm: Time Stamp.....01/01/1972 00:00:00
|---Write Alarm: Subcode.....Other
|---Write Alarm: Discrete Value.....State 0
|---ITK Version.....6
|---Revision.....0
|---Fail Active.....0x00000000
|---Offspec Active.....0x00000000
|---Maintenance Active.....0x00000000
|---Check Active.....0x00000000
|---Fail Map.....0x00000000
|---Offspec Map.....0x00000000
|---Maintenance Map.....0x00000000
|---Check Map.....0x00000000
|---Fail Mask.....0x00000000
|---Offspec Mask.....0x00000000
|---Maintenance Mask.....0x00000000
|---Check Mask.....0x00000000
|---Fail Diagnostic Alarm Unacknowledged.....Uninitialized
|---Fail Diagnostic Alarm Alarm State.....Uninitialized
|---Fail Diagnostic Alarm Time Stamp.....01/01/1900 00:00:00
|---Fail Diagnostic Alarm Subcode.....0
|---Fail Diagnostic Alarm Value.....0
|---Offspec Alarm Unacknowledged.....Uninitialized
|---Offspec Alarm Alarm State.....Uninitialized
|---Offspec Alarm Time Stamp.....01/01/1900 00:00:00
|---Offspec Alarm Subcode.....0
|---Offspec Alarm Value.....0
|---Maintenance Alarm Unacknowledged.....Uninitialized
|---Maintenance Alarm Alarm State.....Uninitialized
|---Maintenance Alarm Time Stamp.....01/01/1900 00:00:00
|---Maintenance Alarm Subcode.....0
|---Maintenance Alarm Value.....0
|---Check Alarm Unacknowledged.....Uninitialized
|---Check Alarm Alarm State.....Uninitialized
|---Check Alarm Time Stamp.....01/01/1900 00:00:00
|---Check Alarm Subcode.....0
|---Check Alarm Value.....0
|---Fail Priority.....0
|---Offspec Priority.....0
|---Maintenance Priority.....0
|---Check Priority.....0
|---Field Diagnostic Simulate Diagnostic Sim.....0x00000000
|---Field Diagnostic Simulate Diagnostic Value....0x00000000
|---Field Diagnostic Simulate Diagnostic En.....Disabled
|---Recommended Action.....No Action
|---BLOCK_ERR_DESC_1.....0x20000000
|---Key.....17
|---REVISION_ID.....ICoT_II_FF_Rev3.1.0
|---REVISION_IDATE.....08 August 2012
|---STACK_REVISION.....R
|---STACK_DATE.....3
|---FBAPP_REVISION.....R
|---FBAPP_DATE.....2
|---SUPPORTED_MODES.....0x88

ICOT2-FF XDUCER_BLOCK_APB MENU TREE

Block: XDUCER_BLOCK_APB:

|---**Process**
- |---Strategy....0
- |---Alert Key....0
- |---Block Mode: Target....Auto
- |---Block Mode: Actual....Auto
- |---Block Mode: Permitted....Auto, Man, OOS
- |---Block Mode: Normal....Auto
- |---Tag Description....
- |---Characteristics Block Tag....XDUCER_BLOCK_APB

|---**Status**
- |---Block Error....0x0000

|---**Other**
- |---Static Revision....0
- |---Update Event: Unacknowledged....Unacknowledged
- |---Update Event: Update State....Reported
- |---Update Event: Time Stamp....01/01/1972 00:00:00
- |---Update Event: Static Rev....3
- |---Update Event: Relative Index....0
- |---Block Alarm: Unacknowledged....Uninitialized
- |---Block Alarm: Alarm State....Uninitialized
- |---Block Alarm: Time Stamp....01/01/1972 00:00:00
- |---Block Alarm: Subcode....Other
- |---Block Alarm: Value....0
- |---Transducer Directory Entry[1]....0
- |---Transducer Type....**********
- |---Transducer Type Version....0
- |---Transducer Error....**********
- |---Collection Directory[1]....0
- |---Final Value Status....Bad::NonSpecific:NotLimited
- |---Final Value Value....0 %
- |---Final Value Range EU at 100%....100 %
- |---Final Value Range EU at 0%....0 %
- |---Final Value Range Units Index....%
- |---Final Value Range Decimal....2
- |---Final Value Hi Cutoff....100 %
- |---Final Value Lo Cutoff....0 %
- |---Final Position Value Status....Good_NonCascade::NonSpeci
- |---Final Position Value Value....0.36 %
- |---Working Position Status....Good_NonCascade::NonSpeci
- |---Working Position Value....0.36
- |---Working Setpoint Status....Bad::NonSpecific:NotLimited
- |---Working Setpoint Value....0 %
- |---Deviation Deadband Decimal....2 %
- |---Deviation Time....0 Sec
- |---Deviation Value....0.36
- |---Position Alert High....95 %
- |---Position Alert Low....5 %
- |---Signal Action....0
- |---Stop Hi Position....100 %
- |---Stop Lo Position....0 %
- |---Travel Accumulator....0
- |---Travel Units....%
- |---XD Fault State....0 %
- |---XD Fault State Option....Fail Closed
- |---Cycle Counter....0
- |---Signal Action....Increase to Open
- |---Readback Select....Final Position Value
- |---CALIBRATION COMMANDS....Normal Operation
- |---CALIBRATION STATES....Normal Operation
- |---Transducer OOS Options....Hold Last Value
- |---Position Features....0x0000
- |---Actuator Fail Action....Uninitialized
- |---Actuator Manufacturer Id....0
- |---Actuator Model Number....
- |---Actuator Serial Number....
- |---custom_curve_scaling_factor....Rotary
- |---Valve Manufacturer Id....
- |---Valve Model Number....
- |---Valve Serial Number....
- |---Valve Type....Uninitialized
- |---Transducer Calibration Location....
- |---Transducer Calibration Date....01/01/1900 00:00:00
- |---Transducer Calibration Who....
- |---VTS Command....Uninitialized
- |---VTS Mode....Disabled
- |---VTS Pause....0 s
- |---VTS Result....No Initial Results
- |---VTS Detailed Result....0x0000
- |---Closed Position Deadband....0
- |---Closed Position Shift....0
- |---Table Description Min Num Points....0
- |---Table Description Max Num Points....0
- |---Table Description Table Element Data Type....0
- |---Element of array CURVE_X....0
- |---custom_curve_scaling_factor....0
- |---Curve X[1]....0
- |---Curve X[2]....0
- |---Curve X[3]....0
- |---Curve X[4]....0
- |---Curve X[5]....0
- |---Curve X[6]....0
- |---Curve X[7]....0
- |---Curve X[8]....0
- |---Curve X[9]....0
- |---Curve X[10]....0
- |---Curve X[11]....0
- |---Curve X[12]....0
- |---Curve X[13]....0
- |---Curve X[14]....0
- |---Curve X[15]....0
- |---Curve X[16]....0
- |---Curve X[17]....0
- |---Curve X[18]....0
- |---Curve X[19]....0
- |---Curve X[20]....0
- |---Curve X[21]....0
- |---Curve Y[1]....0
- |---Curve Y[2]....0
- |---Curve Y[3]....0
- |---Curve Y[4]....0
- |---Curve Y[5]....0
- |---Curve Y[6]....0
- |---Curve Y[7]....0
- |---Curve Y[8]....0
- |---Curve Y[9]....0
- |---Curve Y[10]....0
- |---Curve Y[11]....0
- |---Curve Y[12]....0
- |---Curve Y[13]....0
- |---Curve Y[14]....0
- |---Curve Y[15]....0
- |---Curve Y[16]....0
- |---Curve Y[17]....0
- |---Curve Y[18]....0
- |---Curve Y[19]....0
- |---Curve Y[20]....0
- |---Curve Y[21]....0
- |---Curve X[1]....0
- |---Curve X[2]....0
- |---Curve X[3]....0
- |---Curve X[4]....0
- |---Curve X[5]....0
- |---Curve X[6]....0
- |---Curve X[7]....0
- |---Curve X[8]....0
- |---Curve X[9]....0
- |---Curve X[10]....0
- |---Curve X[11]....0
- |---Curve X[12]....0
- |---Curve X[13]....0
- |---Curve X[14]....0
- |---Curve X[15]....0
- |---Curve X[16]....0
- |---Curve X[17]....0
- |---Curve X[18]....0
- |---Curve X[19]....0
- |---Curve X[20]....0
- |---Curve X[21]....0
- |---Curve Y[1]....0
- |---Curve Y[2]....0
- |---Curve Y[3]....0
- |---Curve Y[4]....0
- |---Curve Y[5]....0
- |---Curve Y[6]....0
- |---Curve Y[7]....0
- |---Curve Y[8]....0
- |---Curve Y[9]....0
- |---Curve Y[10]....0
- |---Curve Y[11]....0
- |---Curve Y[12]....0
- |---Curve Y[13]....0
- |---Curve Y[14]....0
- |---Curve Y[15]....0
- |---Curve Y[16]....0
- |---Curve Y[17]....0
- |---Curve Y[18]....0
- |---Curve Y[19]....0
- |---Curve Y[20]....0
- |---Curve Y[21]....0
- |---Cycle Counter Deadband....2.5 %
- |---Friction Unit....**********
- |---Friction....0

ICOT2-FF XDUCER_BLOCK_APB MENU TREE (continued)

- |---Hysterisis.....0%
- |---Position Deadband.....0.6
- |---Stroke Time Closed 1.029
- |---Stroke Time Open.....58.526
- |---Travel Accumulator Deadband .....0.6 %
- |---Trip Timeout .....0 Sec
- |---XD Command.....Normal Operation
- |---Cycle Counter Limit.....1000
- |---Partial Stroke Breakout Time.....0 Sec
- |---Partial Stroke Breakout Timeout.....0 Sec
- |---Partial Stroke Initial Start Time 01/01/1972 00:00:00
- |---Partial Stroke Interval.....0
- |---Partial Stroke Options .....Freeze Analog Feed
- |---Partial Stroke Ramp Timeout.....0 %/s
- |---Partial Stroke Travel .....0 %
- |---Partial Stroke Timeout .....0 Sec
- |---Partial Stroke Test Completion Timeout.....0 Sec
- |---Full Stroke Breakout Time .....0 Sec
- |---Full Stroke Breakout Timeout .....0 Sec
- |---Full Stroke Ramp Timeout.....0 %/s
- |---Full Stroke Travel Timeout.....0 Sec
- |---Full Stroke Completion Timeout .....0 Sec
- |---Pressure Port A.....18.08
- |---Pressure Port B.....0
- |---Pressure Unit .....%
- |---Pressure Supply.....0
- |---Characterization.....Linear
- |---Limit Stroke Time Close.....0 Sec
- |---Limit Stroke Time Open .....0 Sec
- |---Travel Accumulator Limit 1000
- |---Travel Accumulation Unit.....%
- |---Internal Temperature 26.5
- |---Minimum Internal Temperature.....0
- |---Maximum Internal Temperature.....0
- |---Internal Temperature Unit.....°C
- |---BLOCK_ERR_DESC_2 .....0x00000000
- |---BLOCK_ERR_DESC_3 .....0x00000000
- |---COMM_DIAG_TPTO 0
- |---FLOP_ENABLE.....0
- |---Servo Gain 2
- |---Servo Reset .....10 Sec
- |---Servo Rate .....50 Sec
- |---VALVE_OPEN_SLEW_LIMIT.....5
- |---VALVE_CLOSE_SLEW_LIMIT.....5
- |---XD_RESET_COUNTERS.....0x00
- |---XD_ALERT_ENABLE 0x00
- |---XD_ALERT_SUMMARY 0x0080
- |---Serial Number Password 0
- |---Serial Number Control Status .....disabled
- |---Serial Number 0
- |---GenValveSign Password .....
- |---Gen Valve Signature.....Disable
- |---custom_curve_scaling_factor .....0: PST - Reference
- |--- Signature Range .....[1, 25]
- |---Open Signature Timestamp[1].....0
- |---Open Signature Timestamp[2].....0
- |---Open Signature Timestamp[3].....0
- |---Open Signature Timestamp[4].....0
- |---Open Signature Timestamp[5].....0
- |---Open Signature Timestamp[6].....0
- |---Open Signature Timestamp[7].....0
- |---Open Signature Timestamp[8].....0
- |---Open Signature Timestamp[9].....0
- |---Open Signature Timestamp[10].....0
- |---Open Signature Timestamp[11].....0
- |---Open Signature Timestamp[12].....0
- |---Open Signature Timestamp[13].....0
- |---Open Signature Timestamp[14].....0
- |---Open Signature Timestamp[15].....0
- |---Open Signature Timestamp[16].....0
- |---Open Signature Timestamp[17].....0
- |---Open Signature Timestamp[18].....0
- |---Open Signature Timestamp[19].....0
- |---Open Signature Timestamp[20].....0
- |---Open Signature Timestamp[21].....0
- |---Open Signature Timestamp[22].....0
- |---Open Signature Timestamp[23].....0
- |---Open Signature Timestamp[24].....0
- |---Open Signature Timestamp[25].....0
- |---Open Signature Pos[1].....0
- |---Open Signature Pos[2].....0
- |---Open Signature Pos[3].....0
- |---Open Signature Pos[4].....0
- |---Open Signature Pos[5].....0
- |---Open Signature Pos[6].....0
- |---Open Signature Pos[7].....0
- |---Open Signature Pos[8].....0
- |---Open Signature Pos[9].....0
- |---Open Signature Pos[10].....0
- |---Open Signature Pos[11].....0
- |---Open Signature Pos[12].....0
- |---Open Signature Pos[13].....0
- |---Open Signature Pos[14].....0
- |---Open Signature Pos[15].....0
- |---Open Signature Pos[16].....0
- |---Open Signature Pos[17].....0
- |---Open Signature Pos[18].....0
- |---Open Signature Pos[19].....0
- |---Open Signature Pos[20].....0
- |---Open Signature Pos[21].....0
- |---Open Signature Pos[22].....0
- |---Open Signature Pos[23].....0
- |---Open Signature Pos[24].....0
- |---Open Signature Pos[25].....0
- |---Open Signature Supply Pressure[1] 0
- |---Open Signature Supply Pressure[2] 0
- |---Open Signature Supply Pressure[3] 0
- |---Open Signature Supply Pressure[4] 0
- |---Open Signature Supply Pressure[5] 0
- |---Open Signature Supply Pressure[6] 0
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- |---Open Signature Supply Pressure A[1].....0
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- |---Close Signature Supply Pressure B[23] 0
- |---Close Signature Supply Pressure B[24] 0
- |---Close Signature Supply Pressure B[25] 0
- |---Time Stamp 01/01/1900 00:00:00
- |---RESERVED..... 0
- |---RESERVED..... 0
- |---RESERVED..... 0
- |---SUPPORTED_MODES..... 0x98

ICOT2-FF XDUCER_BLOCK_APB MENU TREE (continued)

|---**ALL**
| |---Characteristics Block Tag.....XDUCER_BLOCK_APB
| |---Static Revision.....0
| |---Tag Description .....
| |---Strategy 0
| |---Alert Key.....0
| |---Block Mode: Target .....Auto
| |---Block Mode: Actual.....Auto
| |---Block Mode: Permitted .....Auto, Man, OOS
| |---Block Mode: Normal .....Auto
| |---Block Error.....0x0000
| |---Update Event: Unacknowledged.....Unacknowledged
| |---Update Event: Update State .....Reported
| |---Update Event: Time Stamp.....01/01/1972 00:00:00
| |---Update Event: Static Rev 3
| |---Update Event: Relative Index.....0
| |---Block Alarm: Unacknowledged .....Uninitialized
| |---Block Alarm: Alarm State .....Uninitialized
| |---Block Alarm: Time Stamp.....01/01/1972 00:00:00
| |---Block Alarm: Subcode.....Other
| |---Block Alarm: Value 0
| |---Transducer Directory Entry[1] 0
| |---Transducer Type .....**********
| |---Transducer Type Version 0
| |---Transducer Error .....**********
| |---Collection Directory[1] 0
| |---Final Value Status .....Bad::NonSpecific:NotLimited
| |---Final Value Value .....0 %
| |---Final Value Range EU at 100% .....100 %
| |---Final Value Range EU at 0% .....0 %
| |---Final Value Range Units Index.....%
| |---Final Value Range Decimal.....2
| |---Final Value Hi Cutoff .....100 %
| |---Final Value Lo Cutoff.....0 %
| |---Final Position Value Status .....Good_NonCascade::NonSpecific
| |---Final Position Value Value .....0.36 %
| |---Working Position Status .....Good_NonCascade::NonSpecific
| |---Working Position Value 0.36
| |---Working Setpoint Status.....Bad::NonSpecific:NotLimited
| |---Working Setpoint Value.....0 %
| |---Deviation Deadband Decimal.....2 %
| |---Deviation Time.....0 Sec
| |---Deviation Value 0.36
| |---Position Alert High.....95 %
| |---Position Alert Low.....5 %
| |---Signal Action.....0
| |---Stop Hi Position.....100 %
| |---Stop Lo Position .....0 %
| |---Travel Accumulator 0
| |---Travel Units .....%
| |---XD Fault State.....0 %
| |---XD Fault State Option .....Fail Closed
| |---Cycle Counter.....0
| |---Signal Action.....Increase to Open
| |---Readback Select .....Final Position Value
| |---CALIBRATION COMMANDS.....Normal Operation
| |---CALIBRATION STATES .....Normal Operation
| |---Transducer OOS Options.....Hold Last Value
| |---Position Features 0x0000
| |---Actuator Fail Action .....Uninitialized
| |---Actuator Manufacturer Id.....0
| |---Actuator Model Number .....
| |---Actuator Serial Number.....
| |---custom_curve_scaling_factor.....Rotary
| |---Valve Manufacturer Id .....
| |---Valve Model Number.....
| |---Valve Serial Number .....
| |---Valve Type.....Uninitialized
| |---Transducer Calibration Location .....
| |---Transducer Calibration Date 01/01/1900 00:00:00
| |---Transducer Calibration Who .....
| |---VTS Command.....Uninitialized
| |---VTS Mode.....Disabled
| |---VTS Pause .....0 s
| |---VTS Result .....No Initial Results
| |---VTS Detailed Result.....0x0000
| |---Closed Position Deadband.....0
| |---Closed Position Shift 0
| |---Table Description Min Num Points.....0
| |---Table Description Max Num Points.....0
| |---Table Description Table Element Data Type 0
| |---Element of array CURVE_X.....0
| |---custom_curve_scaling_factor.....0
| |---Curve X[1].....0
| |---Curve X[2].....0
| |---Curve X[3].....0
| |---Curve X[4].....0
| |---Curve X[5].....0
| |---Curve X[6].....0
| |---Curve X[7].....0
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| |---Curve Y[17].....0
| |---Curve Y[18].....0
| |---Curve Y[19].....0
| |---Curve Y[20].....0
| |---Curve Y[21].....0
| |---Cycle Counter Deadband.....2.5 %
| |---Friction Unit .....**********
| |---Friction.....0
| |---Hysterisis.....0%
| |---Position Deadband 0.6
| |---Stroke Time Closed.....1.029
| |---Stroke Time Open 58.526
| |---Travel Accumulator Deadband.....0.6 %
| |---Trip Timeout .....0 Sec

ICOT2-FF XDUCER_BLOCK_APB MENU TREE (continued)

- XD Command ..... Normal Operation
- Cycle Counter Limit 1000
- Partial Stroke Breakout Time ..... 0 Sec
- Partial Stroke Breakout Timeout ..... 0 Sec
- Partial Stroke Initial Start Time 01/01/1972 00:00:00
- Partial Stroke Interval 0
- Partial Stroke Options ..... Freeze Analog Feed
- Partial Stroke Ramp Timeout ..... 0 %/s
- Partial Stroke Travel ..... 0 %
- Partial Stroke Timeout ..... 0 Sec
- Partial Stroke Test Completion Timeout 0 Sec
- Full Stroke Breakout Time ..... 0 Sec
- Full Stroke Breakout Timeout ..... 0 Sec
- Full Stroke Ramp Timeout ..... 0 %/s
- Full Stroke Travel Timeout ..... 0 Sec
- Full Stroke Completion Timeout ..... 0 Sec
- Pressure Port A 18.08
- Pressure Port B 0
- Pressure Unit ..... %
- Pressure Supply 0
- Characterization ..... Linear
- Limit Stroke Time Close ..... 0 Sec
- Limit Stroke Time Open ..... 0 Sec
- Travel Accumulator Limit 1000
- Travel Accumulation Unit ..... %
- Internal Temperature 26.5
- Minimum Internal Temperature 0
- Maximum Internal Temperature 0
- Internal Temperature Unit ..... °C
- BLOCK_ERR_DESC_2 ..... 0x00000000
- BLOCK_ERR_DESC_3 ..... 0x00000000
- COMM_DIAG_TPTO 0
- FLOP_ENABLE 0
- Servo Gain 2
- Servo Reset ..... 10 Sec
- Servo Rate ..... 50 Sec
- VALVE_OPEN_SLEW_LIMIT 5
- VALVE_CLOSE_SLEW_LIMIT 5
- XD_RESET_COUNTERS 0x00
- XD_ALERT_ENABLE 0x00
- XD_ALERT_SUMMARY 0x0080
- Serial Number Password 0
- Serial Number Control Status ..... disabled
- Serial Number 0
- GenValveSign Password .....
- Gen Valve Signature ..... Disable
- custom_curve_scaling_factor ..... 0: PST - Reference
- Signature Range ..... [1, 25]
- Open Signature Timestamp[1] 0
- Open Signature Timestamp[2] 0
- Open Signature Timestamp[3] 0
- Open Signature Timestamp[4] 0
- Open Signature Timestamp[5] 0
- Open Signature Timestamp[6] 0
- Open Signature Timestamp[7] 0
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| |---Close Signature Supply Pressure A[12] 0
| |---Close Signature Supply Pressure A[13] 0
| |---Close Signature Supply Pressure A[14] 0
| |---Close Signature Supply Pressure A[15] 0
| |---Close Signature Supply Pressure A[16] 0
| |---Close Signature Supply Pressure A[17] 0
| |---Close Signature Supply Pressure A[18] 0
| |---Close Signature Supply Pressure A[19] 0
| |---Close Signature Supply Pressure A[20] 0
| |---Close Signature Supply Pressure A[21] 0
| |---Close Signature Supply Pressure A[22] 0
| |---Close Signature Supply Pressure A[23] 0
| |---Close Signature Supply Pressure A[24] 0
| |---Close Signature Supply Pressure A[25] 0
| |---Close Signature Supply Pressure B[1] 0
| |---Close Signature Supply Pressure B[2] 0
| |---Close Signature Supply Pressure B[3] 0
| |---Close Signature Supply Pressure B[4] 0
| |---Close Signature Supply Pressure B[5] 0
| |---Close Signature Supply Pressure B[6] 0
| |---Close Signature Supply Pressure B[7] 0
| |---Close Signature Supply Pressure B[8] 0
| |---Close Signature Supply Pressure B[9] 0
| |---Close Signature Supply Pressure B[10] 0
| |---Close Signature Supply Pressure B[11] 0
| |---Close Signature Supply Pressure B[12] 0
| |---Close Signature Supply Pressure B[13] 0
| |---Close Signature Supply Pressure B[14] 0
| |---Close Signature Supply Pressure B[15] 0
| |---Close Signature Supply Pressure B[16] 0
| |---Close Signature Supply Pressure B[17] 0
| |---Close Signature Supply Pressure B[18] 0
| |---Close Signature Supply Pressure B[19] 0
| |---Close Signature Supply Pressure B[20] 0
| |---Close Signature Supply Pressure B[21] 0
| |---Close Signature Supply Pressure B[22] 0
| |---Close Signature Supply Pressure B[23] 0
| |---Close Signature Supply Pressure B[24] 0
| |---Close Signature Supply Pressure B[25] 0
| |---Time Stamp 01/01/1900 00:00:00
| |---RESERVED 0
| |---RESERVED 0
| |---RESERVED 0
| |---SUPPORTED_MODES 0x98

ICOT2-FF AI_BLOCK MENU TREE

Block: AI 514:

|---**Quick Config**
| |---Channel ..... 1 Channel 1(Position – actual)
| |---Linearization Type ..... Direct
| |---Transducer Scale: EU at 100%..... 100%
| |---Transducer Scale: EU at 0%..... 0%
| |---Transducer Scale: Units Index..... % .....
| |---Transducer Scale: Decimal..... 3
| |---Output Scale: EU at 100% 100%
| |---Output Scale: EU at 0% 100%
| |---Output Scale: Units Index ..... %
| |---Output Scale: Decimal 3
|
|---**Common Config**
| |---Acknowledge Option 0x0000
| |---Alarm Hysteresis 0.5%
| |---Alert Key..... 0
| |---High High Limit..... 1.#INF %
| |---High High Priority ..... 0.....
| |---High Limit..... 1.#INF %
| |---High Priority..... 0
| |---I/O Options 0x0000
| |---Linearization Type..... Direct
| |---Low Low Limit..... -1.#INF %
| |---Low Low Priority..... 0
| |---Low Limit ..... -1.#INF %
| |---Low Priority..... 0
| |---Block Mode: Target ..... OOS
| |---Block Mode: Actual..... .....
| |---Block Mode: Permitted..... Auto, Man, OOS
| |---Block Mode: Normal..... Auto
| |---Output Scale: EU at 100% 100%
| |---Output Scale: EU at 0% 0%
| |---Output Scale: Units Index ..... % .....
| |---Output Scale: Decimal 3
| |---Process Value Filter Time..... 0 Sec
|
|---**Advanced Config**
| |---Low Cutoff ..... 0 %
| |---Simulate: Simulate Status ..... Bad::NonSpecific:NotLimited
| |---Simulate: Simulate Value..... 0 %
| |---Simulate: Transducer Status ..... Bad::NonSpecific:NotLimited
| |---Simulate: Transducer Value..... 0 % .....
| |---Simulate: Simulate En/Disable..... Disabled
| |---Static Revision..... 5
| |---Status Options..... 0x0000
| |---Strategy..... 0
| |---Transducer Scale: EU at 100%..... 100 % ..
| |---Transducer Scale: EU at 0%..... 0 %
| |---Transducer Scale: Units Index..... %
| |---Transducer Scale: Decimal..... 3
|
|---**I/O References**
| |---Channel ..... 1 – Channel 1 (Position – actual)
| |
|---**Connectors**
| |---Output Status ..... Bad::NonSpecific:NotLimited
| |---Output Value ..... 0 %
|
|---**Online**
| |---Block Error..... 0x0000
| |---Field Value Discrete: Status ..... Bad::NonSpecific:NotLimited
| |---Field Value Discrete: Value..... 0 %
| |---Block Mode: Target ..... OOS
| |---Block Mode: Actual..... .....
| |---Block Mode: Permitted..... Auto, Man, OOS
| |---Block Mode: Normal..... Auto
| |---Output Discrete: Status ..... Bad::NonSpecific:NotLimited
| |---Output Discrete: Value ..... 0 %
| |---Process Value Discrete: Status ..... Bad::NonSpecific:NotLimited
| |---Process Value Discrete: Value..... 0 %
|
|---**Status**
| |---Block Error..... 0x0000
|

|
|---**Other**
| |---Tag Description ..... …
| |---Grant Deny: Grant..... 0x00
| |---Grant Deny: Deny 0x00
| |---Update Event: Unacknowledged..... Uninitialized
| |---Update Event: Update State ..... Uninitialized
| |---Update Event: Time Stamp..... 01/01/1972 00:00:00
| |---Update Event: Static Rev..... 0
| |---Update Event: Relative Index 0
| |---Block Alarm: Unacknowledged ..... Uninitialized
| |---Block Alarm: Alarm State..... Uninitialized
| |---Block Alarm: Time Stamp 01/01/1972 00:00:00
| |---Block Alarm: Subcode..... Other
| |---Block Alarm: Value..... 0
| |---Alarm Summary: Current 0x0000
| |---Alarm Summary: Unacknowledged 0x0000
| |---Alarm Summary: Unreported 0x0000
| |---Alarm Summary: Disabled 0x0000
| |---High Alarm: Unacknowledged..... Uninitialized
| |---High Alarm: Alarm State..... Uninitialized
| |---High Alarm: Time Stamp..... 01/01/1972 00:00:00
| |---High Alarm: Subcode ..... Other
| |---High Alarm: Float Value ..... 0 %
| |---High High Alarm: Unacknowledged ..... Uninitialized
| |---High High Alarm: Alarm State ..... Uninitialized
| |---High High Alarm: Time Stamp 01/01/1972 00:00:00
| |---High High Alarm: Subcode..... Other
| |---High High Alarm: Float Value..... 0 %
| |---Low Alarm: Unacknowledged ..... Uninitialized
| |---Low Alarm: Alarm State ..... Uninitialized
| |---Low Alarm: Time Stamp..... 01/01/1972 00:00:00
| |---Low Alarm: Subcode ..... Other
| |---Low Alarm: Float Value..... 0 %
| |---Low Low Alarm: Unacknowledged..... Uninitialized
| |---Low Low Alarm: Alarm State..... Uninitialized
| |---Low Low Alarm: Time Stamp..... 01/01/1972 00:00:00
| |---Low Low Alarm: Subcode ..... Other
| |---Low Low Alarm: Float Value ..... 0 %
| |---Transducer Value: Status ..... Bad::NonSpecific:NotLimited
| |---Transducer Value: Value 42
| |---Transducer Units..... %
| |---Detailed Block Errors 0x00000000
| |---Supported Modes..... 0x98
|

ICOT2-FF AI_BLOCK MENU TREE (continued)

|
|---**All**
|---Characteristics: Block Tag ..... AI IFF2_002067
|---Static Revision..... 5
|---Tag Description ..... …
|---Strategy..... 0
|---Alert Key..... 0
|---Block Mode: Target ..... OOS
|---Block Mode: Actual.....
|---Block Mode: Permitted ..... Auto, Man, OOS
|---Block Mode: Normal ..... Auto
|---Block Error..... 0x0000
|---Process Value Discrete: Status..... Bad::NonSpecific:NotLimited
|---Process Value Discrete: Value..... 0 %
|---Output Discrete: Status ..... Bad::NonSpecific:NotLimited
|---Output Discrete: Value ..... 0 %
|---Simulate Discrete: Simulate Status..... Bad::NonSpecific:NotLimited
|---Simulate Discrete: Value..... 0 %
|---Simulate Discrete: Transducer Status ..... Bad::NonSpecific:NotLimited
|---Simulate Discrete: Transducer Value ..... 0 %
|---Simulate Discrete: Simulate En/Disable ..... Disabled
|---Transducer Scale EU at 100%..... 100 %
|---Transducer Scale: EU at 0%..... 0 %
|---Transducer Scale: Units Index..... %
|---Transducer Scale: Decimal..... 3
|---Output Scale: EU at 100% ..... 100 %
|---Output Scale: EU at 0% ..... 0 %
|---Output Scale: Units Index ..... %
|---Output Scale: Decimal..... 3
|---Grant Deny: Grant 0x00
|---Grant Deny: Deny..... 0x00
|---I/O Options 0x0000
|---Status Options..... 0x0000
|---Channel ..... 1 – Channel 1 (Position – Actu
|---Linearization Type ..... Indirect
|---Low Cutoff ..... 0 %
|---Process Value Filter Time..... 0 Sec
|---Field Value Status ..... Bad::NonSpecific:NotLimited
|---Field Value Value ..... 0 %
|---Update Event: Unacknowledged..... Uninitialized
|---Update Event: Update State ..... Uninitialized
|---Update Event: Time Stamp..... 01/01/1972 00:00:00
|---Update Event: Static Rev..... 0
|---Update Event: Relative Index..... 0
|---Block Alarm: Unacknowledged ..... Uninitialized
|---Block Alarm: Alarm State ..... Uninitialized
|---Block Alarm: Time Stamp..... 01/01/1972 00:00:00
|---Block Alarm: Subcode..... Other
|---Block Alarm: Value..... 0
|---Alarm Summary: Current 0x0000
|---Alarm Summary: Unacknowledged..... 0x0000
|---Alarm Summary: Unreported 0x0000
|---Alarm Summary: Disabled 0x0000
|---Acknowledge Option 0x0000
|---Alarm Hysteresis ..... 0.5 %
|---High High Priority 0
|---High High Limit..... 1.#INF %
|---High Priority..... 0
|---High Limit..... 1.#INF %
|---Low Priority..... 0
|---Low Limit ..... -1.#INF %
|---Low Low Priority..... 0
|---Low Low Limit..... -1.#INF %
|---High High Alarm: Unacknowledged ..... Uninitialized
|---High High Alarm: Alarm State ..... Uninitialized
|---High High Alarm: Time Stamp..... 01/01/1972 00:00:00
|---High High Alarm: Subcode..... Other
|---High High Alarm: Float Value..... 0 %
|---High Alarm: Unacknowledged..... Uninitialized
|---High Alarm: Alarm State..... Uninitialized
|---High Alarm: Time Stamp 01/01/1972 00:00:00
|---High Alarm: Subcode ..... Other
|---High Alarm: Float Value ..... 0 %
|---Low Alarm: Unacknowledged..... Uninitialized
|---Low Alarm: Alarm State..... Uninitialized
|---Low Alarm: Time Stamp..... 01/01/1972 00:00:00
|---Low Alarm: Subcode ..... Other
|---Low Alarm: Float Value ..... 0 %
|---Low Low Alarm: Unacknowledged..... Uninitialized
|---Low Low Alarm: Alarm State..... Uninitialized
|---Low Low Alarm: Time Stamp 01/01/1972 00:00:00
|---Low Low Alarm: Subcode ..... Other
|---Low Low Alarm: Float Value ..... 0 %
|---Transducer Value: Status..... Bad::NonSpecific:NotLimited
|---Transducer Value: Value..... 42
|---Transducer Units..... %
|---Detailed Block Errors..... 0x00000000
|---Supported Modes..... 0x98

ICOT2-FF AO_BLOCK MENU TREE

Block: AO 561:

---Quick Config
- ---Alert Key ... 0
- ---Process Value Scale: EU at 100% ... 100 %
- ---Process Value Scale: EU at 0% ... 0 %
- ---Process Value Scale: Units Index ... %
- ---Process Value Scale: Decimal ... 3
- ---Simulate: Simulate Status ... Good_NonCascade::Non
- ---Simulate: Simulate Value ... 50
- ---Simulate: Transducer Status ... Good_NonCascade::Non
- ---Simulate: Transducer Value ... 50
- ---Simulate: Simulate En/Disable ... Disabled
- ---Setpoint: Status ... Good_NonCascade::Non
- ---Setpoint: Value ... 50 %
- ---Setpoint High Limit ... 100 %
- ---Setpoint Low Limit ... 0 %

---Common Config
- ---Alert Key ... 0
- ---I/O Options ... 0x0000
- ---Block Mode: Target ... Auto
- ---Block Mode: Actual ... Auto
- ---Block Mode: Permitted ... RCas,Cas,Auto,Man,OOS
- ---Block Mode: Normal ... Cas, Auto
- ---Process Value Scale: EU at 100% ... 100 %
- ---Process Value Scale: EU at 0% ... 0 %
- ---Process Value Scale: Units Index ... %
- ---Process Value Scale: Decimal ... 3
- ---Setpoint: Status ... Good_NonCascade::Non
- ---Setpoint: Value ... 50 %
- ---Setpoint High Limit ... 100 %
- ---Setpoint Low Limit ... 0 %

---Advanced Config
- ---Fault State Time ... 0 Sec
- ---Fault State Value ... 0 %
- ---Shed Options ... Uninitialized
- ---Simulate: Simulate Status ... Bad::NonSpecific
- ---Simulate: Simulate Value ... 50
- ---Simulate: Transducer Status ... Good_NonCascade::Non
- ---Simulate: Transducer Value ... 50
- ---Simulate: Simulate En/Disable ... Disabled
- ---Setpoint Rate Down ... 1.#INF PV/Sec
- ---Setpoint Rate Up ... 1.#INF PV/Sec
- ---Static Revision ... 3
- ---Status Options ... 0x0000
- ---Strategy ... 0
- ---Transducer Scale: EU at 100% ... 100
- ---Transducer Scale: EU at 0% ... 0
- ---Transducer Scale: Units Index ... %
- ---Transducer Scale: Decimal ... 3

---I/O References
- ---Channel ... 1 – Channel 1 (Position –

---Connectors
- ---Back Calculation Output Discrete: Status ... Good_NonCascade::Non
- ---Back Calculation Output Discrete: Value ... 50 %
- ---Cascade Input: Status ... Good_NonCascade::Non
- ---Cascade Input: Value ... 0 %
- ---Output: Status ... Good_NonCascade::Non
- ---Output: Value ... 50

---Online
- ---Back Calculation Output Discrete: Status ... Good_NonCascade::Non
- ---Back Calculation Output Discrete: Value ... 50 %
- ---Block Error ... 0x0000
- ---Cascade Input: Status ... Bad::NonSpecific:NotLimit
- ---Cascade Input: Value ... 0 %
- ---Block Mode: Target ... Auto
- ---Block Mode: Actual ... Auto
- ---Block Mode: Permitted ... RCas,Cas,Auto,Man,OOS
- ---Block Mode: Normal ... Cas, Auto
- ---Output: Status ... Good_NonCascade::Non
- ---Output: Value ... 50
- ---Process Value: Status ... Good_NonCascade::Non
- ---Process Value: Value ... 50 %
- ---Remote Cascade Input: Status ... Bad::NonSpecific:NotLimit
- ---Remote Cascade Input: Value ... 0 %
- ---Remote Cascade Output: Status ... Good_NonCascade::Non
- ---Remote Cascade Output: Value ... 50 %
- ---Readback: Status ... Good_NonCascade::Non
- ---Readback: Value ... 50
- ---Setpoint: Status ... Good_NonCascade::Non
- ---Setpoint: Value ... 50 %

---Status
- ---Block Error ... 0x0000

---Other
- ---Tag Description ... …
- ---Grant Deny: Grant ... 0x00
- ---Grant Deny: Deny ... 0x00
- ---Update Event: Unacknowledged ... Uninitialized
- ---Update Event: Update State ... Uninitialized
- ---Update Event: Time Stamp ... 01/01/1972 00:00:00
- ---Update Event: Static Rev ... 0
- ---Update Event: Relative Index ... 0
- ---Block Alarm: Unacknowledged ... Uninitalized
- ---Block Alarm: Alarm State ... Uninitalized
- ---Block Alarm: Time Stamp ... 01/01/1972 00:00:00
- ---Block Alarm: Subcode ... OutOfService
- ---Block Alarm: Value ... 0
- ---Transducer Value: Status ... Bad::NonSpecific:NotLimit
- ---Transducer Value: Value ... 2.14994e+033
- ---Detailed Block Errors ... 0x00000000
- ---Supported Modes ... 0x9E

---All
- ---Characteristics: Block Tag ... AO
- ---Static Revision ... 3
- ---Tag Description ... …
- ---Strategy ... 0
- ---Alert Key ... 0
- ---Block Mode: Target ... Auto
- ---Block Mode: Actual ... Auto
- ---Block Mode: Permitted ... RCas,Cas,Auto,Man,OOS
- ---Block Mode: Normal ... Cas, Auto
- ---Block Error ... 0x0000
- ---Process Value: Status ... Good_NonCascade::Non
- ---Process Value: Value ... 50 %
- ---Setpoint: Status ... Good_NonCascade::Non
- ---Setpoint: Value ... 50 %
- ---Output: Status ... Good_NonCascade::Non
- ---Output: Value ... 50
- ---Simulate: Simulate Status ... Good_NonCascade::Non
- ---Simulate: Simulate Value ... 50
- ---Simulate: Transducer Status ... Good_NonCascade::Non
- ---Simulate: Transducer Value ... 50
- ---Simulate: Simulate En/Disable ... Disabled
- ---Process Value Scale: EU at 100% ... 100 %
- ---Process Value Scale: EU at 0% ... 0 %
- ---Process Value Scale: Units Index ... %
- ---Process Value Scale: Decimal ... 3
- ---Transducer Scale: EU at 100% ... 100
- ---Transducer Scale: EU at 0% ... 0
- ---Transducer Scale: Units Index ... %
- ---Transducer Scale: Decimal ... 3
- ---Grant Deny: Grant ... 0x00
- ---Grant Deny: Deny ... 0x00
- ---I/O Options ... 0x0000
- ---Status Options ... 0x0000
- ---Readback: Status ... Good_NonCascade::Non
- ---Readback: Value ... 50
- ---Cascade Input: Status ... Bad::NonSpecific:NotLimit
- ---Cascade Input: Value ... 0 %
- ---Setpoint Rate Down ... 1.#INF PV/Sec
- ---Setpoint Rate Up ... 1.#INF PV/Sec
- ---Setpoint High Limit ... 100 %
- ---Setpoint Low Limit ... 0 %
- ---Channel ... 1 – Channel (Position – ta
- ---Fault State Time ... 0 Sec
- ---Fault State Value ... 0
- ---Back Calculation Output: Status ... Good_NonCascade::Non
- ---Back Calculation Output: Value ... 50 %
- ---Remote Cascade Input: Status ... Bad::NonSpecific:NotLimit
- ---Remote Cascade Input: Value ... 0 %
- ---Shed Options ... NormalShed_NormalRetu
- ---Remote Cascade Output: Status ... Good_NonCascade::Non
- ---Remote Cascade Output: Value ... 50 %
- ---Update Event: Unacknowledged ... Uninitialized
- ---Update Event: Update State ... Uninitialized
- ---Update Event: Time Stamp ... 01/01/1972 00:00:00
- ---Update Event: Static Rev ... 0
- ---Update Event: Relative Index ... 0
- ---Block Alarm: Unacknowledged ... Unacknowledged
- ---Block Alarm: Alarm State ... Clear-Reported
- ---Block Alarm: Time Stamp ... 01/01/1972 00:00:00
- ---Block Alarm: Subcode ... OutOfService
- ---Block Alarm: Value ... 0
- ---Transducer Value: Status ... Bad::NonSpecific:NotLimit
- ---Transducer Value: Value ... 2.14994e+033
- ---Detailed Block Errors ... 0x00000000
- ---Supported Modes ... 0x9E