azbil

CM2-AVP703-2001

Smart Valve Positioner 700 Series with FOUNDATION Fieldbus

Model AVP703

User's Manual

Azbil Corporation

azbil

Important

- Please be sure to hand this manual to the staff who will be using this product.
- No part of this publication may be reproduced or reused in any form or by any means without the prior written permission of the publisher.
- The information and specifications in this document may be subject to change without prior notice.
- While the contents of this document have been thoroughly checked, please contact us if you find any incorrect or incomplete descriptions.
- We can not take responsibility for any unexpected results that are the result of your handling of the product.
- FOUNDATION™ Fieldbus is a trademark of the FieldComm Group.

Introduction

Thank you for purchasing our AVP703 Smart Valve Positioner. The AVP703 (called "the device" below) is a smart valve positioner that can be connected to the Foundation Fieldbus.

The auto setup function makes it easy to set up the valve.

All adjustments and setup can be performed from the Foundation Fieldbus host. The Local User Interface (LUI), which consists of the LCD (liquid crystal display) and operation buttons, facilitates monitoring of input signals, valve opening, pressure display, and other items as well as basic adjustments.

In addition, the built-in pressure sensor can be used to measure the supply air pressure and output air pressure. As a result, the device can not only perform self-diagnostics but can also be combined with the control valve maintenance support system called "Valstaff" in order to monitor the characteristics, operating status, and other data of the control valve, helping to improve the maintenance efficiency of control valves. This instruction manual describes how to handle the device. Read this manual to make full use of the features of this product.

Scope of this manual and related documents

This document describes the functions and method of installation and adjustment of this device. For details on the FOUNDATION Fieldbus network, refer to Fieldbus Integration Manual (No. CM2-FBS100-2001*).

For details on the control valve diagnostic items, refer to the Smart Valve Positioner 700 Series Control Valve Diagnostic Function Manual (No. CM2-AVP700-2003*).

** If you need the above documents, please contact one of our sales representatives.*

Safety precautions

■ Symbols

The purpose of the safety precautions listed here is to ensure the user uses the product safely and correctly, to prevent harm to the user and other people and damage to property. Make sure to observe the safety precautions.

Many different symbols are used in this manual.

Their appearance and meaning are described below. Thoroughly understand the explanation before starting to read the main text.

⚠ **WARNING**	Wrong handling may cause the death or severe injury of the user.
⚠ **CAUTION**	Wrong handling may cause a minor injury to the user or damage to equipment.

■ Sample symbols

	This symbol indicates warnings and cautions for handling the device.
	This symbol indicates prohibited actions that must not be taken.
	This symbol indicates instructions for an action that must be taken.

Handling Precautions:

This symbol indicates a point to be noted when handling the device.

Precautions for safe work

⚠ WARNING	
⚡	Do not perform wiring with wet hands or while the device is energized. This may lead to electric shock. Turn the power off before starting the work and work with dry hands or use gloves.
❗	Follow the work procedure defined in the explosion protection guidelines of countries when performing the power distribution work in an explosion-proof area.
🚫	For devices equipped with the pressure-resistant, explosion-proof specifications, open/close the explosionproof enclosure and the cover according to "Chapter 7 Notes on the Explosion-Proof".

⚠ CAUTION	
🚫	Do not get on the installed device or use it as a step stool. This is dangerous because the device may tip over.
🚫	Do not touch the device during operation without reason. This is dangerous because the surface may be hot or cold depending on the usage environment.
❗	Be careful not to touch the edge of the cover or the screw threads of the main unit when opening the cover of the terminal box. You may be injured by these parts.
❗	Use a DC power supply with overload protection. Overload may cause smoke or fire.
❗	If a tool or other item touches the glass part of the display, it may break, leading to an injury. Be careful. Wear safety glasses during work.
❗	This product is heavy. Be careful where you step and wear safety shoes during work.
🚫	Do not touch the feedback lever or other moving part while the device is operating. You may be injured by getting your hand or other body part caught in them.
❗	Properly use the power supply based on the specifications. Inputting a different power supply may damage the device.
❗	Use gloves and other protective equipment during work in a hot, cold, or other severe environment.
🚫	Do not move the device close to a magnet or magnetic driver. The control valve may operate.
❗	Apply the correct supply air pressure in accordance with the specification of the device. The overpressure may cause abnormal actions of the control valve or damage to the pressure gauge.

Precaution for disposal of Electrical and Electronic Equipment

Disposal of Electrical and Electronic Equipment (for Environmental Protection)
This is an industrial product subject to the WEEE Directive.
Do not dispose of electrical and electronic equipment in the same way as household waste.
Old products contain valuable raw materials and must be returned to an authorized collection point for correct disposal or recycling.

Unpacking, Verification, and Storage of Product

Unpacking

This device is precision measuring equipment. Carefully handle it to prevent accidents or damage.

After unpacking, check that the items below are included.

- The device
- Feedback lever and hexagon socket bolts×2
- (4-mm) hexagon wrench×1 (for feedback lever) (Included only when the device is shipped alone.)
- Regulator (optional)
- Mounting plate set (optional)
- Pressure-resistant packing cable adapter and pressure-resistant elbow (option for explosion-proof specifications)
- Instruction manual (this document) (Included if specified at the time of purchase.)
- Extension lever and hexagon socket bolts×2 (optional)

Specifications check

The specifications are shown on the nameplate of the main unit. Check that the specifications are the same as what you specified. In particular, confirm the following points.

- Tag No. (TAG No.)
- Model (MODEL)
- Work No. (PROD.)
- Supply air pressure (SUPPLY)
- Explosion protection certification seal (for explosion-proof specifications)

⚠WARNING

When using the device in an explosion-proof area, be sure to select the model that satisfies the necessary explosion-proof requirements. Non-explosion-proof products cannot be used in an explosion-proof area.

Contact

For inquiries about this device, please contact us.

When contacting us, let us know the model number and production number.

Storage

When storing the device after purchase, obey the following precautions.

- When storing the device before it has been used
  1. Store the device as packed at shipment.
  2. Store the device at an indoor location with little vibration or shocks and at normal temperature and humidity (about 25°C, 65%).
- When storing the device after it has been used
  1. Tightly secure the terminal box cover and block the conduit connection port with tape to prevent humidity intrusion.
  2. Block the three pneumatic piping connection ports (SUP, OUT1 and OUT2) with tape to prevent humidity and dust intrusion.
  3. Pack the device in the same way as at shipment.
  4. Store the device at an indoor location with little vibration or shocks where it will not be exposed to rain or water and at normal temperature and humidity (about 25°C, 65%).

Table of Contents

Chapter 1. Structure of the 700 Series Control System

This chapter describes the device configuration of the control system that uses the device.

- Description of the configuration of the input/output system in the device
- Description of the structure of the main unit of the device and the name and function of each part

1-1. System Configuration

This device is a Fieldbus-enabled smart valve positioner and registered Foundation Fieldbus product.

The concept and the operation block diagram of the control valve control system that uses the device are shown below.

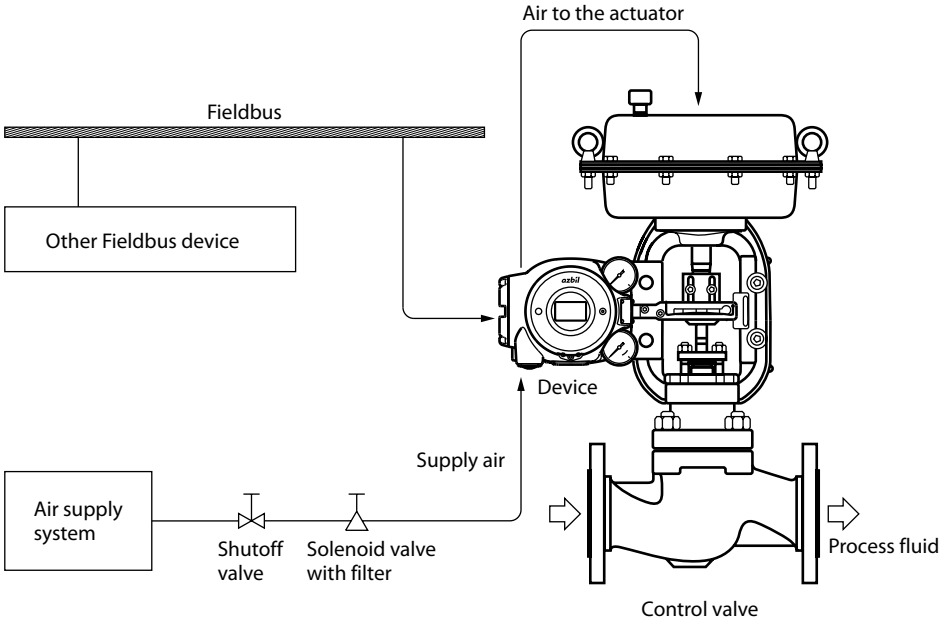


Figure 1-1. Concept Diagram of the 700 Series Control System

1) Operation block diagram

The block configuration of a typical function block and positioner is shown in the figure below.

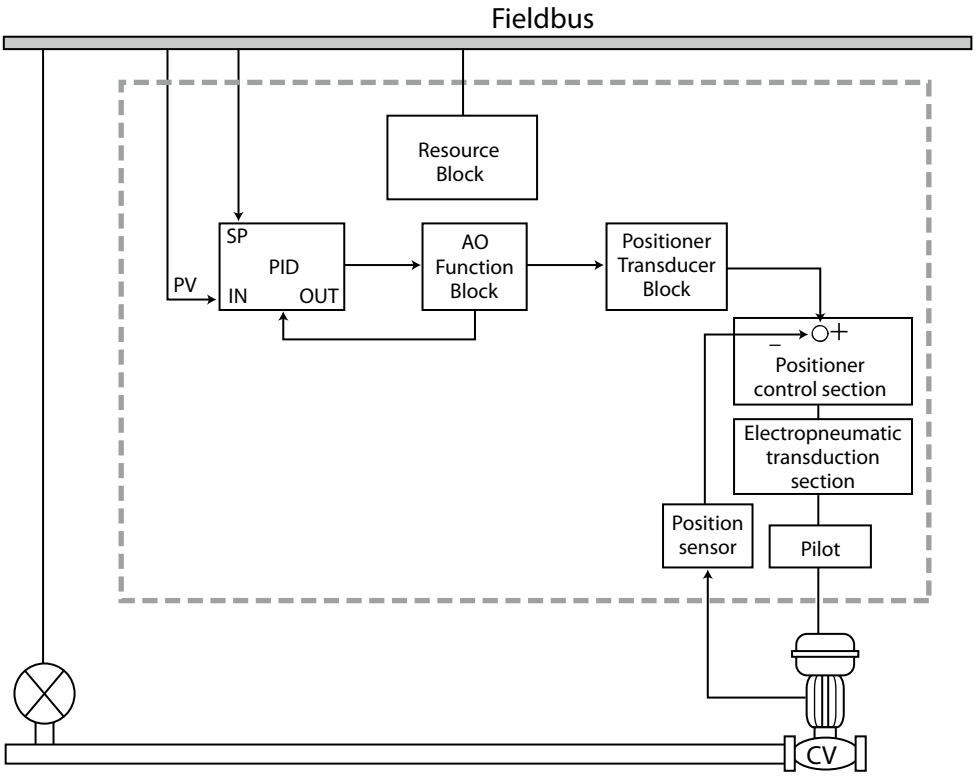


Figure 1-2. Operation Block Diagram (AVP703)

1-2. Structure of the Device and Description of Each Part

1-2-1. Structure of the Device

1) Major components

The structure of the main unit of the device is shown in the figure below.

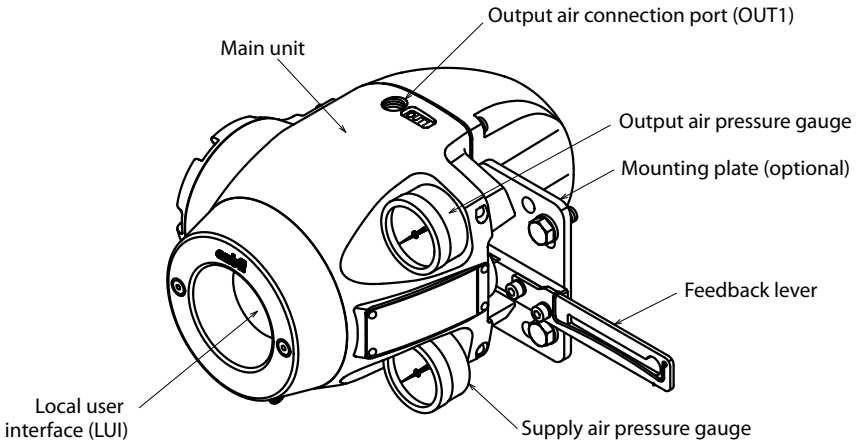


Figure 1-3. Structure of the Device (Upper)

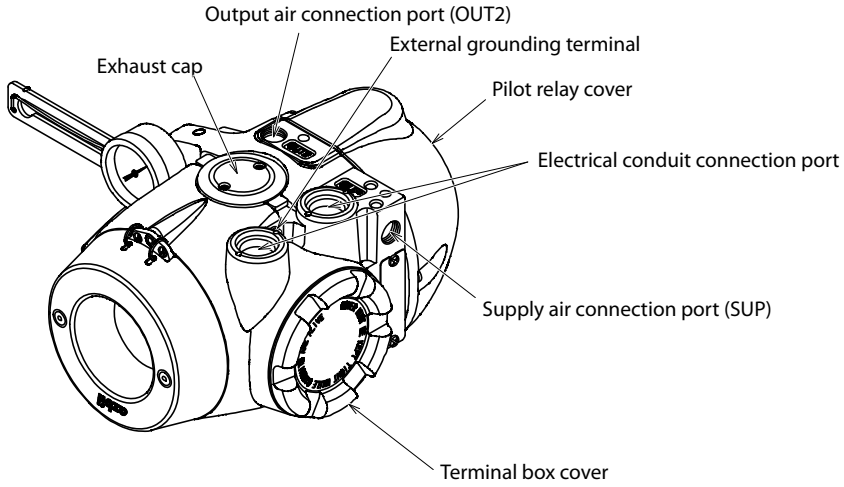


Figure 1-4. Structure of the Device (Lower)

2) Name and description of each part

The table below describes each part.

Table 1-1. Description of Each Part

Name	Description
Main unit	• Houses electronic circuits, an electro-pneumatic transducer (EPM), a position sensor (VTD), and a pressure sensor.
Pilot relay cover	• Cover of the pilot relay that amplifies the air signal from the EPM (electro-pneumatic transducer) and transduces it into the air signal sent to the actuator. • When you must adjust the balance pressure to switch between the pilot relay for the single-acting actuator and the pilot relay for the double-acting actuator, remove this cover.
Auto/Manual (A/M) switch	• This switch is used to switch how the output air between the auto operation status and the manual operation status is controlled. This switch is built into the pilot relay. This switch can be seen by removing the pilot relay cover.
Feedback lever	• Extracts and transmits the movement of the control valve lift to the VTD (position sensor).
Local user interface (LUI)	• The LUI allows you to adjust the zero span, perform auto setup, and manually operate the device with the LCD (liquid crystal display) and operation buttons without using the communicator.
Supply air pressure gauge	• Indicates the pressure of supply air.
Output air pressure gauge	• Indicates the pressure of output air.
Supply air connection port (SUP)	• Supply air is input to this port. • “SUP” is displayed at this port.
Output air connection port (OUT1)	• Output air is sent out of this port to the actuator. • “OUT1” is displayed at this port.
Output air connection port (OUT2)	• Output air is sent out of this port to the actuator. • This port is blocked with a blind plug in the single-acting actuator. • OUT2 is displayed at the output port for the double-acting actuator.
Mounting plate (optional)	• The mounting plate is used to mount the device onto the actuator. • The shape of the mounting plate differs depending on the specifications (actuator model).

1-2-2. Structure of Terminal Box

1) Major components

The terminal box houses the Fieldbus terminal and the internal grounding terminal.

The structure of the terminal box is as shown below.

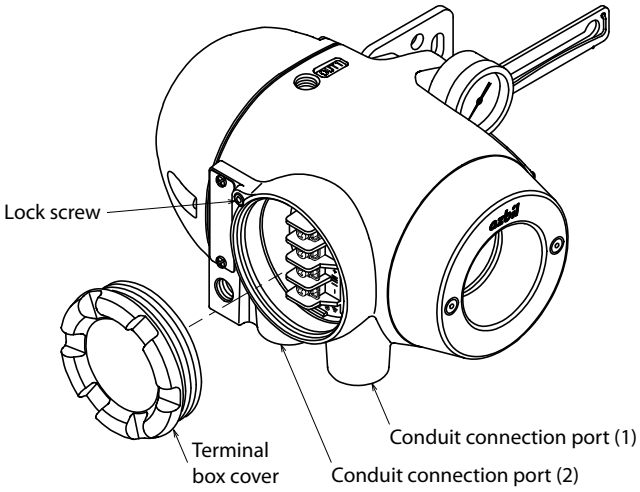


Figure 1-5. Structure of Terminal Box

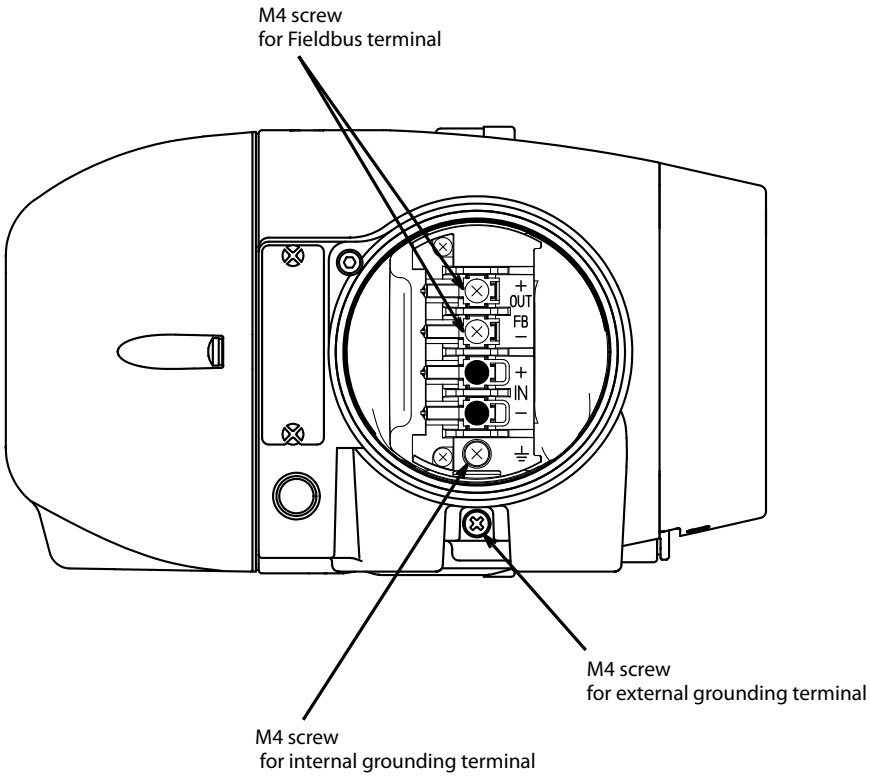


Figure 1-6. Terminal Block in the Terminal Box

2) Name and description of each part

The table below describes each part of the terminal box.

Table 1-2. Description of Each Part

Name	Description
Terminal box cover	• Lid of terminal box. • This cover has a pressure-resistant explosion-proof structure.
Lock screw	• Used to secure the terminal box cover.
Fieldbus terminal	• "FB" is displayed at this terminal. • The Fieldbus signal cable is connected to this terminal.
External grounding terminal	• External terminal for grounding. The cable for grounding is connected to this terminal.
Internal grounding terminal	• Internal terminal for grounding. The cable for grounding is connected to this terminal.
Conduit connection port (1)	• Service entrance for a cable.
Conduit connection port (2)	• Service entrance for a cable. • This entrance is normally blocked with a blind plug.

⚠WARNING

When using a pressure-resistant explosion-proof model in a dangerous place, be sure to use the specified cable adapter for pressure-resistant packing for the conduit connection port. Securely close the terminal box cover all the way. Then, rotate the lock screw counterclockwise to secure the terminal box cover.

Handling Precautions:

Ground either the external or internal grounding terminal according to the specifications. Be careful not to ground the device at two points.

1-2-3. Display on the Local User Interface (LUI)

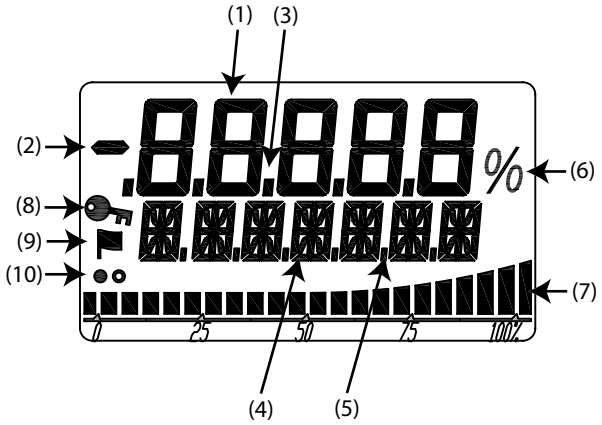


Figure 1-7. Segments on the LUI

Table 1-3. Description of Each Part

No.	Displayed element	Main display
(1)	7 segments (5 digits)	Displays the main numerical values such as the specified opening.
(2)	Minus sign	Displays the sign for the 7-segment number.
(3)	Decimal point (5 places)	Displays the decimal point for the 7-segment number.
(4)	16 segments (7 digits)	Displays the unit, status, or other data.
(5)	Dot (6 places)	Displays the 16-segment auxiliary display, separator, or other data.
(6)	Percentage	Displays %.
(7)	Bar graph (22 bars)	Displays the bar graph in percentage at a set point, etc.
(8)	Key mark	On: LUI operation is unavailable. Off: LUI operation is available. Blinking: LUI is in operation.
(9)	Flag mark	When the self-diagnostic alarm is activated, the key mark is displayed. For detailed information of the alarms, please refer to the status monitor of page 3-3 .
(10)	Display refresh mark	Display during operation White and black circles alternately blink.

For a display example, refer to “Appendix A. LUI Display Example.”

! Handling Precautions:

The LUI buttons may not respond well near an electromagnetic inductor (such as a large transformer or high-frequency furnace).

Remove sand, dust, and other foreign objects from the rubber parts of the operation buttons before operating the LUI. Operating the LUI with foreign objects on it may damage the rubber parts.

Do not pull the rubber parts of the operation buttons. This may deteriorate the sealability, possibly causing malfunction.

Chapter 2. Installation of the 700 Series

This chapter describes the usage conditions, installation, piping, and wiring of the device.

2-1. Usage Conditions

The device must be installed in the location, which satisfies the following conditions.

Also, the divice must be used in accordance with its specification.

Table 2-1. Range of Usage Conditions

		Units	Basic operating conditions	Normal operating conditions	Marginal operating conditions	Transportation conditions
Operating temperature range	General model	°C	+23 ±2	−40 to +80	−40 to +80	−40 to +70
	TIIS flameproof model	°C	+23 ±2	−20 to +55	−20 to +55	−40 to +70
	IECEx/FM/FMC/CCC/ KCs flameproof model	°C	+23 ±2	−30 to +75	−30 to +75	−40 to +70
	FM Intrinsically Safe (ic) and Nonincendive	°C	+23 ±2	−24 to +75	−24 to +75	−40 to +70
	ATEX/IECEx intrinsically safe model (FISCO)	°C	23±2	−40 to +60	−40 to +60	−40 to +70
	LUI	°C	+23 ±2	0 to 50	−40 to +80	−40 to +70
Power supply voltage		V	9 to 32	9 to 32	32	—
Vibration	Amplitude *1	mm_{p-p}	0	15/(5 to 8 Hz)	15/(5 to 10 Hz)	15/(5 to 10 Hz)
	Acceleration *1 *2	m/s^2	0	20/(8 to 400 Hz)	40/(10 to 400 Hz)	40/(10 to 400 Hz)
Friction of applied valve		%	3 to 20	3 to 20	0 to 3 20 to 100	—
Supply air pressure Ps (140 kPa≤Ps≤700 kPa)		kPa	Ps ±1%	140 to 700	0 to 710	—
Installation orientation *3		°	±1*4	±180	±180	±180
Humidity range		%RH	50 ±10	5 to 100	5 to 100	5 to 100

Each operating condition is defined as follows.

- Basic operating condition: Range in which the accuracy is guaranteed
- Normal operating condition: Range in which the positioner normally operates
- Marginal operating condition: Range in which performance is not guaranteed but the device can be used without being permanently damaged
- Transportation condition: Environment condition range in which the non-operating device is not permanently damaged during transportation

**1. Vibration conditions when the positioner cover is positioned at the center front.*

**2. The pressure gauge is not applied.*

**3. The slope characteristics are not included.*

**4. The status where the drive shaft of the direct-acting actuator is perpendicular to the ground and that is used as the reference.*

2-2. Selection Criteria for Installation Location

The device is designed to withstand severe conditions, but the installation location should be selected according to the criteria described below to maximize performance.

2-2-1. Selection Criteria for Installation Location

Install the device in a location that satisfies all of the following conditions.

- Operating temperature range that conforms to the explosion protection rules
- Relative humidity: 5 to 100%RH
- Ambient temperature change rate: ±20°C/hr or slower
- Electromagnetic induction: 400 A/m or less (Avoid places near a large transducer, high-frequency furnace, or other such equipment.)
- Do not use a transceiver near the device.
- Vibration: 20 m/s^2 (5 to 400 Hz) or less (The vibration conditions defined for the device are the vibrations at the positioner part.)

2-2-1-1. Criteria for instrumentation air

The device employs a nozzle flapper structure in the electropneumatic transduction section. If instrumentation air is contaminated (includes oil, water, or other substance), the positioner function of the device may not function properly or an irrecoverable failure may occur. Therefore, the quality of instrumentation air supplied to the device is defined as follows.

- Solid material: No particles with a diameter larger than 3 μm.
- Oil: Less than 1 ppm.
- Supply air humidity: The dew point temperature is at least 10°C lower than that of the device.

(This criterion is based on Japanese Industrial Standards JIS C 1805-1(2001).)

Select a compressor and main line or terminal-installation type compressed air purifier by referring to the above specifications.

(1) Compressed air purifier for the main line

Select a compressed air purifier for the main line, such as a main line filter or micro-alescer, to satisfy the above specifications.

Domestic compressed air purifier manufacturers of Japan: SMC Corporation and CKD Corporation

(2) Compressed air purifier to be installed on the terminal

If an air purifier cannot be installed on the main line due to installation of a control valve or for other reasons, use an compressed air purifier that can be installed on the terminal in order to satisfy the above specifications.

<Example devices>

Products from SMC Corporation

- Mist Separator AM150 or AM250 Series (Filtering level: 0.3 μm, Secondary oil mist concentration: 1.0 mg/m^3)

CKD Corporation

- Oil mist filter
- M1000 or M3000 Series
- Mantle S Type (Filtering level: 0.3 μm, Remaining oil: 1.0 mg/m^3)

Handling Precautions:

Select a compressed air purifier with specifications suited to the usage conditions. Even when you install the above oil removal equipment, it is necessary to properly inspect and maintain the air circuit section for long-term stable operation. Install the oil removal equipment before use and perform periodic inspection and maintenance.

The warranty is void if the device fails because the quality of the above instrumentation air was not sufficient.

2-3. Installation Procedure

2-3-1. Mounting the 700 Series onto the Actuator

The device is a smart valve positioner for use with a control valve that uses a direct-acting or rotary actuator. The main unit of the device weighs approximately 4.2 kg. The basic mounting procedure is the same as that for conventional electropneumatic positioners.

⚠ CAUTION

Be careful not to get injured by sharp parts such as the edge of the main unit or actuator or screw threads during mounting.

The type of mounting plate, mounting method, and mounting procedure differ depending on the actuator model to be mounted in the device.

If the device is not properly mounted, not only will the device not be able to operate at its true performance but it may be damaged or fail. Pay attention to the following points.

- The mounting plate and its accessories differ depending on the specifications (actuator model). Be sure to use the appropriate mounting plate and accessories for the actuator to be mounted.
- When installing the control valve, ensure as much surrounding space as possible and put the device in the correct orientation taking maintainability (such as piping, wiring, and adjustment) into consideration.
- Deliver the device to the installation location in the packaged state if possible.
- Do not apply excessive force to the feedback lever during mounting.
- Do not bend the feedback pin.
- Do not block the exhaust port located underneath.
- Install the device so that the electrical conduit connection port does not face upward.
- Securely tighten bolts.
- If the pressure regulator with filter is installed with the device, install with the drain of the pressure regulator with filter facing downward. If the pressure regulator with filter cannot be attached vertically (with the drain facing downward), install it separated from the AVP with the proper orientation.
- In order to avoid the possibility of rainwater entering the pressure gauge, install the gauge such that it does not face upward or downward. In addition, the pressure gauge has a rainwater drain on its underside, so install the gauge with this hole facing downward.
- If you install this device with the LCD facing upwards, use the LCD cover and pressure gauge elbows as necessary, depending on the circumstances. For details, refer to 6) below, “Installing the device with the LCD facing upwards.”

1) Mounting the feedback lever

Assemble the feedback lever from the front of the main unit of the device using the two included hexagon socket bolts.

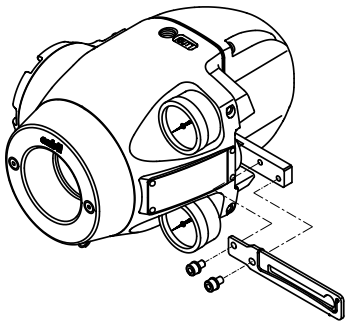


Figure 2-1. Mounting Procedure for Feedback Lever

Assemble the extension lever as shown in the figure below if necessary.

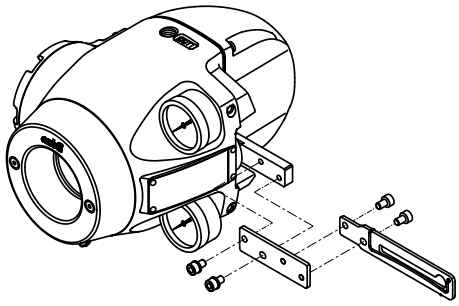


Figure 2-2. Mounting Procedure for Extension Lever

2) Mounting example

A typical mounting method is shown in the figure below. If your actuator is not shown in the figure below, refer to the assembly diagram included with the device.

[Direct-Acting Actuator HA2 to 4, PSA1 to 4, 6, VA1 to 6 from Azbil Corporation]

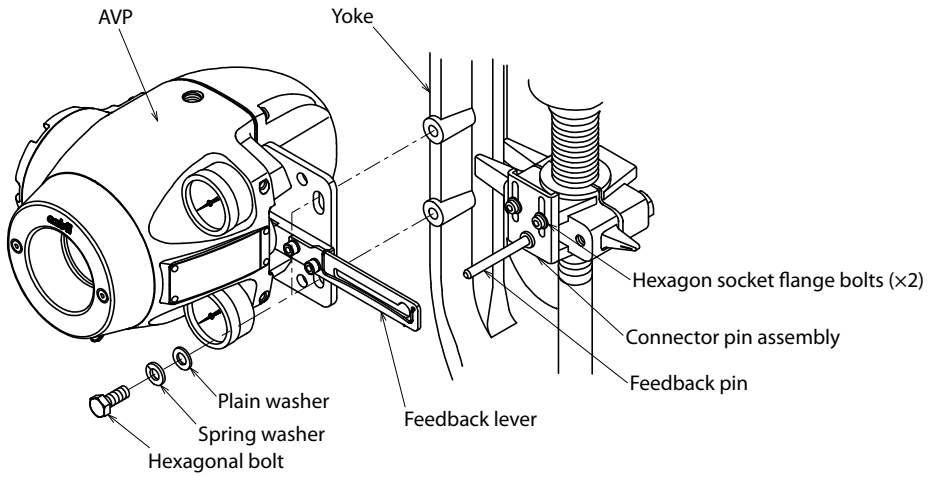


Figure 2-3. Mounting Procedure for Direct-Acting Actuator HA2 to 4, PSA1 to 4, 6, VA1 to 6 from Azbil Corporation

[RSA1, 2, VR3 actuator from Azbil Corporation]

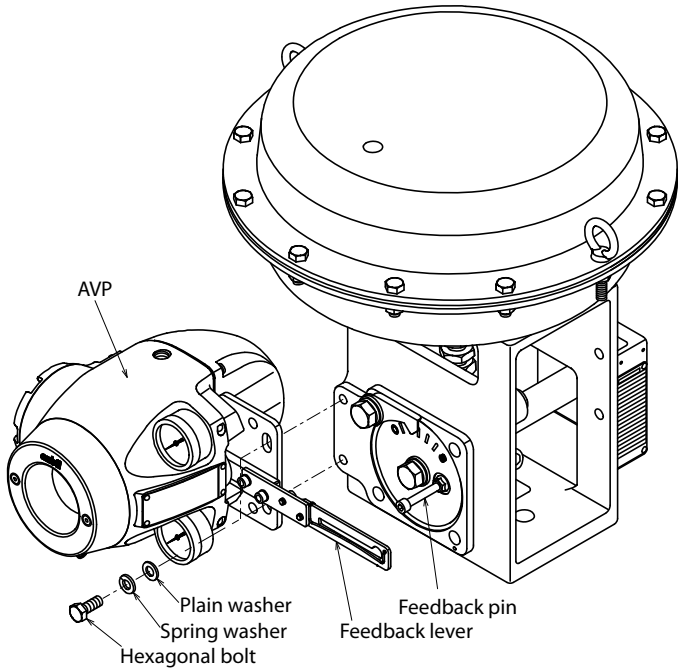


Figure 2-4. Mounting Procedure for RSA1, 2, VR3 Actuator from Azbil Corporation

[Example of double-acting rotary cylinder actuator]

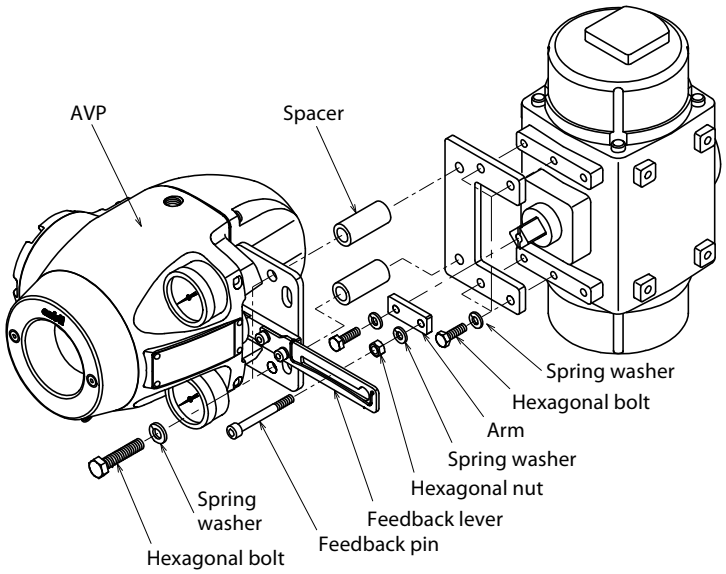


Figure 2-5. Mounting Procedure for Double-Acting Rotary Cylinder Actuator

3) Mounting procedure

The procedure for mounting the feedback lever onto the actuator is shown below.

Step	Description
1	Tightly secure the mounting plate by inserting hexagonal bolts (M8×20) with spring washers into the (two) screw holes at the rear of the device.
2	Tightly secure the device (mounting plate) onto the mounting seat of the actuator by using bolts and washers. At this time, insert the actuator feedback pin into the slotted hole of the feedback lever in the device.

4) Connection of feedback pin and feedback lever (1)

There are several points to be careful of when connecting the feedback lever to the device and the actuator feedback pin. Connect correctly.

- Only a pin with a diameter of 6 mm can be used.
- Insert the pin between the guide and the spring.

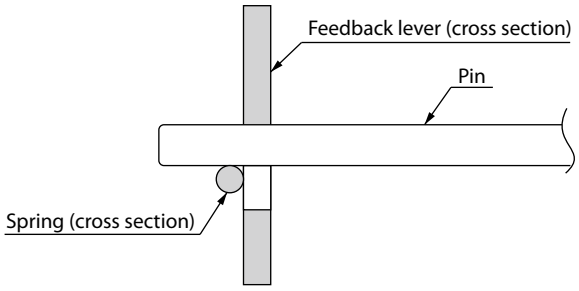


Figure 2-6. Connection of Feedback Lever and Feedback Pin

- Make the feedback lever perpendicular to the pin when viewed from the above.

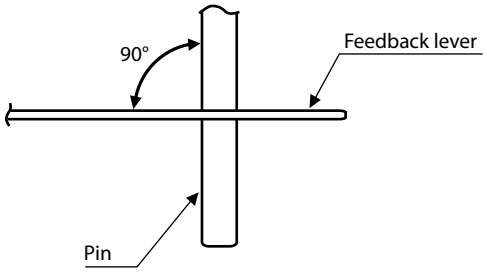


Figure 2-7. Angle between Feedback Lever and Pin

- Mount the lever so that it is horizontal when opened by 50%.
- The allowable rotation angle of the feedback lever is horizontal ± 30°. If the angle exceeds ±30°, the self-diagnostic function detects Valve Travel Detector Out of Range and the device will not operate normally. (The accuracy is guaranteed when the rotation angle is between ±4° and ±20°.)

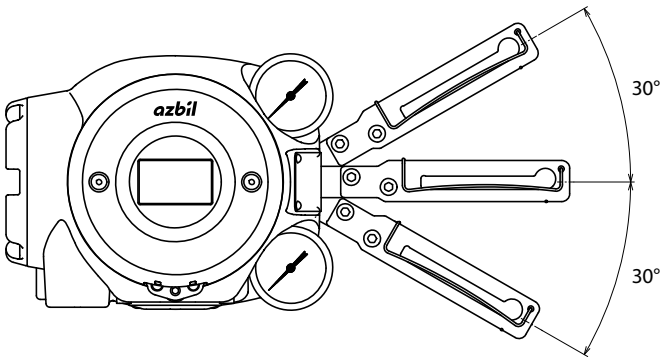


Figure 2-8. Operation Angle of Feedback Lever

- When assembling the lever onto a rotary cylinder so that the shaft of the rotary cylinder is positioned between the feedback pin and the 700 Series as shown in the figure below, select Rotary/90° (for 90°) or Rotary/other (for angles other than 90°) as the Actuator Type according to the rotation angle.

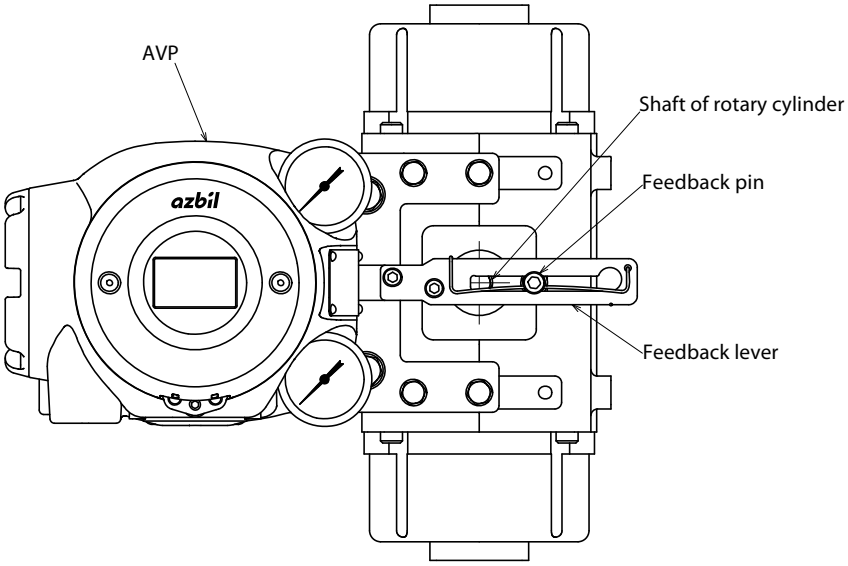


Figure 2-9. Connection of the Rotary Cylinder to the Feedback Pin and Feedback Lever

- When the rotary cylinder is large and the lever is assembled so that the feedback pin is positioned between the 700 Series and the shaft of the rotary cylinder as shown in the figure below, select Rotary (sub)/90° (for 90°) or Rotary (sub)/other (for angles other than 90°) as the Actuator Type according to the rotation angle.

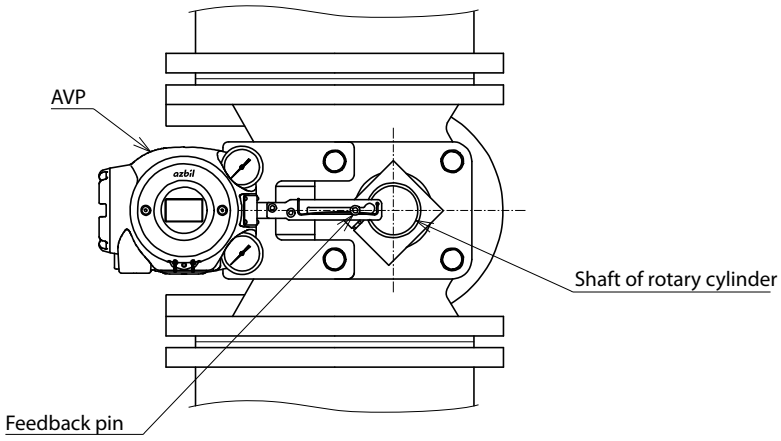


Figure 2-10. Connection of the Rotary Cylinder to the Feedback Pin and Feedback Lever(Large cylinder)

5) Maintenance space behind the device

The device has a nozzle flapper mechanism in the back of the main unit. When cleaning the flapper, you must remove the pilot relay cover secured to the back with three screws. Design the clamp and feedback mechanism to ensure maintenance space for cleaning.

6) Installing the device with the LCD facing upwards

If you install the device with the LCD facing upwards, use the accessories below as required depending on the circumstances. (Refer to 6-9, "Resale Parts.")

- LCD cover (material: silicone rubber)
  This cover reduces deterioration of the LCD due to sunlight (ultraviolet radiation). Use the cover if the device is used in a place with strong sunlight (outdoors, etc.).

⚠ CAUTION

Before mounting or removing the LCD cover, it is necessary to remove the face cover from the main unit. Take care as you work not to touch sharp parts of the face cover, such as the rim. You might be injured.

Handling Precautions:

Remove the face cover when checking the LCD.

- Pressure gauge elbows (Connection: Rc1/8)
  The elbows are for mounting the pressure gauges if the device is installed in a place with direct exposure to rainwater (outdoors, etc.). (If the pressure gauges are installed facing upward, they will be damaged by rainwater.

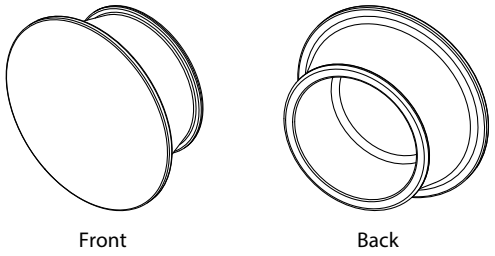


Figure 2-11. LCD cover

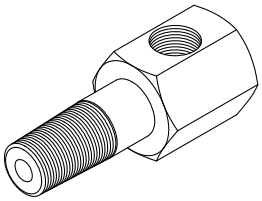


Figure 2-12. Pressure gauge elbow

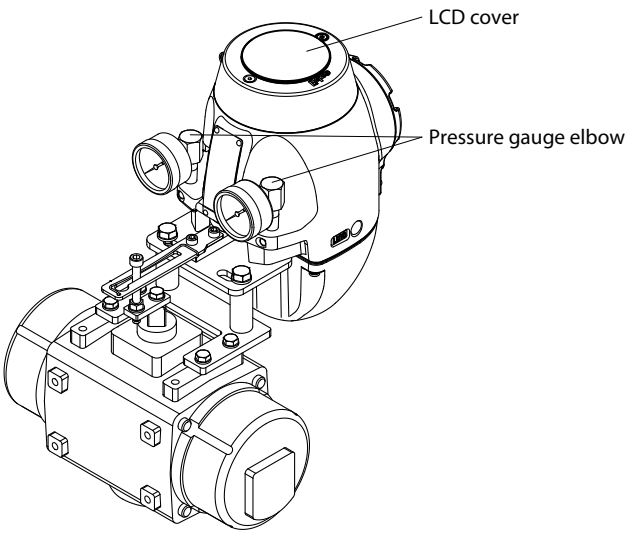


Figure 2-13. Example of LCD cover and pressure gauge elbow mounting

2-3-2. Pneumatic Piping Connection

This section describes how to supply the air for the device to drive the actuator.

1) Air supply system

Supply air must be clean and dry to stably use the device for a long time. A typical example of an air supply system is shown in the figure below.

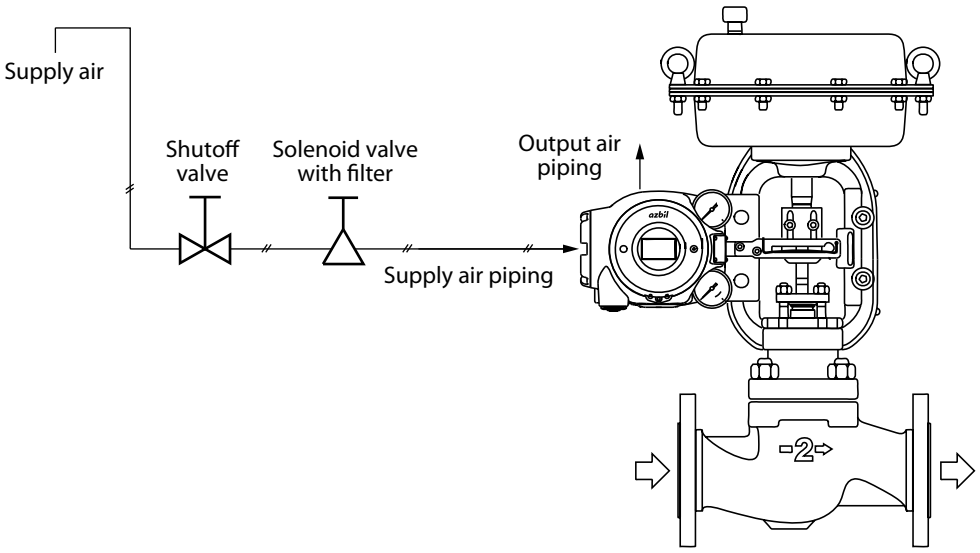


Figure 2-14. Air Supply System

2) Supply air

Use supply air that conforms to the instrumentation air standards (on page 2-2).

3) Solenoid valve with filter

- The solenoid valve with filter is used to adjust the pressure of the supply air to the device.
- Install this valve as close to the main unit of the device as possible.
- The control valve can be manually operated by using the A/M switching function. (The double-acting actuator does not support manual operation.)
- Use a 3-μm or finer filter.
- The filter removes solid materials from supply air.
- If the filter is not equipped, separately insert a (3-μm or finer) filter immediately before the solenoid valve.
- Install the solenoid valve so that the drain faces downward.
- If you select the built-in Azbil regulator, the filter is built into the device before shipment.

4) Shutoff valve

- The shutoff valve is used to temporarily stop supplying air to the device.
- With this valve, the device or control valve can be removed without having to stop the whole air supply system during maintenance or other operations.

5) Piping

- Use piping with an inside diameter of 6 mm.
- When using the device in a corrosive atmosphere, select piping appropriate to the environment of the installation location. For example, you may use the vinyl-coated copper pipe.
- To prevent air leaks, be sure to use a fitting that is appropriate for the pipe.

6) Connection positions

The positions of the supply air connection port and output air connection port are shown in the figure below. Select the dimensions of the connection port screws according to the specifications.

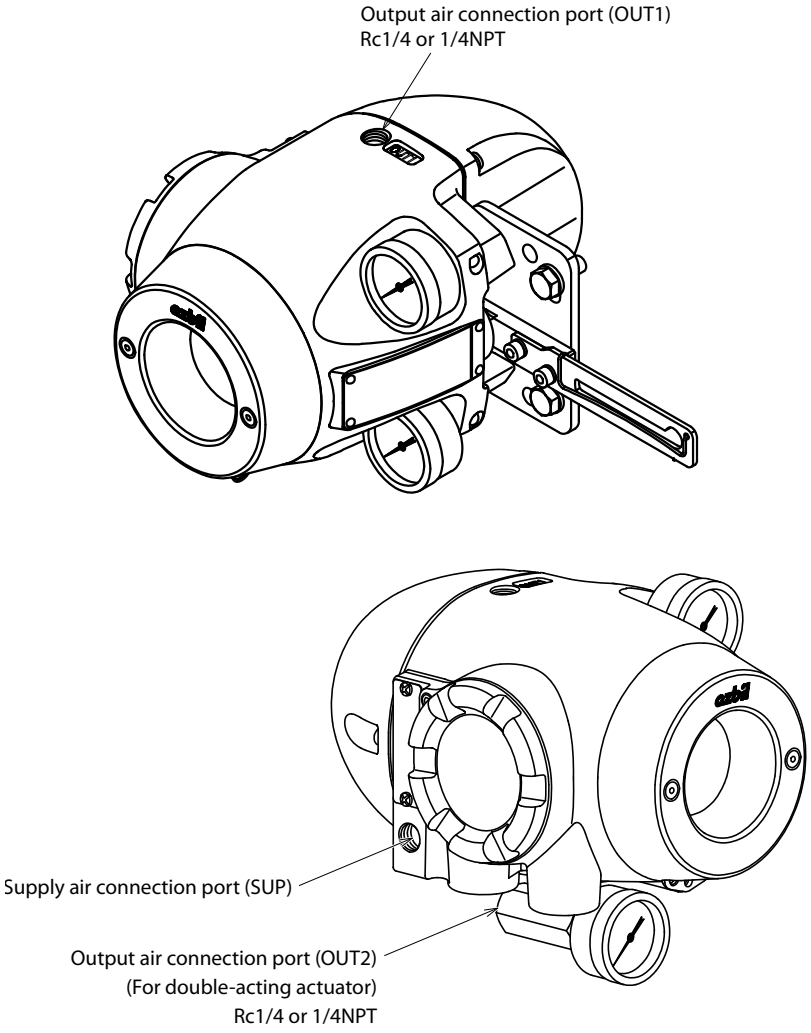


Figure 2-15. Pneumatic Piping Connection

! Handling Precautions:

When connecting the electromagnetic valve for emergency shutoff, air valve, or other part, install it between the output air connection and the actuator rather than the supply air connection side of the device.

7) Mounting procedure

The procedure for connecting pneumatic piping to operate the device is shown below.

Step	Description
1	Connect the joint for piping to the connection port using seal tape. **Handling Precautions:** • Use seal tape as the seal material. Avoid using solid or liquid seal material if possible. • Do not let the seal tape get in the piping. • If you do use a liquid seal, make sure that no drops of the seal material get in the piping.
2	Connect the supply and output pipes to each joint in consideration of the arrangement of the piping. **Handling Precautions:** • For the double-acting actuator, the connection between output air connection ports OUT1 and OUT2 and the actuator is determined by the valve operation. Check the valve operation before connecting pipes. • Sufficiently flush piping before connection to prevent burrs on the piping or other foreign objects from getting in the piping. • Keep the output air piping as short as possible.
3	After all piping is complete, make sure that air does not leak.

2-3-3. Electrical Wiring Connection

This section describes how to connect electrical wiring for signal inputs from the controller.

⚠ WARNING

Turn the power off before starting wiring work. Otherwise, electric shock may occur.

When using the explosion-proof 700 Series in a dangerous place, be sure to connect the wiring while following "Chapter 7. Notes on the Explosion-Proof 700 Series."

⚠ CAUTION

Be sure to perform grounding work following the electrical work guidelines in each region.

Handling Precautions:

Be sure to attach a blind plug to the unused conduit connection port so that it is completely covered.

1) Connection positions

The figure below shows the terminal block in the terminal box.

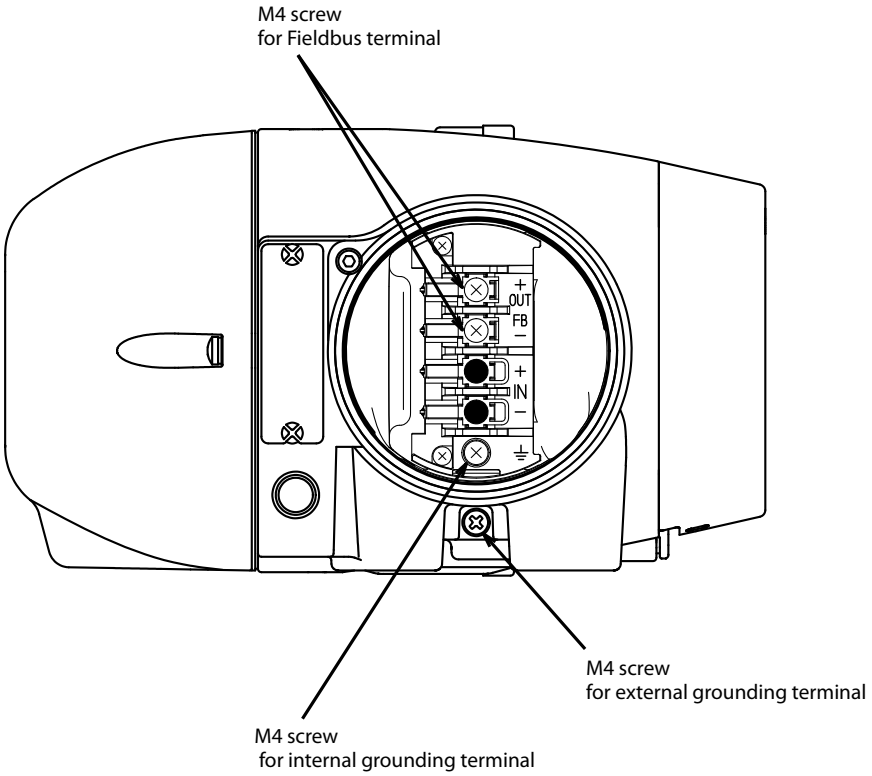


Figure 2-16. Terminal Block in the Terminal Box

2) Terminal for external grounding

Connect the external grounding terminal to the case with two washers as follows.

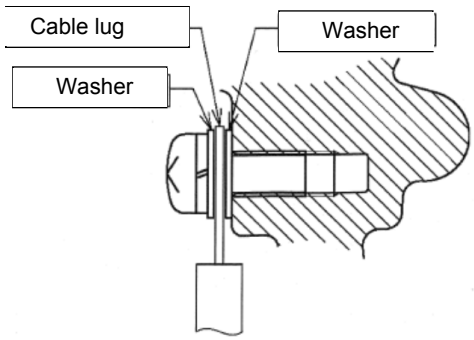


Figure 2-17. Connection of External Grounding Terminal

3) How to install a Fieldbus network

There are two ways to install a fieldbus network.

(1) Bus type: Connect each field device from the trunk cable within 1 m.

(2) Tree type: Install the trunk cable to the field and connect feeder cables from a junction box to each field device.

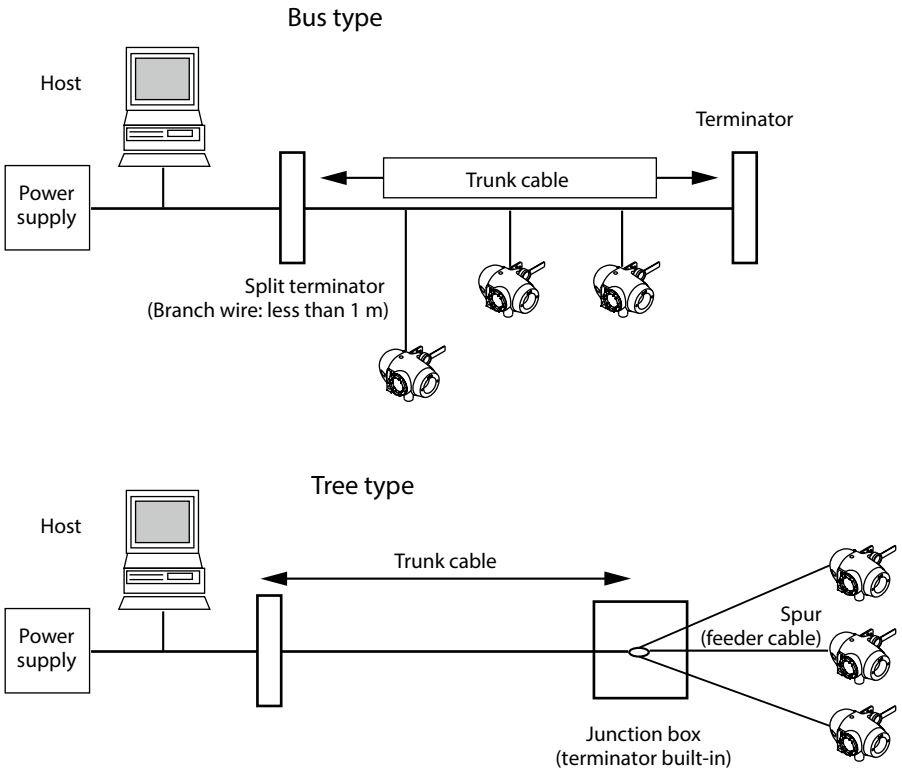


Figure 2-18. How to Install Fieldbus Networks

4) Precautions for installing cables

Note the following points when installing a cable.

- Route the cable so as to avoid high-capacity transducers, motors, power supplies for engines, or other devices that generate noise. Do not put a cable in the same tray or duct as a cable for an engine.
- We recommend using conduits and ducts to route cables for waterproofing and protection from damage. Be sure to use a waterproof adapter at the conduit connection port.
- When routing cables in a place subject to electromagnetic noise, use conduits and ducts.

2-3-4. Cables

1) Selection and conditions of cables

The criteria for selection and the conditions of cables for wiring are described below.

- We recommend using 600-V plastic insulated sheath electric wire CVV (JIS C 3401 by Japanese Industrial Standards) for control with a conductive cross-section of 1.25 mm^2 or a stranded cable with equivalent or higher performance.
- When routing cable in a place subject to electromagnetic noise, use shielded wire CVVS (JCS 4258 by the Japanese Electric Wire & Cable Makers' Association) and metal conduits.
- Select a sheath material that withstands the cable installation environment (including the ambient temperature, corrosive gas, and corrosive liquid).

Use cable with an outside diameter of 7 to 12 mm. When using a pressure-resistant packing cable adapter, be sure to use packing appropriate for the outside diameter of the cable.

A crimping terminal with insulated sleeve (for M4 screw) is recommended for terminals.

2) Types of Fieldbus cables

The maximum length of Fieldbus cable depends on the cable type. Refer to the table below.

Type	Description of cable	Size (mm^2)	Maximum length (m)
Type A	Twisted pair wire with individual shields	0.8 (18AWG)	1900
Type B	Common shielded multiple twisted pair wire	0.32 (22AWG)	1200
Type C	Unshielded multiple twisted pair wire	0.13 (26AWG)	400
Type D	Single unshielded wire	1.25 (16AWG)	200

! Handling Precautions:

Model AVP703 is intended for use in industrial locations defined in CE marking directive (EN 61326-1).

3) Wiring procedure

The procedure for electrical wiring to operate the device is shown below.

Step	Description
1	Turn off the Fieldbus power supply.
2	Rotate the lock screw (M4) on the terminal box cover with a (3-mm) hexagonal wrench clockwise to loosen it.
3	Rotate the terminal box cover counterclockwise to remove it. **Handling Precautions:** • Be careful not to damage the paintwork with a tool or other object.
4	Remove the dust-proof plug from the conduit connection port.
5	Insert the cable into the conduit connection port. **Handling Precautions:** • Be careful not to damage the sheath of the cable.
6	Wire the cable to the relevant terminal in the terminal box. **Handling Precautions:** • Be careful of the polarity. • Sufficiently tighten the terminal screw. The recommend tightening torque is 1.5 N·m.
7	Apply sufficient waterproof treatment to the conduit to prevent rainwater or other liquid from entering inside. **Handling Precautions:** • We recommend using silicon non-hardening seal material.
8	Mount the terminal box cover, sufficiently tighten it with an appropriate tool, and then secure the cover by rotating the lock screw counterclockwise. **⚠ CAUTION** Be careful not to get your finger caught in the clamp. Be careful not to hurt your finger with the edge of cover or the screw threads of the main unit. **Handling Precautions:** • Be careful not to damage the paintwork of the device with a tool or other object.

2-4. Cable gland and flameproof universal elbow for TIIS Flameproof apparatus

TIIS Flameproof SVP model is provided with a certified cable gland.

The cable gland seals the cable entering the SVP enclosure to withstand an internal explosion and protects the cable from being damaged mechanically and electrically.

Use the dedicated elbow if it is necessary to change the direction of the cable with these models.

! Handling Precautions:

If the device is to be used under the authorization other than that for the TIIS Flameproof standards, the wiring of cables must be performed according to local regulations for electrical installations in explosive atmospheres.

1) Structure of the flameproof cable gland

The Flameproof cable gland is shown below in assembled and exploded views.

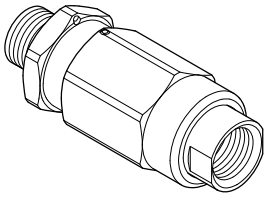


Figure 2-19. Flameproof cable gland

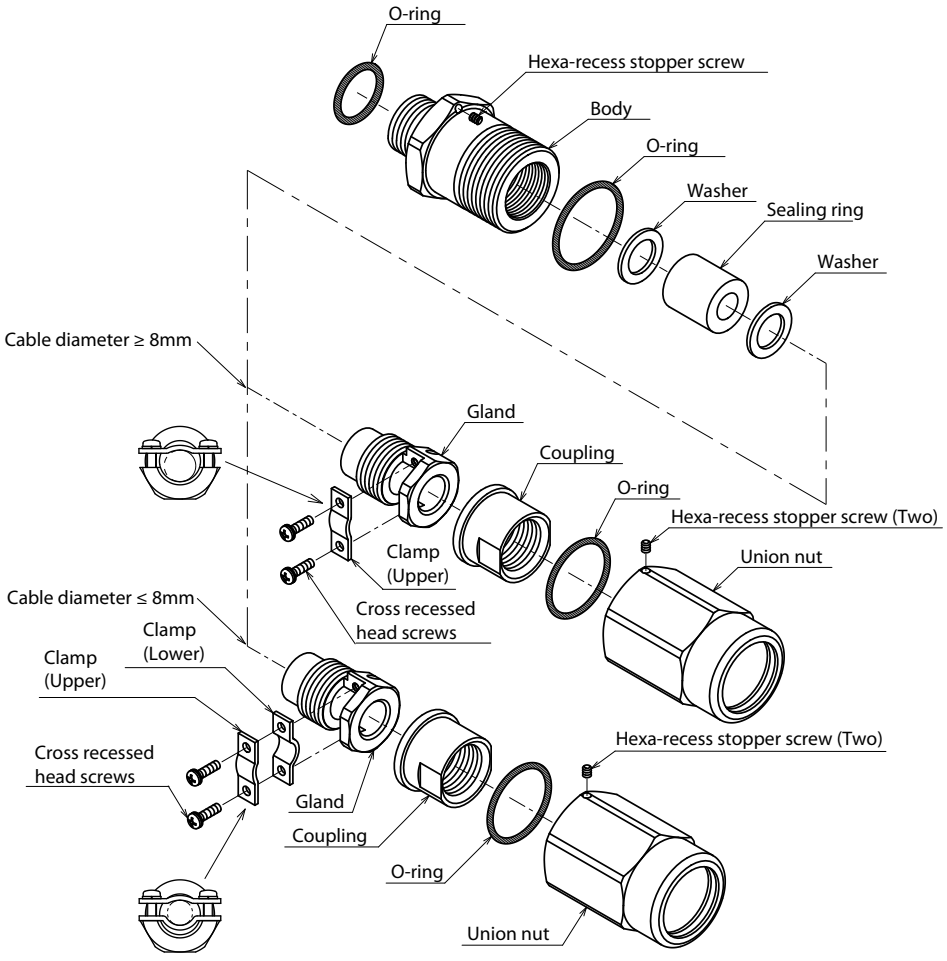


Figure 2-20. Constituent elements of flameproof cable gland

2) Structure of the flameproof universal elbow

The figure below shows the universal elbow.

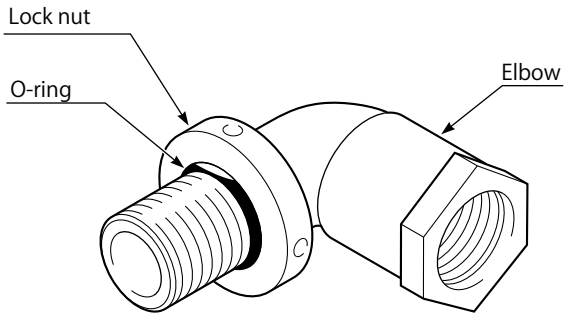
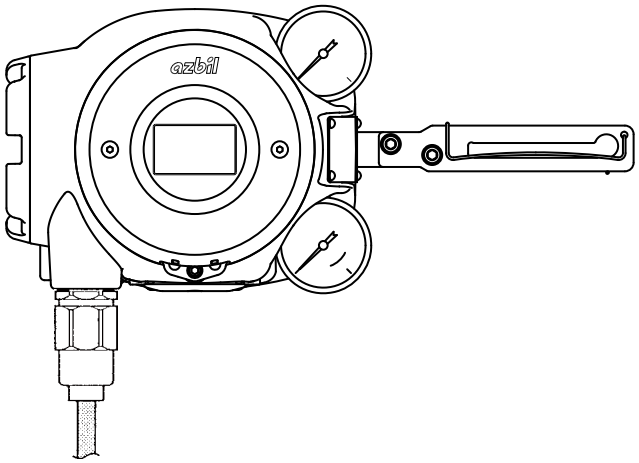


Figure 2-21. Flameproof elbow

3) Mounting example

The flameproof cable gland and the universal elbow are used to connect the field wiring cable to the device enclosure, as shown below.

a) Use of flameproof cable gland



b) Use of flameproof cable gland and elbow

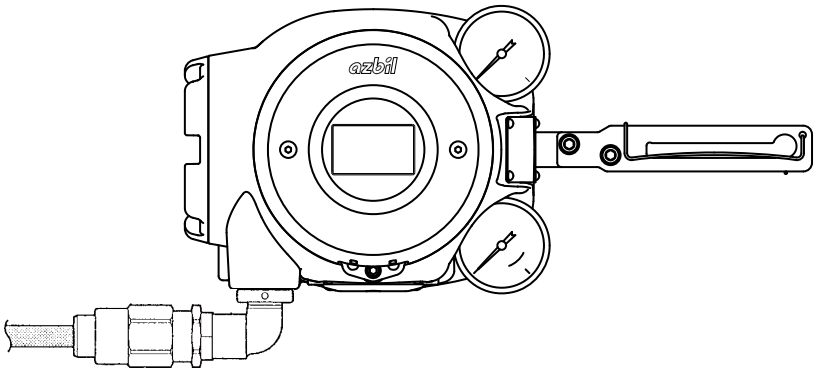


Figure 2-22. Mounting example of flameproof cable gland and elbow

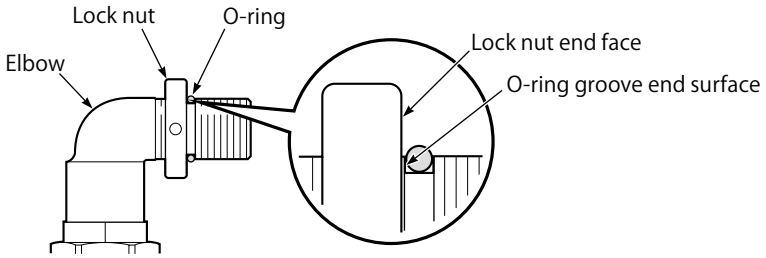
4) Mounting procedure for flameproof cable gland

The procedure for mounting the flameproof cable gland is shown below.

<table>
<tr><th>Step</th><th>Description</th></tr>
<tr><td>1</td><td>Securely screw the main unit of the adapter into the conduit connection port of the terminal box or into the flameproof universal elbow, and fasten the hexagon socket bolt.
Handling Precautions:
• Apply adequate waterproofing to these parts. We recommend the use of silicone resin based non-hardening seal materials.</td></tr>
<tr><td>2</td><td>Refer to the illustrations and insert the cable carefully.
⚠WARNING
If the diameters of the cable and the packing do not match each other, the propagation of flame cannot be prevented. Refer to the table below and select a packing adaptor whose internal diameter matches the outer diameter of the cable.
<table>
<tr><th>Cable outer diameter (mm)</th><th>Packing inner diameter (mm)</th><th>Notes</th></tr>
<tr><td>7.0 to 8.0</td><td>8</td><td>Provided</td></tr>
<tr><td>8.0 to 10.0</td><td>10</td><td>Built in</td></tr>
<tr><td>10.0 to 12.0</td><td>12</td><td>Provided</td></tr>
</table>
The cable outer diameter is 8 mm max., fix the cable gland with the clamps.
Handling Precautions:
• Pay attention to the surface of the device. Tools may cause damage the surface.</td></tr>
<tr><td>3</td><td>Screw the gland into the main unit of the adapter to secure it in place.
⚠WARNING
To prevent injuries due to a spark travel, be sure to tighten down the packing adequately.</td></tr>
<tr><td>4</td><td>Pass the cable through the body and insert it into the terminal box.</td></tr>
<tr><td>5</td><td>Screw the union nut onto the body and tighten it down securely to hold it in place. Then, tighten the union nut's recess screw.</td></tr>
</table>

5) Mounting procedure for flameproof universal elbow

The procedure for mounting the flameproof universal elbow is shown below.

Step	Description
1	Align the end surface of the lock nut with the end surface of the O-ring groove as shown below.  Figure 2-23. Arrangement of lock nut and O-ring
2	Screw the flameproof universal elbow into the terminal box conduit connection port until the lock nut end surface hits the connection port end surface. When two elbow are used, at first, screw the first elbow into the terminal box. Next, screw the second elbow into the terminal box in the reverse direction to the first elbow. **Handling Precautions:** • Apply adequate waterproofing to these parts.
3	Turn the flameproof universal elbow to loose in the desired direction. **Handling Precautions:** • Do not loosen it more than 1 turn.
4	Lock the flameproof universal elbow in place by tightening down the lock nut using the special tool.

Chapter 3. Operation of the 700 Series

This chapter describes how to start operating the device and adjust the device using the local user interface (LUI). When you purchase the device alone, be sure to read "Installation of the 700 Series" before reading this chapter.

3-1. Local User Interface (LUI)

Four push buttons on the LUI (with MODE, ▽, △, and ENT symbols) can be operated by removing two screws ((2.5-mm) hexagonal socket bolts) from the front cover of the device.

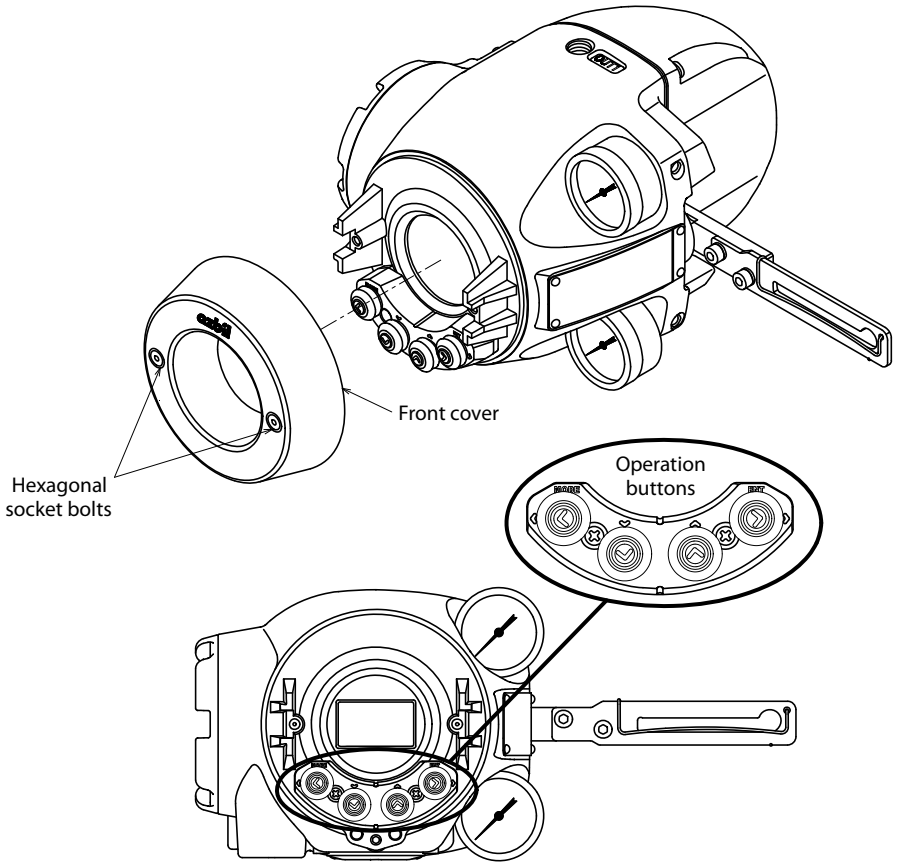


Figure 3-1. LUI Structure with the Front Cover Removed

Table 3-1.

Key input	Monitor mode	Setup mode
ENT	Switches between display categories.	Goes to the next display.
▽	Selects the next item.	
△	Selects the previous item.	
MODE	Switches between display categories.	Goes back to the previous display.
MODE Hold down	Switches between setup mode and monitor mode.	
ENT Hold down		Executes the function.

The LUI supports the monitor and setup modes.

In monitor mode, the normal, detailed, status, and FF monitors are available. The normal monitor can be used to monitor data such as opening and input signals and it displays alarm information if a self-diagnostic alarm is issued.

To change from monitor mode to setup mode, hold down the 

button. In setup mode, operations such as auto setup and zero span adjustment can be performed. Figure 3-2 shows a diagram of the LUI screen transition.

The LUI displays the dynamic values in the device and can be used to adjust and set up the following six functions.

- Auto setup function
- Zero span adjustment
- Supply pressure bypass function
- Starting the PST (Partial Stroke Test)
- Specification of control parameters
- Setup of the control valve system

Handling Precautions:

- To perform adjustments and change settings with the LUI, set Target for MODE_BLK in the Positioner Transducer Block to OOS (Out of service) from the host.
- You cannot perform operations from the host while performing adjustments and changing settings with the LUI.
- If there is a foreign object near the operation buttons, remove it before starting operation.

3-1-1. Displays

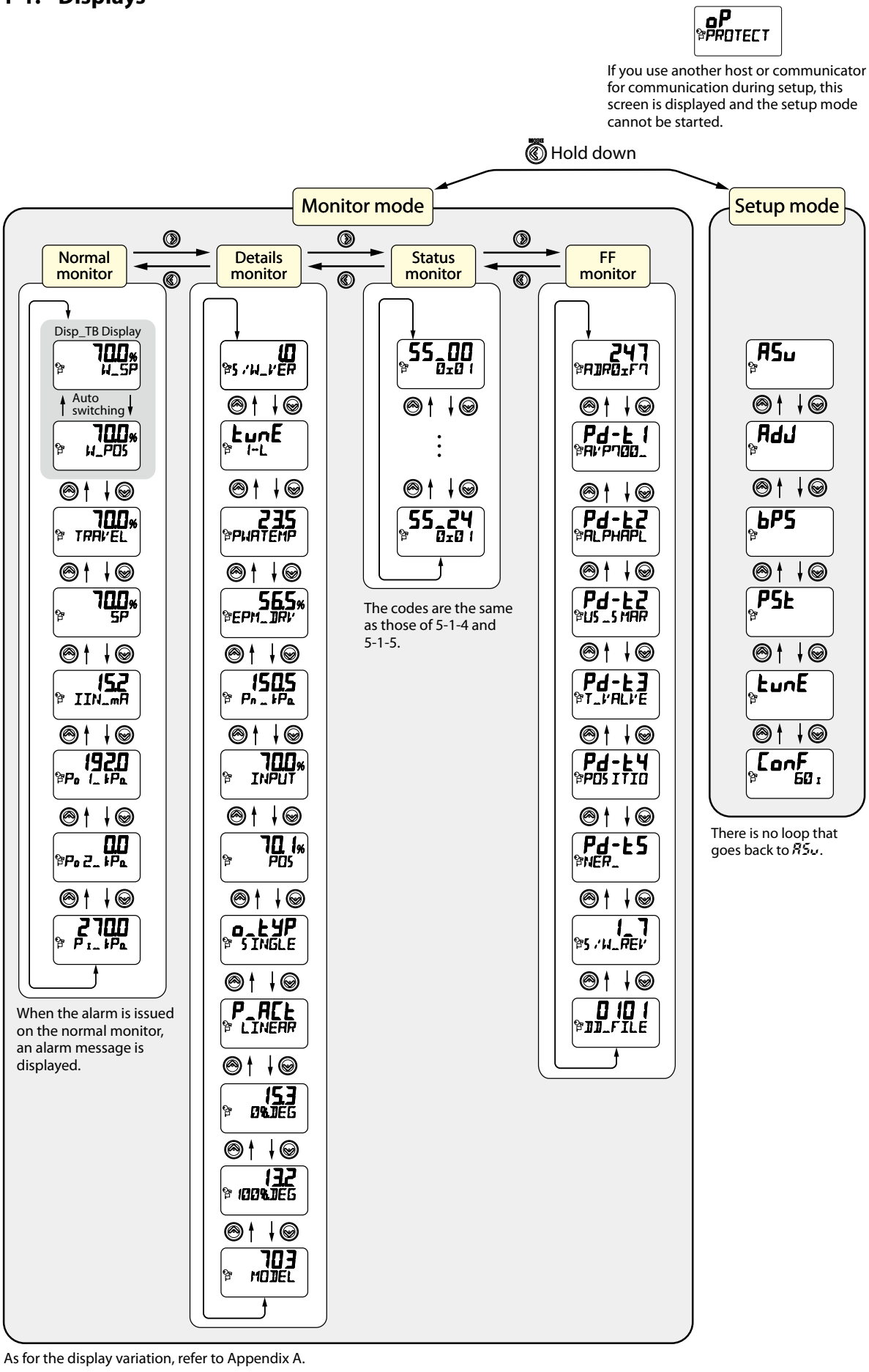


Figure 3-2.

3-1-2. Disp_TB Display

1) Display at startup

The display changes as follows at startup:

(1) All segments are lit (approx. 0.8 s) → (2) All segments are turned off (approx. 0.8 s) → (3) Normal monitor Disp_TB display ("FF_DISCON") (approx. 10 s) → (4) Normal monitor Disp_TB display ("DSP_OOS") (approx. 30 s) → (5) Normal monitor Disp_TB display: normal display

If "FF_DISCON" continues to be displayed, contact your dealer.

2) Normal Display

With the factory default settings, the values of WORKING_SP and WORKING_POS for the Positioner Transducer Block are indicated cyclically in the following sequence.

Sequence No.	Numerical value section	Character string section	Display duration (s)
1	WORKING_SP value	W_SP (Tag)	5
2	WORKING_SP value	% (Unit)	5
3	WORKING_SP value	(Status)	5
4	WORKING_POS value	W_POS (Tag)	5
5	WORKING_POS value	% (Unit)	5
6	WORKING_POS value	(Status)	5

To change display duration, change the settings of the following parameter.

- DISPLAY_CYCLE: 1 to 10 s can be specified.

Contents of the character string section can be configured by changing the settings of the following parameter.

- DISPLAY_INFO_SELECTION: Factory default settings: 0x07 (Tag, Unit, and Status are displayed)

To display only Unit, for example, set the parameter to 0x02.

[When displaying other parameters]

To display parameters other than WORKING_SP for the Positioner Transducer Block (the factory default setting), configure the following parameters.

- BLOCK_TAG_SELECTION_1: specify the BLOCK_TAG of the block that the parameter to display belongs to
- PARAM_SELECTION_1: specify the parameter to display
- DISPLAY_TAG_1: specify the tag to display

For example, to display the OUT parameter of the AO Function Block, do the following:

(1) Set BLOCK_TAG_SELECTION_1 to "AO_FB" (AO_FB is the default block tag name. If the name was changed after shipment, specify the new name.)

(2) Check that BLOCK_TYPE_SELECTION_1 is set to "0x0102: Analog Output (AO)."

(3) Set PARAM_SELECTION_1 to "9: OUT."

(4) Enter "OUT," for example, for the DISPLAY_TAG_1 parameter, which specifies the tag name.

For other parameters that can be displayed, see Table 3-3, "Parameters that can be displayed," on the next page.

Table 3-2. Parameters that can be displayed

Block	Profile Number	Parameter	Index	Range	Index
Positioner TB	0x0145	FINAL_VALUE	14	FINAL_VALUE_RANGE	15
		FINAL_POSITION_VALUE	18	FINAL_VALUE_RANGE	15
		WORKING_POS	19	FINAL_VALUE_RANGE	15
		WORKING_SP	20	FINAL_VALUE_RANGE	15
PID FB	0x0108	OUT	9	OUT_SCALE	11
		IN	15	PV_SCALE	10
		CAS_IN	18	PV_SCALE	10
		BKCAL_IN	27	OUT_SCALE	11
		BKCAL_OUT	31	PV_SCALE	10
		RCAS_IN	32	PV_SCALE	10
		ROUT_IN	33	OUT_SCALE	11
		RCAS_OUT	35	PV_SCALE	10
		ROUT_OUT	36	OUT_SCALE	11
		TRK_VAL	39	TRK_SCALE	37
		FF_VAL	40	FF_SCALE	41
AO FB	0x0102	OUT	9	XD_SCALE	12
		CAS_IN	17	PV_SCALE	11
		RCAS_IN	26	PV_SCALE	11
		BKCAL_OUT	25	PV_SCALE	11
		RCAS_OUT	28	PV_SCALE	11
IS FB	0x0126	OUT	7	OUT_RANGE	8
		IN_1	11	OUT_RANGE	8
		IN_2	12	OUT_RANGE	8
		IN_3	13	OUT_RANGE	8
		IN_4	14	OUT_RANGE	8
OS FB	0x011C	OUT_1	8	OUT_1_RANGE	10
		OUT_2	9	OUT_2_RANGE	11
		CAS_IN	14	No unit	×
		BKCAL_IN_1	19	OUT_1_RANGE	10
		BKCAL_IN_2	20	OUT_2_RANGE	11
		BKCAL_OUT	15	No unit	×

3) Adding parameters to be displayed

For the Disp_TB, up to 4 parameters can be cyclically displayed.

The following example is the procedure for configuring the cyclic display of three parameters.

Displayed parameters: WORKING_SP and WORKING_POS from the Positioner Transducer Block, and OUT from the AO Function Block.

- With the factory default settings, WORKING_SP and WORKING_POS for the Positioner Transducer Block are displayed. In order to add OUT from the AO Function Block as the third parameter, set DISPLAY_PARAM_SELECTION to 0x07 (bit 2: Selection 3 Enable). The default value of DISPLAY_PARAM_SELECTION is 0x03.
- Set BLOCK_TAG_SELECTION_3 to "AO_FB." Check that BLOCK_TYPE_SELECTION_3 is set to "0x0102: Analog Output (AO)".
- Set PARAM_SELECTION_3 to "9: OUT."
- Enter "OUT," for example, for the DISPLAY_TAG_3 parameter, which specifies the tag name.

With the above configuration, the parameters are displayed cyclically in the following se-

quence.

Sequence No.	Numerical value section	Character string section	Display duration (s)
1	WORKING_SP value	W_SP (Tag)	5
2	WORKING_SP value	% (Unit)	5
3	WORKING_SP value	(Status)	5
4	WORKING_POS value	W_POS (Tag)	5
5	WORKING_POS value	% (Unit)	5
6	WORKING_POS value	(Status)	5
7	AO: OUT value	OUT (Tag)	5
8	AO: OUT value	% (Unit)	5
9	AO: OUT value	(Status)	5

To change the display duration, change the settings of DISPLAY_CYCLE. 1 to 10 s can be specified.

To add a fourth parameter, specify the following:

- DISPLAY_PARAM_SELECTION: 0x0f (bit 3: Selection 4 Enable)
- BLOCK_TAG_SELECTION_4: specify the BLOCK_TAG of the block that the parameter to display belongs to
- PARAM_SELECTION_4: specify the parameter to display
- DISPLAY_TAG_4: specify the tag to display

For details on Disp_TB parameters, refer to the “Parameters in the Display Transducer Block” section in Appendix C, “Parameter List.”

4) Status indication

For the status indicated in the character string section, see Table 3-3, "Indicated status," below.

Table 3-3. Indicated status

Quality	Substatus	Units displayed	Description
0: Bad	0	Bad_0	Non-specific
	1	Bad_1	Configuration Error
	2	Bad_2	Not Connected
	3	Bad_3	Device Failure
	4	Bad_4	Sensor Failure
	5	Bad_5	No Comm, with LUV
	6	Bad_6	No Comm, no LUV
	7	Bad_7	Out of Service
	8	Bad_8	Transducer in MAN
1: Uncertain	0	Unctn_0	Non-specific
	1	Unctn_1	Last Usable Value
	2	Unctn_2	Substitute/Manual Entry
	3	Unctn_3	Initial Value
	4	Unctn_4	Sensor Conversion not Accurate
	5	Unctn_5	Engineering Unit Range Violation
	6	Unctn_6	Sub-normal
	7	Unctn_7	Transducer in MAN
2: GOOD (NC)	0	GD-NC_0	Non-specific
	1	GD-NC_1	Active Block Alarm
	2	GD-NC_2	Active Advisory Alarm
	3	GD-NC_3	Active Critical Alarm
	4	GD-NC_4	Unack Block Alarm
	5	GD-NC_5	Unack Advisory Alarm
	6	GD-NC_6	Unack Critical Alarm
	8	GD-NC_8	Initial Fault State (IFS)
3: GOOD (C)	0	GD-C_0	Non-specific
	1	GD-C_1	Initialization Acknowledge
	2	GD-C_2	Initialization Request
	3	GD-C_3	Not Invited
	4	GD-C_4	Not Selected
	6	GD-C_6	Local Override
	7	GD-C_7	Fault State Active
	8	GD-C_8	Initial Fault State (IFS)

5) Unit to be displayed

The method of displaying the unit can be specified by UNIT_SELECTION_n. The available options are "0: Auto" and "1: Custom."

If "0: Auto" is selected, parameter values will be displayed in the predefined unit. For details, see Appendix C, "Parameter List," and Table 3-4,

"Units displayed on the LCD." If "1: Custom" is selected, the first seven characters of the unit specified by CUSTOM_UNIT_n (32 characters max.)

will be displayed.

Table 3-4. Units displayed on the LCD

Unit	Unit code	Display	Description
UNIT_K	1000	K	Kelvin
UNIT_degC	1001	degC	degree Celsius
UNIT_degF	1002	degF	degree Fahrenheit
UNIT_degR	1003	degR	degree Rankine
UNIT_m3	1034	m3	cubic meter
UNIT_cm3	1036	cm3	cubic centimeter
UNIT_L	1038	L	liter
UNIT_gal	1048	gal	US gallon
UNIT_ImpGal	1049	ImpGal	Imperial gallon
UNIT_bbl	1051	bbl	barrel
UNIT_kg	1088	kg	kilogram
UNIT_g	1089	g	gram
UNIT_t	1092	t	metric ton
UNIT_lb	1094	lb	pound (mass)
UNIT_Pa	1130	Pa	pascal
UNIT_GPa	1131	GPa	gigapascal
UNIT_MPa	1132	MPa	megapascal
UNIT_KPa	1133	kPa	kilopascal
UNIT_mPa	1134	mPa	millipascal
UNIT_uPa	1135	uPa	micropascal
UNIT_hPa	1136	hPa	hectopascal
UNIT_bar	1137	bar	bar
UNIT_mbar	1138	mbar	millibar
UNIT_torr	1139	torr	torr
UNIT_atm	1140	atm	atmospheres
UNIT_psi	1141	psi	pounds per square inch
UNIT_psia	1142	psia	pounds per square inch absolute
UNIT_psig	1143	psig	pounds per square inch gauge
UNIT_gcm2	1144	gcm2	gram per square centimeter
UNIT_kgcm2	1145	kgcm2	kilogram per square centimeter
UNIT_inH2O	1146	inH2O	inches of water
UNIT_inH2O_4C	1147	inH2O4C	inches of water at 4°C
UNIT_inH2O_68F	1148	inH2O68	inches of water at 68°F
UNIT_mmH2O	1149	mmH2O	millimeters of water
UNIT_mmH2O_4C	1150	mmH2O4C	millimeters of water at 4°C
UNIT_mmH2O_68F	1151	mmH2O68	millimeters of water at 68°F
UNIT_ftH2O	1152	ftH2O	feet of water
UNIT_ftH2O_4C	1153	ftH2O4C	feet of water at 4°C
UNIT_ftH2O_68F	1154	ftH2O68	feet of water at 68°F
UNIT_inHg	1155	inHg	inches of mercury
UNIT_inHg_0C	1156	inHg_0C	inches of mercury at 0°C
UNIT_mmHg	1157	mmHg	millimeters of mercury
UNIT_mmHg_0C	1158	mmHg_0C	millimeters of mercury at 0°C
UNIT_g_s	1318	g/s	gram per second
UNIT_g_m	1319	g/m	gram per minute
UNIT_g_h	1320	g/h	gram per hour
UNIT_g_d	1321	g/d	gram per day
UNIT_kg_s	1322	kg/s	kilogram per second
UNIT_kg_m	1323	kg/m	kilogram per minute

Unit	Unit code	Display	Description
UNIT_kg_h	1324	kg/h	kilogram per hour
UNIT_kg_d	1325	kg/d	kilogram per day
UNIT_t_s	1326	t/s	metric ton per second
UNIT_t_m	1327	t/m	metric ton per minute
UNIT_t_h	1328	t/h	metric ton per hour
UNIT_t_d	1329	t/d	metric ton per day
UNIT_lb_s	1330	lb/s	pound per second
UNIT_lb_m	1331	lb/m	pound per minute
UNIT_lb_h	1332	lb/h	pound per hour
UNIT_lb_d	1333	lb/d	pound per day
UNIT_ST_s	1334	STon/s	short ton per second
UNIT_ST_m	1335	STon/m	short ton per minute
UNIT_ST_h	1336	STon/h	short ton per hour
UNIT_ST_d	1337	STon/d	short ton per day
UNIT_LT_s	1338	LTon/s	long ton per second
UNIT_LT_m	1339	LTon/m	long ton per minute
UNIT_LT_h	1340	LTon/h	long ton per hour
UNIT_LT_d	1341	LTon/d	long ton per day
UNIT_PERCENT	1342	%	percent
UNIT_m3_s	1347	m3/s	cubic meter per second
UNIT_m3_m	1348	m3/m	cubic meter per minute
UNIT_m3_h	1349	m3/h	cubic meter per hour
UNIT_m3_d	1350	m3/d	cubic meter per day
UNIT_L_s	1351	L/s	liter per second
UNIT_L_m	1352	L/m	liter per minute
UNIT_L_h	1353	L/h	liter per hour
UNIT_L_d	1354	L/d	liter per day
UNIT_ML_d	1355	ML/d	megaliter per day
UNIT_CFS	1356	CFS	cubic feet per second
UNIT_CFM	1357	CFM	cubic feet per minute
UNIT_CFH	1358	CFH	cubic feet per hour
UNIT_ft3_d	1359	ft3/d	cubic feet per day
UNIT_SCFM	1360	SCFM	standard cubic feet per minute
UNIT_SCFH	1361	SCFH	standard cubic feet per hour
UNIT_gal_s	1362	gal/s	US gallon per second
UNIT_GPM	1363	GPM	US gallon per minute
UNIT_gal_h	1364	gal/h	US gallon per hour
UNIT_gal_d	1365	gal/d	US gallon per day
UNIT_Mgal_d	1366	Mgal/d	mega US gallon per day
UNIT_ImpGal_s	1367	IpGal/s	Imperial gallon per second
UNIT_ImpGal_m	1368	IpGal/m	Imperial gallon per minute
UNIT_ImpGal_h	1369	IpGal/h	Imperial gallon per hour
UNIT_ImpGal_d	1370	IpGal/d	Imperial gallon per day
UNIT_bbl_s	1371	bbl/s	barrel per second
UNIT_bbl_m	1372	bbl/m	barrel per minute
UNIT_bbl_h	1373	bbl/h	barrel per hour
UNIT_bbl_d	1374	bbl/d	barrel per day
UNIT_mgal_s	1449	mgal/s	milli US gallon per second
UNIT_kgal_s	1450	kgal/s	kilo US gallon per second
UNIT_Mgal_s	1451	Mgal/s	mega US gallon per second
UNIT_mgal_m	1453	mgal/m	milli US gallon per minute

Unit	Unit code	Display	Description
UNIT_kgal_m	1454	kgal/m	kilo US gallon per minute
UNIT_Mgal_m	1455	Mgal/m	mega US gallon per minute
UNIT_mgal_h	1457	mgal/h	milli US gallon per hour
UNIT_kgal_h	1458	kgal/h	kilo US gallon per hour
UNIT_Mgal_h	1459	Mgal/h	mega US gallon per hour
UNIT_mgal_d	1461	mgal/d	milli US gallon per day
UNIT_kgal_d	1462	kgal/d	kilo US gallon per day
UNIT_Mgal_d	1463	Mgal/d	mega US gallon per day
UNIT_mImpGal_s	1464	mIpGa/s	milli imperial gallon per second
UNIT_kImpGal_s	1465	kIpGa/s	kilo imperial gallon per second
UNIT_MImpGal_s	1466	MIpGa/s	mega imperial gallon per second
UNIT_mImpGal_m	1468	mIpGa/m	milli imperial gallon per day
UNIT_kImpGal_m	1469	kIpGa/m	kilo imperial gallon per day
UNIT_MImpGal_m	1470	MIpGa/m	mega imperial gallon per day
UNIT_mImpGal_h	1472	mIpGa/h	milli imperial gallon per hour
UNIT_kImpGal_h	1473	kIpGa/h	kilo imperial gallon per hour
UNIT_MImpGal_h	1474	MIpGa/h	mega imperial gallon per hour
UNIT_mImpGal_d	1476	mIpGa/d	milli imperial gallon per day
UNIT_kImpGal_d	1477	kIpGa/d	kilo imperial gallon per day
UNIT_MImpGal_d	1478	MIpGa/d	mega imperial gallon per day
UNIT_Mbbl_s	1482	Mbbl/s	megabarrel per second
UNIT_Mbbl_m	1486	Mbbl/m	megabarrel per minute
UNIT_Mbbl_h	1490	Mbbl/h	megabarrel per hour
UNIT_Mbbl_d	1494	Mbbl/d	megabarrel per day
UNIT_mm3_s	1496	mm3/s	cubic millimeter per second
UNIT_km3_s	1497	km3/s	cubic kilometer per second
UNIT_Mm3_s	1498	Mm3/s	cubic megameter per second
UNIT_mm3_m	1500	mm3/m	cubic millimeter per minute
UNIT_km3_m	1501	km3/m	cubic kilometer per minute
UNIT_Mm3_m	1502	Mm3/m	cubic megameter per minute
UNIT_mm3_h	1504	mm3/h	cubic millimeter per hour
UNIT_km3_h	1505	km3/h	cubic kilometer per hour
UNIT_Mm3_h	1506	Mm3/h	cubic megameter per hour
UNIT_mm3_d	1508	mm3/d	cubic millimeter per day
UNIT_km3_d	1509	km3/d	cubic kilometer per day
UNIT_Mm3_d0	1510	Mm3/d	cubic megameter per day
UNIT_cm3_s	1511	cm3/s	cubic centimeter per second
UNIT_cm3_m	1512	cm3/m	cubic centimeter per minute
UNIT_cm3_h	1513	cm3/h	cubic centimeter per hour
UNIT_cm3_d	1514	cm3/d	cubic centimeter per day
UNIT_kL_m	1518	kL/m	kiloliter per minute
UNIT_kL_h	1519	kL/h	kiloliter per hour
UNIT_kL_d	1520	kL/d	kiloliter per day
UNIT_Nm3_s	1522	Nm3/s	Normal cubic meter per second
UNIT_Nm3_m	1523	Nm3/m	Normal cubic meter per minute
UNIT_Nm3_h	1524	Nm3/h	Normal cubic meter per hour
UNIT_Nm3_d	1525	Nm3/d	Normal cubic meter per day
UNIT_Sm3_s	1527	Sm3/s	Standard cubic meter per second
UNIT_Sm3_m	1528	Sm3/m	Standard cubic meter per minute
UNIT_Sm3_h	1529	Sm3/h	Standard cubic meter per hour
UNIT_Sm3_d	1530	Sm3/d	Standard cubic meter per day

Unit	Unit code	Display	Description
UNIT_NL_s	1532	NL/s	Normal liter per second
UNIT_NL_m	1533	NL/m	Normal liter per minute
UNIT_NL_h	1534	NL/h	Normal liter per hour
UNIT_NL_d	1535	NL/d	Normal liter per day
UNIT_SL_s	1537	SL/s	Standard liter per second
UNIT_SL_m	1538	SL/m	Standard liter per minute
UNIT_SL_h	1539	SL/h	Standard liter per hour
UNIT_SL_d	1540	SL/d	Standard liter per day
UNIT_mL_m	1589	mL/m	milliliters per minute
UNIT_ML_h	1617	ML/h	megaliter per hour
UNIT_ML_m	1618	ML/m	megaliter per minute
UNIT_kL_s	1619	kL/s	kiloliter per second
UNIT_kft3_d	1620	kft3/d	cubic kilofeet per day
UNIT_kCFH	1621	kCFH	cubic kilofeet per hour
UNIT_kCFM	1622	kCFM	cubic kilofeet per minute
UNIT_kCFS	1623	kCFS	cubic kilofeet per second
UNIT_mft3_d	1624	mft3/d	cubic millifeet per day
UNIT_mCFH	1625	mCFH	cubic millifeet per hour
UNIT_mCFM	1626	mCFM	cubic millifeet per minute
UNIT_mCFS	1627	mCFS	cubic millifeet per second
UNIT_kgal	1648	kgal	kilogallon
UNIT_kImpGal	1649	kImpGal	kilo-imperial gallon
UNIT_Mft3_d	1653	Mft3/d	cubic Megafeet per day
UNIT_Mm3_d1	1654	Mm3/d	cubic Megameters per day

6) Abnormality indication

If the Disp_TB went out of service (OOS) or a communication error occurred between the two CPUs of the positioner, these abnormalities will be indicated instead of the normal display.

- DSP_OOS

  If the Disp_TB went out of service, the following will be indicated.

Numerical value section	(Turned off)
Character string section	DSP_OOS

  Change the mode of Disp_TB to Auto to show the normal display.

- FF_DISCON (communication error between the two CPUs)

  If a communication error occurred between the two CPUs of the positioner, the following will be indicated.

Numerical value section	FF
Character string section	DISCON

  If FF_DISCON was displayed, contact your dealer.

7) Alarms

If an error or failure occurred, the following alarms will be indicated cyclically.

Table 3-5. Indicated alarms

FD_xxx_ACTIVE Bit	Units displayed	Description
0	Check	
1	FST Exe	Full Stroke Test is Executing
2	PST Exe	Partial Stroke Test is Executing
3	VsigExe	Valve Signature is Executing
4	SRT Exe	Step Response Test is Executing
5	AutoExe	Auto Calibration is Executing
6	SIM Exe	Simulation is Executing
7	LUT Act	Local User I/F Active
8	Not used	—
9	Not used	—
10	Not used	—
11	FST Alm	Full Stroke Test Alarm
12	PST Alm	Partial Stroke Test Alarm
13	VSD Alm	Valve Self-Diagnostics Alarm
14	VTD Alm	Valve Trend Diagnostics Alarm
15	Air Alm	Positioner Air Circuit Alarm
16		Failure Response is Executing
17	OP Alm	Operation Condition Alarm
18	DiagAlm	FF Standard Diagnostics Alarm
19	FV Alm	Final Value Alarm
20	WP Alm	Working Position Alarm
21	PspOutR	Pressure Supply Out of Range
22	TmpOutR	Temperature Out of Range
23	VTDOutR	VTD Angle Span Out of Range
24	PST Err	Failure of Scheduled PST
25	Exe Err	Internal Program Execution Error
26	Tmp Err	Temperature Sensor Failure
27	PsenErr	Pressure Sensor Failure
28	MBdFail	Main Board Failure
29	VTDFail	VTD Failure
30	CommErr	Main Board Communications Error
31	FBdFail	Fieldbus Board CPU Failure

3-2. Adjustment before Operation

Perform auto setup before using the device. Then, adjust the zero span if necessary.

The zero span adjustment function in the device electrically sets the fully closed and fully open positions of the valve independently of each other. Therefore, you can adjust each of these positions without interfering with the other one.

3-2-1. Auto Setup

There are two auto setup methods.

- Method using the LUI
- Method through Fieldbus communication

This section describes the method using the LUI. For the method through Fieldbus communication and the details of auto setup, refer to Chapter 4.

⚠ CAUTION

It is dangerous during auto setup because the fully closed valve moves to fully open. Be prepared in advance to prevent injury and effects on the process when the valve moves.

Handling Precautions:

- Please confirm proper supply air is supplied to the device before the Auto setup operation.
- If any of the self-diagnostic messages shown in Table 4-4 in 4-3-1, "Diagnostic Messages" appears, auto setup cannot be executed.
- When auto setup and zero span adjustment are complete, change the input signal and be sure to check valve operations such as opening and shutoff.
- Before the Auto setup operation, set the position of the Actuator Type and the Valve Close Position correctly.
- In some cases, the dynamic characteristic is not set correctly with the actuator capacity, operation stroke, inner diameter of pneumatic piping and piping length. If this occurs, refer to "4-2-4 Control Configuration" and adjust the dynamic characteristic manually.
- When the actuator size is Custom, the size is not changed with the Auto setup. When selecting the actuator size with the Auto setup, set the size as below.
  - PARAM 1 to 6 or PARAM A to C.
- In some cases, the initial setting is not same even though the actuator and valve size is same. Please perform the operation check and configuration of the device if necessary.
- There is a possibility that the forced open value described on page "4-2-6 Final Value Cutoff" may change after performing the Auto-setup operation. Please reconfigure the forced open value if necessary.
- If the booster relay is on, and is operating the Auto-setup function, there might be a possibility of hunting. In this case, adjust the booster's sensitivity, or refer to "4-2-4 Control Configuration" and adjust the dynamic characteristic manually.
- If a speed controller is incorporated, set it to full open and execute auto-setup. Afterwards, adjust the speed with the speed controller.

- When the device is purchased separately, its initial settings are set to those in the list of default values in "Appendix C Parameter List" of this manual. Because the default actuator direction is reverse, if you mount the device on the direct actuator the device will not work. Please be sure to execute the auto setup program before operation and be sure that appropriate settings are created in the device.

The Actuator Type is set to Linear and the Valve Closed Position is set to DOWN when the valve is fully closed at the time of shipment unless there are other shipment setup instructions. If there are shipment setup instructions, check the settings at the time of shipment. Configure settings as needed.

If auto setup fails, refer to 5-1-5, "Auto Setup Failure."

Once auto setup starts, the valve, which is initially fully closed, is fully opened and fully closed. Then, it is opened to between 20% and 25% and between 80% and 85%.

After auto setup, the valve moves to the opening appropriate to the input signal.

Check the Actuator Type and Valve Closed Position before starting auto setup.

- Actuator Type

  Linear (standard): Direct-acting actuator

  Rotary/90°: When the distance between the feedback lever of the rotary actuator (90°) and the pin is longer than the distance from the valve shaft

  Rotary/Other: When the distance between the feedback lever of the rotary actuator (around 60°) and the pin is longer than the distance from the valve shaft

  Rotary (sub)/90°: When the distance between the feedback lever of the rotary actuator (90°) and the pin is shorter than the distance from the valve shaft

  Rotary (sub)/Other: When the distance between the feedback lever of the rotary actuator (around 60°) and the pin is shorter than the distance from the valve shaft

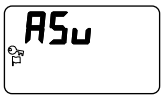
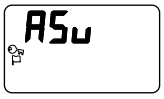
- Valve Closed Position

  DOWN (standard)

  UP

(For more information on setup from the LUI, refer to "Procedure for specifying Actuator Type and Valve Closed Position" in this chapter. For more information on setup from the FOUNDATION Fieldbus, refer to Chapter 4.)

(1) Procedure for performing auto setup

Step	Description	LUI display
1	Loosen two (2.5-mm) hexagonal socket bolts and remove the front cover. (A sample initial setup status of the LUI screen is shown.)	
2	Hold down the MODE button to start the setup mode. To change Actuator Type or Valve Closed Position, refer to step (3).	
3	Press the ENT button once and check that the screen on the right is displayed. Then, hold down the ENT button again to perform auto setup. To display the opening and pressure during execution, use the ENT button.	 
4	The valve, which is initially fully closed, is fully opened and fully closed again. Then, it is opened to between 20% and 25% and between 80% and 85%. After the valve operation ends, the LUI screen changes and the opening appropriate to the input signal is set.	
5	When you press the ENT button, the initial screen of the auto setup is displayed again.	

The “FAIL” signs in the auto setup operation are as follows.

FAIL00: The auto seuup is failed (The valve does not move, etc.).

FAIL01: The input signal is low level.

FAIL02: A function except for the auto setup is in operation.

FAIL90: The auto setup is forcibly shut down. (Auto setup was stopped from the LUI.)

For countermeasures for these problems, refer to 5-1-5, “Auto Setup Failure.”

(2) Procedure for aborting auto setup

Step	Description	LUI display
1	To abort auto setup during execution, press the button.	
2	Holding down the ENT button aborts the execution. If auto setup is aborted, data is not saved.	
3	When you press the ENT button, the initial screen of the auto setup is displayed again.	

(3) Procedure for specifying Actuator Type and Valve Closed Position

Step	Description	LUI display
1	Start the setup mode and display the screen on the right by repeatedly pressing the ▲ and ▼ button.	
2	Press the ENT button.	
3	Select an appropriate actuator type with the ▲ and ▼ buttons and press the ENT button. (The figure to the right shows an example of when LINEAR is selected.)	
4	Select an appropriate feedback lever position when the valve is fully closed with the ▲ and ▼ buttons and hold down the ENT button to set that position.	
5	The specified actuator type and feedback lever position when the valve is fully closed are displayed. Check the settings.	
6	Go back to the desired menu with the ▲ and ▼ buttons.	

3-2-2. Zero Span Adjustment

After auto setup, check the 0% and 100% positions. If adjustment is required, adjust the zero span.

! Handling Precautions:

- If you adjust the span after auto setup, the forced fully opening value is automatically changed to the value calculated by subtracting 1% from the overstroke percentage.

⚠ CAUTION

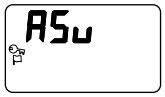
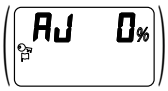
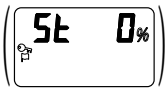
Then zero span adjustment is dangerous because of valve action. Take measures in advance to prevent injury to personnel and effects on the process in case the valve operates.

The following two zero span adjustment methods are available.

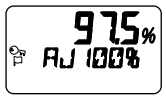
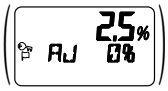
- Method using the LUI
- Method using Fieldbus communication (This method is further broken down into the following four methods.)
  - Auto Travel Calibration
  - Angle Correction
  - Manual Setting
  - Change Travel Angle

This section describes the method using the LUI. For the method using Fieldbus communication, refer to Chapter 4.

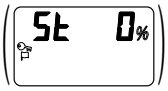
(1) Procedure for adjusting the zero span

Step	Description	LUI display
1	Set Target for MODE_BLK to MAN (Manual) in the Positioner Transducer Block and specify the desired opening value (0% or 100%) in FINAL_VALUE. Then, set Target for MODE_BLK to OOS(Out of service).	
2	Loosen two (2.5-mm) hexagonal socket bolts and remove the front cover.	
3	Hold down the MODE button to start the setup mode.	
4	Press the button to display the screen shown on the right (ADJ).	
5	Press the ENT button, select whether to adjust the angle for 100% or 0% opening with the and buttons, and press the ENT button. (Refer to "(2) Procedure for adjusting the angle.") To manually adjust each opening rather than using the opening adjustment function, select manual adjustment for 100% opening (0% opening) with the and buttons and press the ENT button. (Refer to "(3) Procedure for manual adjustment.")	 100% opening angle adjustment  (0% opening angle adjustment)  100% opening manual adjustment  (0% opening manual adjustment)

(2) Procedure for adjusting the angle

Step	Description	LUI display
1	Select the angle (COARSE, MID, FINE) for 100% opening adjustment (0% opening adjustment) with the ▲ and ▼ buttons and press the ENT button. COARSE: Angle 1° MID: Angle 0.1° FINE: Angle 0.01°	 
2	Adjust the angle by pressing the ▲ button to increase the opening and pressing the ▼ button to decrease the opening.	 
3	Pressing the ENT button displays the current opening and output air pressure (Pout 1). Check that the angle is properly adjusted. If further adjustment is required, go back to the adjustment screen with the MODE button.	 

(3) Procedure for manual adjustment

Step	Description	LUI display
1	Manually specify the desired position for 100% opening (0% opening).	 
2	Press the ENT button.	 
3	Check that the desired position is selected and then hold down the → button. This adjusts the 100% opening (0% opening).	 

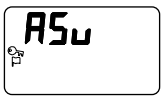
3-2-3. Supply Bypass

Supply bypass allows the valve to be fully closed and opened and enables operation with the solenoid valve. (For double-acting actuators, the valve can only be fully opened or closed.)

⚠ CAUTION

When the supply bypass operates, it is dangerous because the valve moves. Be prepared in advance to prevent injury and effects on the process when the valve moves.

(1) Procedure for supply bypass

Step	Description	LUI display
1	Loosen two (2.5-mm) hexagonal socket bolts and remove the front cover.	
2	Make a long press of the MODE button to start setup mode.	
3	Press the button to display the screen shown on the right.	
4	Press the ENT button to go to the screen shown on the right. To set the output air pressure to 0, hold down the ENT button. (If the output air pressure is already 0 or it is set to the supply air pressure at the supply bypass, go to the screen of step 7 where the supply bypass can be operated.)	
5	To change the output air pressure to the supply air pressure, press the button to display the screen on the right and hold down the ENT button.	
6	If supply bypass conditions are satisfied, the screen shows that each bypass operates.	 
7	To clear supply bypass operations, press the button to display the screen shown on the right.	
8	Holding down the ENT button clears the supply bypass.	

The “FAIL” signs in the supply bypass operation are as follows.

FAIL01: The input signal is low level.

FAIL02: A function except for the supply bypass is in operation.

FAIL90: The auto setup is forcibly shut down.

3-2-4. Control Parameters

Control parameters are determined by Actuator Size (PARAM 1 to 6, A, B, C) and Friction Level (Light (L), Medium (M), Heavy (H)).

Table 3-6. Actuator Size

Actuator Size	Operating speed [s]	Typical actuator model	Actuator capacity (Typical value) [cm³]
PARAM C	Up to 0.25	—	200
PARAM B	Up to 0.35	—	300
PARAM A	Up to 0.45	—	400
PARAM 1	Up to 0.85	PSA1, PSK1	600
PARAM 2	Up to 2.0	PSA2, HA2	1400
PARAM 3	Up to 6.5	PSA3, HA3	2700
PARAM 4	Up to 8.15	PSA4, HA4	6600
PARAM 5	Up to 12	PSA6	8100
PARAM 6	Up to 99	VA5	25300
Custom	—	—	Individually set*

** Consult with one of our service representatives.*

Table 3-7. Friction Level

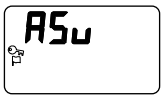
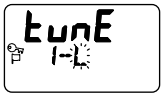
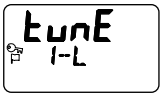
Friction Level*	Example of gland packing material
HEAVY	Graphite packing type
MEDIUM	Yarn packing type
LIGHT	V-type PTFE packing type

** This value differs depending on the friction of the gland packing rather than the material.*

⚠ CAUTION

It is dangerous because the valve moves when control parameters are changed. It is dangerous because the valve moves when the control parameters keep in nonoperational condition for 10 minutes. Be prepared in advance to prevent injury and effects on the process when the valve moves.

(1) Procedure for specifying control parameters

Step	Description	LUI display
1	Loosen two (2.5-mm) hexagonal socket bolts and remove the front cover.	
2	Hold down the MODE button to start the setup mode.	
3	Press the button to display the screen shown on the right (tune).	
4	Press the ENT button to display the screen on the right and select PARAM 1 to 6, A, B, or C for Actuator Size by operating the button, and press the ENT button.	
5	Select L (Light), M (Medium), or H (Heavy) for Friction Level and set it by holding down the ENT button. To return the setting to its original value, reset the value with MODE before holding down the ENT button.	
6	Check the specification result when it is displayed.	

3-3. Starting Operation

3-3-1. Checking Fieldbus Operation

Check the operation of the device in combination with Fieldbus.

It is necessary to input the DD (device description) file and the CF (capability) file for the device in the host before operating Fieldbus. The DD and CF files can be downloaded from the official Website of Fieldbus Foundation. It is necessary to configure the following settings in the host to operate Fieldbus. Configure the following settings and check that PD_TAG and NODE_ADRS can be set.

1) Specification of LAS (Link Active Scheduler) network parameters

Turn on the Fieldbus power supply and check that the voltage between the FB+ and FB– terminals is between 9 V and 32 V.

Symbol	Parameter name	Description and setting value
V (ST)	Slot time	Specify 5 or a larger value.
V (MID)	Minimum gap between frames	Specify 10 or a larger value.
V (MRD)	Maximum response delay time	Specify a value such that the product of V (MRD) and V (ST) is 20 or larger.
V (FUN)	First unpoled node number	Specify the value next to the address used by the host. Specify 12 or a larger value in hexadecimal format.
V (NUN)	Number of unpoled nodes	Unused address range. Specify the value calculated by subtracting the V (FUN) value from the minimum address of the field device that uses an address.

2) PD_TAG (Physical DeviceTAG), address check

Symbol	Parameter name	Setting value	Data at shipment
PD_TAG	Physical device tag	Up to 32 ASCII characters	32 spaces if there is no specification.
NODE_ADRS	Node address	Specify F7 or a smaller hexadecimal value that represents the minimum address for the BASIC device.	F8 in hexadecimal format

The same address as other devices cannot be specified for NODE_ADRS. (If the same address is specified, it is changed to the default address (0xF8 to 0xFB).)

Specify a different address for each device.

3-3-2. Preoperation Check

Check the following points before starting operation.

- The device is properly installed and the feedback lever, feedback pin and other parts are not damaged or fractured.
- The pneumatic piping is completely connected and an appropriate supply air pressure is supplied. (Air is not leaking.)
- The Fieldbus power supply is applied.

1) Procedure for checking the device operation

The procedure for checking the device operation is shown below.

Step	Description
1	Change the input signal from Fieldbus and check that the opening of the control valve changes according to the specified characteristics. If operation is not normal, refer to “Chapter 5 Troubleshooting.”
2	After confirming normal operation, tightly secure the terminal cover.

Chapter 4. Operations Using Fieldbus Communication

This chapter describes the operations performed using Fieldbus communication.

For the basic operations, the relationship between the mode and data settings, the specification and modification of data, how to save each type of data, and other descriptions, refer to this chapter.

4-1. Fieldbus Communication Menus

One of the following four types of Fieldbus communication menu structures is available depending on the host to be used.

This section describes the device menu for communicator.

- Device menu for the communicator

  Displays the parameters for setup, adjustment, and other operations of the positioner.

  This menu can be displayed in the host that supports the device menu. (Example: 475 communicator from EMERSON)

- Block menu for the communicator

  This is the menu for each block in the communicator that can perform Fieldbus communication and displays the parameters for setup, adjustment, and other operations of the positioner. (Example: 475 communicator from EMERSON)

- Block menu for PC

  This is the menu for each block in the host (PC) that can display the block menu and displays the parameters for setup, adjustment, and other operations of the positioner. (Example: Device Management System, InnovativeField Organizer, from Azbil)

- Parameter list

  The parameter list displays all the parameters by block.

  The parameter lists for the Positioner Transducer Block, Resource Block, and Display Transducer Block are provided in Appendix C.

4-2. Setup and Adjustment of Device

Set up and adjust the functions required for the device to operate properly.

To change settings, perform adjustment, or operate the control valve in simulation mode in the Transducer Block in the positioner, it is necessary to change Target for MODE_BLK from the host.

To change settings or make adjustments, set Target for MODE_BLK to OOS (Out of Service).

To operate the control valve in simulation mode, set Target for MODE_BLK to MAN (Manual).

After changing the settings, making adjustments, or operating the control valve in simulation mode, return Target for MODE_BLK to AUTO.

! Handling Precautions:

Target for MODE_BLK cannot be changed from OOS (Out of service) while you are making adjustments or changing settings with the LUI. Change the setting after operating the LUI.

4-2-1. Process Variables

The measurement value data present when the device is operating can be viewed.

You can view the following items by selecting [Process Variables].

Table 4-1. Description of Each Part

Item		Description
Final Value	Status	Displays the status (Status) and value (Value) of input signals to the device.
	Value	
Working Setpoint	Status	Displays the status (Status) and value (Value) after the characteristic transduction of input signals (Final Valve).
	Value	
Working Position	Status	Displays the status (Status) and value (Value) of the opening feedback value of the control valve
	Value	
Final Position Value	Status	Displays the status (Status) and value (Value) after the reverse characteristic transduction of opening (Working Position).
	Value	
Drive Signal		Control output value (current value that flows through the coil in the electropneumatic transduction section).
Pressure Port A		Output air pressure (OUT1) value.
Pressure Port B		Output air pressure (OUT2) value.
Pressure Supply		Supply air pressure (SUP) value.
Pressure Nozzle		Nozzle back pressure (Pn) value.
Internal Temperature		Temperature in the device.
VTD Temperature		Temperature in the opening detection section.

4-2-2. Auto Setup

Auto setup is a function that automatically performs basic adjustments and setup after the device is assembled onto the actuator.

Select [Device]→[Basic Setup]→[Auto Setup].

⚠ CAUTION

It is dangerous during auto setup because the fully closed valve moves to fully open. Be prepared in advance to prevent injury and effects on the process when the valve moves.

Handling Precautions:

- Check that an appropriate supply air pressure is supplied to the device before starting auto setup.
- If any of the self-diagnostic messages shown in Table 4-4 in 4-3-1, “Diagnostic Messages” appears, auto setup cannot be executed.
- When auto setup and zero span adjustment are complete, change the input signal and be sure to check valve operations such as opening and shutoff.
- Before the Auto setup operation, set the actuator type and feedback lever position when fully closed correctly.
- In some cases, the dynamic characteristic is not set correctly with the actuator capacity, operation stroke, inner diameter of pneumatic piping and piping length. If this occurs, refer to “4-2-4 Control Configuration” and adjust the dynamic characteristic manually.
- When the actuator size is Custom, the size is not changed with the Auto setup. When selecting the actuator size with the Auto setup, set the size as below.
  - PARAM 1 to 6 or PARAM A to C.

- In some cases, the initial setting is not same even though the actuator and valve size is same. Please perform the operation check and configuration of the device if necessary.
- There is a possibility that the forced open value described on page “4-2-6 Final Value Cutoff” may change after performing the Auto-setup operation. Please re-configure the forced open value if necessary.
- If the booster relay is on, and is operating the Auto-setup function, there might be a possibility of hunting. In this case, adjust the booster's sensitivity, or refer to “4-2-4 Control Configuration” and adjust the dynamic characteristic manually.
- If a speed controller is incorporated, set it to full open and execute auto-setup. Afterwards, adjust the speed with the speed controller.
- When the device is purchased separately, its initial settings are set to those in the list of default values in “Appendix C Parameter List” of this manual. Because the default actuator direction’ is reverse, if you mount the device on the direct actuator the device will not work. Please be sure to execute the auto setup program before operation and be sure that appropriate settings are created in the device.

Check the Actuator Type and the Valve Close Position before starting auto setup.

The Actuator Type is set to Linear and the Valve Close Position is set to Down when the valve is fully closed at the time of shipment unless there are other shipment setup instructions. If factory setting (initial setup) is requested, check the settings.

If auto setup fails, refer to 5-1-5, “Auto Setup Failure.”

Once auto setup starts, the valve, which is initially fully closed, is fully opened and fully closed. Then, it is opened to between 20% and 25% and between 80% and 85%.

After auto setup, the valve moves to the opening appropriate to the input signal.

The following items are automatically adjusted and set during auto setup.

(1) Zero span adjustment

The zero point is set to the travel when the valve is fully closed. The span point (100 % travel) is set in such a way that the travel when the valve is fully opened is Travel Cutoff High + 1 %. (If Travel Cutoff High is 99 %, the fully opened position is the span point.) If the span is adjusted after auto setup, Travel Cutoff High will be automatically changed and saved.

(2) Specification of Actuator Size

Select the actuator size from among PARAM 1 to 6, PARAM A, B, and C.

(3) Specification of Friction Level

Select the friction level of the gland packing from among LIGHT, MEDIUM, and HEAVY.

(4) Specification of Feedback Lever Motion

Specify UP or DOWN as the operation of the feedback lever when output air pressure OUT1 increases.

(5) Specification of Positioner Action

The positioner operation is forward operation (Direct) if the output air pressure at power-off is 0.

The positioner operation is reverse operation (Reverse) if the output air pressure at power-off is the supply air pressure.

(6) Specification of Pilot Relay Type

Select Single Acting or Double Acting as the operation of the actuator.

4-2-3. Valve System

Specify the operation of the control valve (actuator and valve) and the positioner.

Select [Device]→[Configuration]→[Positioner Configuration]→[Valve System].

⚠ CAUTION

It is dangerous because the valve moves when the settings are changed. Be prepared in advance to prevent injury and effects on the process when the valve moves.

- Actuator Type

  Select the linear valve (Linear), rotary valve (Rotary), or other rotary valve (Rotary Sub).

  When selecting the rotary valve, select 90° or 60° as the rotation angle (Rotary Angle).

- Valve Closed Position

  Specify the upper position (Feedback Lever Up) or the lower position (Feedback Lever Down) of the feedback lever as viewed from the front when the valve is not open.

- Feedback Lever Motion

  Specify up (Up when Po 1 Increase) or down (Down when Po 1 Increase) for the direction of the feedback lever operation as viewed from the front when the output air pressure (OUT1) increases. (This item is automatically set during auto setup.)

- Pilot Relay Type

  Pilot Relay Type (Single Acting or Double Acting) is indicated. The type is automatically determined by auto setup.

- Positioner Action

  Indicates whether the output air pressure (OUT1) is set to zero (direct) or to supply pressure (reverse) when the power is off. This setting is automatically determined by auto setup, and cannot be changed manually.

Handling Precautions:

The positioner operation direction is determined by the hardware of the main unit. This function cannot be used to switch the operation direction. If you want to switch the operation direction, contact one of our service representatives.

- Electrical Fail To

  Open or Closed is automatically set as the fail safe direction when the electrical signal is “Disconnected” based on the settings for Valve Closed Position, Feedback Lever Motion, and Positioner Action.

- Air Fail To

  Open or Closed is automatically set as the fail safe direction when the supply air pressure is “Disconnected” based on the settings for Valve Closed Position and Feedback Lever Motion.

  This item is not displayed when Pilot Relay Type is Double Acting.

4-2-4. Control Configuration

Control parameters are PID operation parameters for controlling the control valve and are selected based on Actuator Size and Friction Level.

Select [Device]→[Configuration]→[Positioner Configuration]→[Control Configuration].

- Actuator Size

  Specify PARAM 1 to 6 or PARAM A to C depending on the operation speed and capacity of the actuator.
  To specify every PID operation parameter, select Custom. (For details, consult with one of our service representatives.)

Table 4-2. Actuator Size

Actuator Size	Operating speed [s]	Typical actuator model	Actuator capacity (Typical value) [cm³]
PARAM C	Up to 0.25	—	200
PARAM B	Up to 0.35	—	300
PARAM A	Up to 0.45	—	400
PARAM 1	Up to 0.85	PSA1, PSK1	600
PARAM 2	Up to 2.0	PSA2, HA2	1400
PARAM 3	Up to 6.5	PSA3, HA3	2700
PARAM 4	Up to 8.15	PSA4, HA4	6600
PARAM 5	Up to 12	PSA6	8100
PARAM 6	Up to 99	VA5	25300

- Friction Level

  Select Heavy, Medium, or Light depending on the gland packing. (It is not necessary to specify this item when Custom is selected for Actuator Size.)

Table 4-3. Friction Level

Friction Level*	Example of gland packing material
HEAVY	Graphite packing type
MEDIUM	Yarn packing type
LIGHT	V-type PTFE packing type

** This value differs depending on the friction of the gland packing rather than the material.*

- Position Deadband

  Specify the deadband. Although deadband may be effective in preventing hunting, when the friction of the gland packing is especially large, for example, we recommend keeping this value within 1%.

- Replace Control Parameters

  Replace the PID parameters selected in Actuator Size and Friction Level with the values in Control Parameters.

- Control Parameters

  When Actuator Size is Custom, each PID must be specified individually.

  The control algorithm employs dual GAP PID control, which switches PID parameters between three levels depending on the control deviation size. There are 11 parameters as shown below. Set a value larger than the dual width to the gap width. The integration operation is disabled when 9999 is set as the value of the integral.

P Outside of Gap:	Proportional gain outside the gap width (1/%)
I Outside of Gap:	Integral time outside the gap width (s)
D Outside of Gap:	Differential time outside the gap width (s)
Gap Band:	Gap width (±%)
P Inside Gap:	Proportional gain within the gap width (1/%)
I Inside Gap:	Integral time within the gap width (s)
D Inside Gap:	Differential time within the gap width (s)
Dual Gap Band:	Dual gap width (±%)
P Inside of Dual Gap:	Proportional gain within the dual gap width (1/%)
I Inside of Dual Gap:	Integral time within the dual gap width (s)
D Inside of Dual Gap:	Differential time within the dual gap width (s)

4-2-5. Characterization

Specify the flow amount characteristic.

Select [Device]→[Configuration]→[Positioner Configuration]→[Characterization].

- Characterization

  Select Linear, Equal Percent, Quick Open, or Custom Curve.

  The concept of each characteristic is shown below.

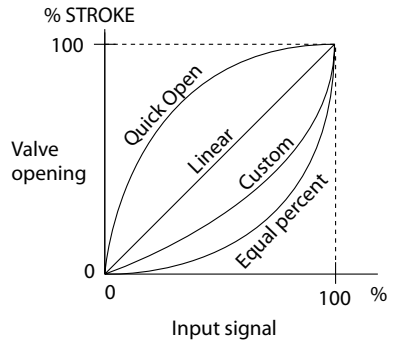


Figure 4-1. Concept of Flow Amount Characteristics

- Custom Curve Data

  When selecting Custom Curve, individually specify the input signal (Custom Data X1 to 21) and the opening (Custom Data Y1 to 21) to specify a polygonal line consisting of 21 points.

! Handling Precautions:

- Specify values such that both Custom Data X and Custom Data Y monotonically increase.
- The setting range is between 0% and 100%. The linear characteristic is set from both edges outside this range.

4-2-6. Final Value Cutoff

Specify the input signal (%) to forcibly fully open or close the valve. The valve is fully closed when the input signal is less than or equal to the forced fully closed value. The valve is fully opened when the input signal is greater than or equal to the forced fully open value. These values can be independently specified.

Select [Device]→[Configuration]→[Positioner Configuration]→[Final Value Cutoff] to specify the forced fully closed value (Final Valve Cutoff Low) and forced fully open value (Final Valve Cutoff High).

The concept of input/output characteristics when the forced fully open and closed values are specified is shown below.

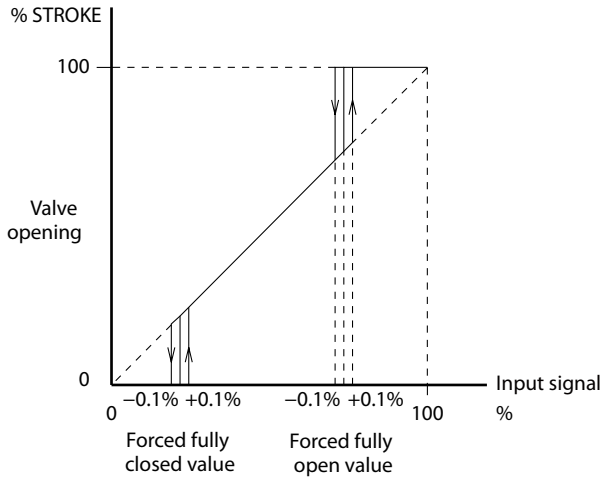


Figure 4-2. Forced Fully Open and Closed Values

! Handling Precautions:

- Specify values such that the forced fully closed value is smaller than the forced fully open value. If the forced fully closed value is equal to the forced fully open value, the valve performs the ON/OFF operation.
- The settable range is between −200% and +50% for the forced fully closed value and between 50% and 200% for the forced fully open value.
- If you adjust the span after auto setup, the forced fully open value is automatically changed to the value calculated by subtracting 1% from the overstroke percentage.
- The forced fully closed and open values each have a hysteresis difference of 0.1%.
- When the valve is forced fully closed (open), Working Setpoint shows the value for the fully closed (open) status.

4-2-7. Units

Specify the units for pressure.

Select [Device]→[Configuration]→[Positioner Configuration]→[Units].

Initial setting of SI system unit and non-SI system unit is as follows. You can not change the initial setting.

If the non-SI system unit is needed, order kg/cm² or psi at the time of purchase.

- SI system: kPa, MPa, Bar
- Non-SI system: kPa, MPa, Bar, kg/cm², PSI

This unit setting is invalid in the LUI display. Only the kPa is valid in the LUI display.

4-2-8. Travel Calibration

Adjust zero and span of valve opening.

Select [Device]→[Maintenance]→[Travel Calibration].

The following four types of zero span adjustment methods are available.

(1) Auto Travel Calibration

(2) Angle Correction

(3) Manual Setting

(4) Change Travel Angle

Handling Precautions:

If you adjust the span after auto setup, the forced fully open value is changed to the value calculated by subtracting 1% from the overstroke percentage.

(1) Auto Travel Calibration

⚠ CAUTION

It is dangerous during automatic opening adjustment because the fully opened valve moves to fully closed. Be prepared in advance to prevent injury and effects on the process when the valve moves.

When you select [Device]→[Maintenance]→[Travel Calibration]→[Auto Travel Calibration], the valve, which is initially fully closed, is fully opened and then fully closed, and the zero point and span point are automatically set.

Handling Precautions:

- If any of the self-diagnostic messages shown in Table 4-4 in 4-3-1, "Diagnostic Messages" appears, auto setup cannot be executed.
- After device operation is performed, make sure Travel Cutoff of the valve with changing input signals.

(2) Angle Correction

Adjust the angles of the zero and span points.

Select [Device]→[Maintenance]→[Travel Calibration]→[Angle Correction].

- 0% Travel

  Set 0% to Final Valve.

  Set a value less than 0% to Final Value Lo Cutoff, select the angle increment and decrement values, and adjust the zero point. (To increase the value by 0.01°, select Increment/0.01.)

  After adjustment, return Final Value Lo Cutoff to the original value.

- 100% Travel

  Set 100% to Final Valve.

  If Final Value Hi Cutoff is less than 100%, set a value larger than 100%, select the angle increment and decrement values, and adjust the span point. After adjustment, return Final Value Hi Cutoff to its original value.

Handling Precautions:

If the angle after adjustment changes by more than ±30°, the operation is disabled.

(3) Manual Setting

Manually fix the 0% or 100% opening and set the zero and span points.

Select [Device]→[Maintenance]→[Travel Calibration]→[Manual Setting].

- 0% Travel

  Move the valve to the 0% opening position by operating the input signal, actuator pressure, manual handle, or other factor and set the zero point.

- 100% Travel

  Move the valve to the 100% opening position by operating the input signal, actuator pressure, manual handle, or other factor and set the span point.

! Handling Precautions:

If the angle after adjustment changes by more than ±30°, the operation is disabled.

(4) Change Travel Angle

Set the angles of 0% opening and 100% opening.

The angle is 0° when the feedback lever is horizontal. The angle is negative if the lever is lower than the horizontal position. The angle is positive if the lever is higher than the horizontal position.

Select [Device]→[Maintenance]→[Travel Calibration]→[Change Travel Angle].

- 0% Travel

  Set the angle of the 0% opening position.

- 100% Travel

  Set the angle of the 100% opening position.

! Handling Precautions:

Specify an angle within ±30°. Accuracy is guaranteed between ±4° and ±20°.

4-2-9. Pressure Sensor Adjustment

Adjust the zero point of the pressure sensor.

Select [Device]→[Maintenance]→[Pressure Sensor Adjustment].

Shut off the supply air pressure before zero adjustment.

4-2-10. Simulation

The following two operations can be changed.

(1) Final Value

Specify the pseudo input signal (0 to 100%) and operate the valve.

Select [Device]→[Maintenance]→[Simulation]→[Final Value].

(2) Drive Signal

Specify the pseudo EPM drive signal (0 to 100%). Regardless of the actual input signal and travel, the desired EPM drive signal can be output from the device.

Select [Device]→[Maintenance]→[Simulation]→[Drive Signal].

4-2-11. Test

The two types of tests are Partial Stroke Tests and Full Stroke Tests.

Set VST_MODE to either PST or FST to perform PST or FST.

(1) Partial Stroke Test

Configure the settings for the partial stroke test.

Select [Device]→[Valve Stroke Test]→[Partial Stroke Test].

- PST Initial Travel
  Specify the opening during normal operation.
- PST Target Travel
  Target opening for the test
- PST Pause Time
  Wait time after the opening reaches the setting value This setting also applies to the FST.
- PST Ramp Rate
  Specify the speed at which the opening setting value changes for every second.
- Set PST Schedule
  First execution date/time
- PST Next Execute Time
  Time to next execution
- PST Interval
  Test execution period
- PST Breakout Timeout
  Timeout time before the opening change is detected
- PST Stroke Travel Timeout
  Timeout time before the opening reaches the setting value
- PST Pressure Threshold
  Threshold value for abnormal pressure evaluation
- PST Alarm Enabled
  Whether to allow the PST alarm to be issued
- PST Stick-Slip Threshold
  Y/X threshold values for stick-slip during execution
- PST Stick-Slip Alarm Enabled
  Whether to allow the stick-slip generation alarm to be issued during execution
- Execute PST
  Executes the PST.
- Abort PST
  Aborts the PST.

(2) Full Stroke Test

Configure settings for the fully close/fully open operation test.

Select [Device]→[Maintenance]→[Full Stroke Test].

- FST Enabled
  Enables or disables the FST start command.
- FST Pause Time
  Wait time after the opening reaches the setting value. This setting also applies to the PST
- FST Ramp Rate
  Speed at which the opening setting value changes
- FST Breakout Timeout
  Timeout time before the opening change is detected
- FST Stroke Travel Timeout
  Timeout time before the opening reaches the setting value
- FST Completion Timeout
  Timeout time before the test ends
- FST Pressure Threshold
  Threshold value for abnormal pressure evaluation
- Execute FST
  Executes the FST.

4-2-12. Restore factory settings

The initial data before shipping from the factory has the setting data and the calibration data.

You can restore the data respectively.

1) Restoring of Setting Data

Select [Device]→[Maintenance]→[Restart]→[Restores factory default blocks].

2) Restoring of Calibration Data

Select [Device]→[Maintenance]→[Restart]→[Resets transducer block factory calibration].

(It may be necessary to restart the communication tool after restoring the factory data.)

! Handling Precautions:

This operation does not change the Fieldbus communication settings such as Device Tag and Long Tag, diagnostics-related settings, and history information.

4-2-13. Operator Action Records

Save the history of setting modification operations.

The operation item, operation method, and time of the last 10 modifications are saved.

Simulation operations are not saved.

Select [Device]→[Operator Action Records].

4-2-14. Device Information

Select [Device]→[Device Information].

The following setting information can be viewed and changed.

Item	Description
Manufacturer Id	Manufacturer ID
Device Type	Device type
ITK Version	ITK version.
Device Revision	Device revision
DD Revision	DD revision
Hardware Revision	Hardware revision
Software Revision	Software revision
Capability Level	
Positioner Software Revision	Positioner software revision
Positioner Model Number	Positioner model number
Positioner Serial Number	Serial number of positioner
VTD Sensor Serial Number	Serial number of angle sensor
Pressure Sensor Serial Number	Serial number of pressure sensor
Operating Time	Operating time
Actuator Manufacturer Id	Actuator manufacturer ID
Actuator Model Number	Actuator model number
Actuator Serial Number	Serial number of actuator
Valve Manufacturer Id	Valve manufacturer ID
Valve Model Number	Valve model number
Valve Serial Number	Serial number of valve
Valve Type	Valve type
Write Lock	Write protection

4-2-15. FF Option

Select [Device]→[Configuration]→[FF Option].

The following items can be specified.

Item	Description
Readback Select	Select WORKING_POS or FINAL_POSITION_VALUE as the opening feedback value. 0: Final Position Value 1: Working Position Value
Positioner OOS Options	Operation when the Positioner TB is OOS (Out of Service). This item is fixed to 0:Hold Last Value in the device.
PSNR Fault State Option	Select the operation for when there is an abnormal status from among the following options: 0: Hold Last Value 1: Fail Closed 2: Fail Open 3: PSNR_FSTATE_VAL
PSNR Fault State	Final output value in the abnormal status when PSNR_FSTATE_OPT is set to 3:PSNR_FSTATE_VAL.
Signal Action	Operation direction of actuator when FINAL_VALUE increases as a result of specification by the user. 0: Increase to Open 1: Increase to Close

! Handling Precautions:

If you want to set Signal Action to Increase to close, contact us.

4-3. Diagnostic Messages

The device has a self-diagnostic function.

Select [Diagnostics]→[Diagnostics Status]→[Positioner Diagnostic Status].

4-3-1. Self-Diagnostic Messages

	English
Failure	Valve Travel Detector Failure
	Valve Travel Detector Out of Range
	CPU Failure
	RAM Failure
	ROM Failure
	A/D Conversion Module 1 Failure
	A/D Conversion Module 2 Failure
	Non-Volatile Memory Failure
	Po 1 Pressure Sensor Failure
	Po 2 Pressure Sensor Failure
	Ps Pressure Sensor Failure
	Pn Pressure Sensor Failure
	Temperature Sensor Failure
	Internal Program Execution Error
Function Check	In Use by Local User I/F
	Auto Setup is running
	Auto Travel Calibration is running
	Step Responce Test is running
	Valve Signature is running
	Partial Stroke Test is running
	Full Stroke Test is running
Out of Specification	VTD Angle Span Out of Range
	Temperature Out of Range
	Supply Pressure Out of Range
	VTD Temperature Out of Range
Maintenance Required	Restriction is clogged*
	Deposits on the Nozzle-Flapper*
Information	Travel Cutoff High
	Travel Cutoff Low
	Factory Settings Restored
	In Use by an Operator
	Local User I/F Abnormal
	Local User I/F was used in past 10 min.

* *This message can be enabled or disabled by changing the setting of [Diagnostics] → [Diagnostic Setup] → [Positioner Air Circuit] → [Positioner Air Circuit Alarm Enabled]. The factory default setting is "Enabled." ("Enabled" is recommended.)*
In addition, you can set the threshold value of this message with [Diagnostics] → [Diagnostic Setup] → [Positioner Air Circuit] → [Drive Sig Shift Threshold +] or [Drive Sig Shift Threshold –]. The factory default setting is "±25 %." ("±25 %" is recommended.)

Self-diagnostic messages pertaining to fail-safe operation

If the device judges, based on the result of self-diagnosis, that it cannot control the valve properly, the device executes fail-safe operation.

The output air pressure during fail-safe operation are as follows.

Positioner action	Pilot Relay Type	Output Air Pressure
Direct action	single acting	zero
	double acting	$P_{o}1$: zero, $P_{o}2$: Supply Pressure
Reverse action	single acting	Supply Pressure
	double acting	$P_{o}1$: Supply Pressure, $P_{o}2$: zero

Fail-safe operation is executed if any of the following self-diagnostic messages appear.

Table 4-4. Self-diagnostic messages leading to fail-safe operation

Message
Valve Travel Detector Failure
Valve Travel Detector Out of Range
CPU Failure
RAM Failure
ROM Failure
A/D Conversion Module 1 Failure
Non-Volatile Memory Failure

4-3-2. Control Valve Diagnostic Messages

The device has a control valve diagnostic function. Select [Diagnostics]→[Diagnostics Status]→[Valve Diagnostic Status].

	English
Out of Specification	Supply Pressure High Alarm
	Supply Pressure Low Alarm
	Temp High Alarm
	Temp Low Alarm
	Deviation +Alarm
	Deviation −Alarm
	Zero Travel +Alarm
	Zero Travel −Alarm
Maintenance Required	Total Stroke Alarm
	Cycle Count Alarm
	Shut Count Alarm
	Max Tvl Speed +Alarm
	Max Tvl Speed −Alarm
	Po Validity +Alarm
	Po Validity −Alarm
	Max Friction Alarm
	Stick-Slip High Alarm
	Stick-Slip Medium Alarm
	Stick-Slip Low Alarm
	PST Start Position Failure
	No change in valve travel in PST
	Did not Reach to Target in PST
	PST Pressure Failure
	PST Incomplete
	Stick-Slip Occurred in PST
	FST Start Position Failure
	No change in valve travel in FST
	Did not Reach to Target in FST
	FST Pressure Failure
	FST Incomplete
	Stick-Slip Occurred in FST

Chapter 5. Troubleshooting

This chapter describes how to address problems in case of troubles.

The following three types of problems may occur when you start up and start operating the device.

- Problems that occur because the specifications of the device are not suitable for the actual use conditions
- Problems due to setup or operation errors
- Problems due to failure of the device

If a problem occurs, take appropriate actions according to the troubleshooting guidelines described in this chapter.

5-1. Troubleshooting

If a problem occurs when operation starts or during operation, address the problem according to the procedure below. If the problem cannot be solved after taking the actions described below, the device may be malfunctioning. In that case, contact the Azbil group.

5-1-1. The Device Does Not Operate. (There Is No Output Air Pressure.)

1. Check that setup has been properly completed (e.g. allowable rotation angle of feedback lever).
2. Check that an appropriate supply air pressure is supplied (e.g. air leak).
3. Check that an appropriate input signal (power supply) is input (e.g. whether electrical wiring is correct).
4. When communication is possible, have the device perform self-diagnostics and take actions according to the displayed messages.
5. Check whether the internal data in the device is properly specified.

5-1-2. The Control Valve Operates Abnormally (There Is Output Air Pressure.)

1. Activate the manual operation status with the A/M switch, adjust air with the solenoid valve, and check that the valve shaft moves smoothly. (Check whether galling or packing solidification has occurred.)
2. Check whether the internal data in the device is properly specified (actuator size and hysteresis, among other data).
3. If the symptoms of the problem can be found in the table below, take the corresponding actions according to the table.

Problem	Point to be checked and action
Hunting Overshoot	• Check that the allowable rotation angle of the feedback lever is obeyed. • Change the friction level from Light to Medium to Heavy. If this does not solve the problem, change the actuator size setting to a smaller parameter with the friction level set to Heavy. (For the work procedure, refer to "Adjustment Procedure when Hunting Occurs" on the next page.)
The device does not complete a full stroke. The response speed is too slow.	• Check that the fully closed and open positions (zero and span) of the valve are properly adjusted. • Check that the EPM drive signal is within the range of 50 ±25%.

5-1-3. Display Transducer Block Does Not Switch To Auto (LUI display says "DISP_OOS.")

Problem	Point to be checked and action
Display TB Does Not Switch To Auto (LUI display says "DISP_OOS.")	• Check if BLOCK_TYPE_SELECTION_n (n=1 to 4) is configured. If not, n will be 0. In that case, assign the BLOCK_TAG (block tag name) of the parameter you want to display to BLOCK_TAG_SELECTION_n (n=1 to 4). • Check if PARAMETER_SELECTION_n (n=1 to 4) is set to the parameter you want to display. • Check if DISPLAY_PARAM_SELECTION is set to the parameters you want to display. Example: If DISPLAY_PARAM_SELECTION=Parameter 1 and Parameter 2 BLOCK_TAG_SELECTION_1, PARAM_SELECTION_1, BLOCK_TAG_SELECTION_2, and PARAM_SELECTION_2 are appropriately configured.

Note: When writing is not possible for BLOCK_TAG_SELECTION_n (n=1 to 4), or PARAMETER_SELECTION_n (n=1 to 4), switch the settings of RB FEATURE_SEL Bit 12 (Deferral of Inter-Parameter WriteChecks) to ON (enabled).

5-1-4. Adjustment Procedure When Hunting Occurs

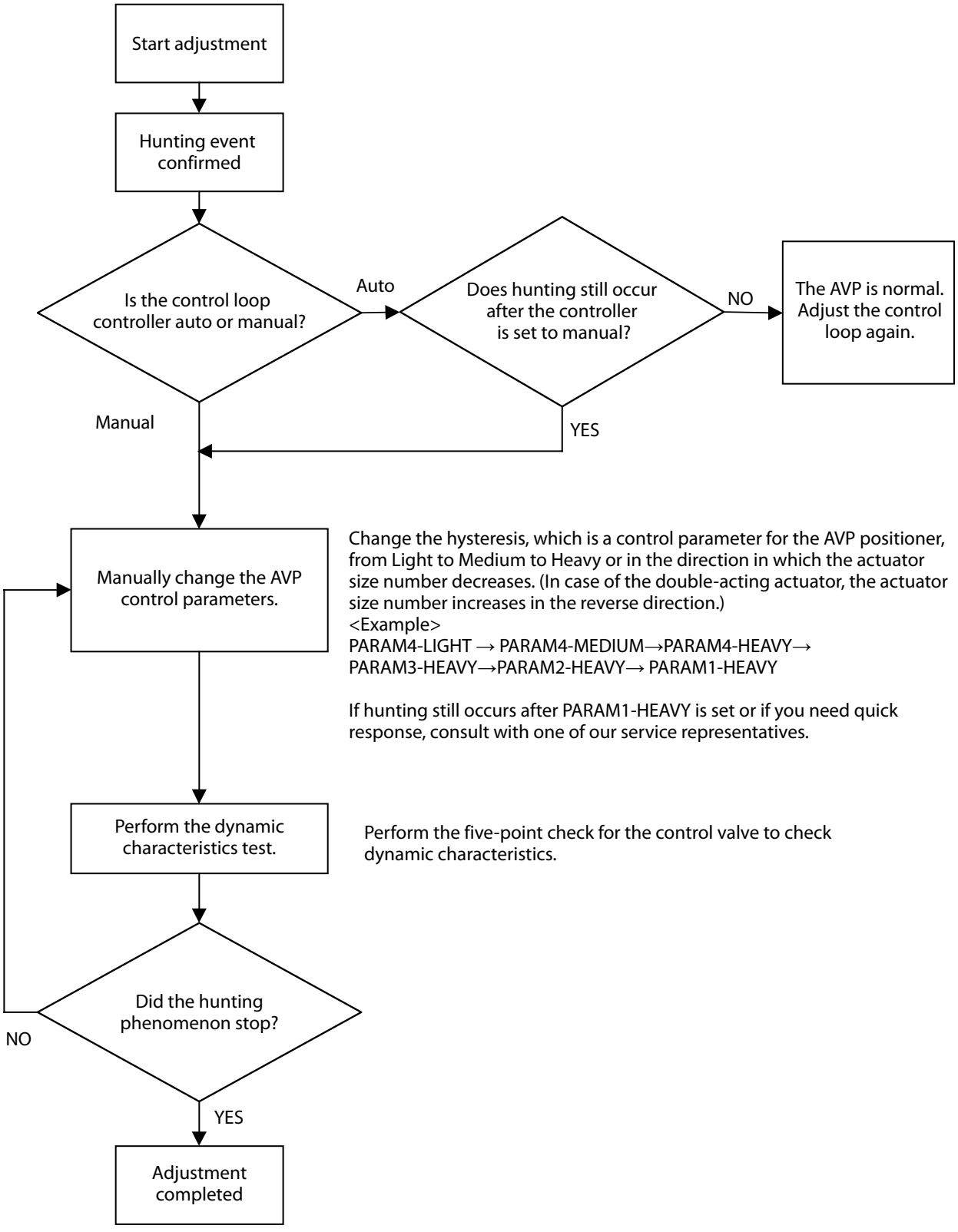


Figure 5-1.

5-1-5. Auto Setup Failure

Check the following:

- The supply air pressure is appropriate.
- The A/M switch is in the AUTO position.
- The feedback pin and feedback lever are properly connected.
- The output air pressure is properly supplied to the actuator.
- Valve motion is not obstructed by a handle, etc.
- PST, FST, Valve Signature and Step Response Test are not running.

If there is no problem with the above, there is a possibility that the attached actuator cannot be set up using the auto setup function for some reason. For example, the actuator may take too long before starting to operate. In this case, the user can set up the device manually in order to control valve travel properly. However, some functions will be unavailable.

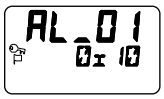
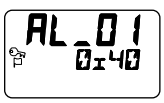
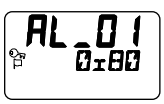
- Some types of valve diagnosis cannot be used. (For details, contact our service staff.)
- Deviation diagnosis when the valve is forced to open might not work properly.

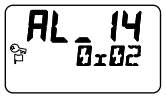
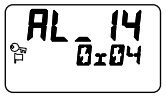
Settings necessary for travel control

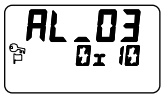
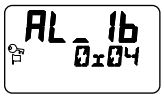
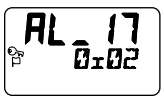
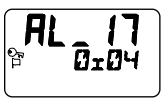
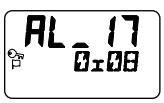
Specify the parameters in the table below, referring to the indicated sections of the manual.

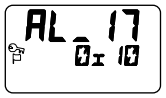
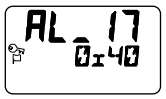
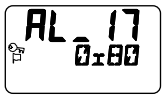
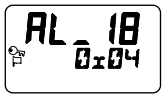
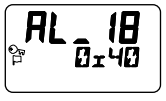
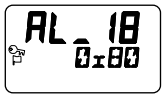
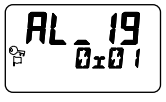
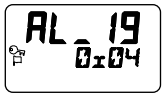
Type	Parameter	Reference	
		LUI	Fieldbus communication
Control valve system settings	Valve Closed Position	3-2-1 (3)	4-2-3
	Actuator Type	3-2-1 (3)	4-2-3
	Feedback Lever Motion	Cannot be specified using the LUI	4-2-3
Zero/span adjustment	Travel Angle 0 %	3-2-2 (3)	4-2-8 (3) or 4-2-8 (4)
	Travel Angle 100 %		
Control parameter settings	Actuator Size	3-2-4	4-2-4
	Friction Level		

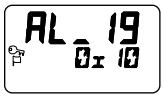
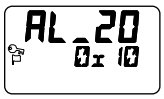
5-2. Description of Messages

Message	LUI display example	LUI display		Description and cause	Action
		Upper part	Lower part (*: Optional)		
ROM Failure		AL_00	0x01, 0x03, 0x05, 0x07, 0x09, 0x0b, 0x0d, 0x0F	ROM error.	Contact Azbil group.
RAM Failure		AL_00	0x02, 0x03, 0x06, 0x07, 0x0A, 0x0b, 0x0E, 0x0F	RAM error.	Contact Azbil group.
Non-Volatile Memory Failure		AL_00	0x04, 0x05, 0x06, 0x07, 0x0c, 0x0d, 0x0E, 0x0F	Non-volatile memory error.	Contact Azbil group.
CPU Failure		AL_00	0x08, 0x09, 0x0A, 0x0b, 0x0c, 0x0d, 0x0E, 0x0F	CPU error.	Contact Azbil group.
Valve Travel Detector Failure		AL_01	0x*1, 0x*5, 0x*9, 0x*d	VTD (angle sensor) error. • The VTD connector is disconnected. • VTD signal line is disconnected or short-circuited.	Contact Azbil group.
Valve Travel Detector Out of Range		AL_01	0x*2, 0x*6, 0x*A, 0x*E	VTD (angle sensor) output error. • The allowable rotation angle of feedback lever (±30°) is exceeded. • The feedback lever is disengaged.	Check that the feedback lever is not disengaged and that the allowable rotation angle (±30°) is obeyed. If the error message does not disappear even after you check these points, contact Azbil group.
A/D Conversion Module 1 Failure		AL_01	0x*4, 0x*5, 0x*6, 0x*c, 0x*d, 0x*E	Error in the AD conversion section (operation part).	Contact Azbil group.
A/D Conversion Module 2 Failure		AL_01	0x*8, 0x*9, 0x*A, 0x*c, 0x*d, 0x*E	Error in the AD conversion section (pressure sensor).	Contact Azbil group.
Po 1 Pressure Sensor Failure		AL_01	0x1*, 0x3*, 0x5*, 0x7*, 0x9*, 0xb*, 0xd*, 0xF*	Error in the Po1 pressure sensor.	Contact Azbil group.
Po 2 Pressure Sensor Failure		AL_01	0x2*, 0x3*, 0x6*, 0x7*, 0xA*, 0xb*, 0xE*, 0xF*	Error in the Po2 pressure sensor.	Contact Azbil group.
Ps Pressure Sensor Failure		AL_01	0x4*, 0x5*, 0x6*, 0x7*, 0xc*, 0xd*, 0xE*, 0xF*	Error in the Ps pressure sensor.	Contact Azbil group.
Pn Pressure Sensor Failure		AL_01	0x8*, 0x9*, 0xA*, 0xb*, 0xc*, 0xd*, 0xE*, 0xF*	Error in the Pn pressure sensor.	Contact Azbil group.

Message	LUI display example	LUI display		Description and cause	Action
		Upper part	Lower part (*: Optional)		
Temperature Sensor Failure		AL_14	0x02, 0x03, 0x06, 0x07, 0x0A, 0x0b, 0x0E, 0x0F	Temperature sensor error.	Contact Azbil group.
Internal Program Execution Error		AL_14	0x04, 0x05, 0x06, 0x07, 0x0c, 0x0d, 0x0E, 0x0F	Program execution error.	Contact Azbil group.
Local User I/F Active		AL_02	0x*2, 0x*3, 0x*6, 0x*7, 0x*A, 0x*b	The LUI is operating (in setup mode).	Exit the LUI setup mode by holding down MODE.
Dummy Drive Signal simulation is running		AL_02	0x*8, 0x*9, 0x*A, 0x*b	The device is in the pseudo EPM drive signal output state.	Clear the pseudo EPM drive signal output state.
Auto Setup is running		AL_02	0x1*	Auto setup is being performed.	Wait until execution ends or stop it with the stop command as needed.
Auto Travel Calibration is running		AL_02	0x2*	Automatic opening adjustment is being performed.	Wait until execution ends or stop it with the stop command as needed.
Step Responce Test is running		AL_02	0x4*	The step response test is being performed.	Wait until execution ends or stop it with the stop command as needed.
Valve Signature is running		AL_02	0x8*	Valve signature is being performed.	Wait until execution ends or stop it with the stop command as needed.
Partial Stroke Test is running		AL_15	0x01	The PST is being performed.	Wait until execution ends or stop it with the stop command as needed.
Full Stroke Test is running		AL_15	0x02	The FST is being performed.	Wait until execution ends or stop it with the stop command as needed.
VTD Angle Span Out of Range		AL_03	0x*1, 0x*3, 0x*5, 0x*7, 0x*9, 0x*b, 0x*d, 0x*F	The zero and span range is too narrow.	Adjust the zero and span so that the angle of the feedback lever has a span of 4° or larger.
Temperature Out of Range		AL_03	0x*8, 0x*9, 0x*A, 0x*b, 0x*c, 0x*d, 0x*E, 0x*F	The temperature in the device is lower than −40°C or higher than 80°C.	Set the ambient temperature to between −40°C and 80°C as specified by the usage conditions. If this message is displayed even though this condition is satisfied, a sensor error is suspected. contact Azbil group.

Message	LUI display example	LUI display		Description and cause	Action
		Upper part	Lower part (*: Optional)		
Supply Pressure Out of Range		AL_03	0x1*, 0x5*	The supply air pressure detected in the device is lower than 50 kPa or higher than 715 kPa.	• Check that the supply air pressure is applied. • Set the supply air pressure to 715 kPa or lower. If this message is displayed even though this condition is satisfied, a sensor error is suspected. Contact Azbil group.
Supply Pressure High Alarm		AL_16	0x01, 0x05, 0x09	The supply air pressure is higher than the specified threshold value.	• Check the supply air pressure. • Check that the threshold value is appropriate.
Supply Pressure Low Alarm		AL_16	0x02, 0x06, 0x0A	The supply air pressure is lower than the specified threshold value.	
Temp High Alarm		AL_16	0x04, 0x05, 0x06	The internal temperature is higher than the specified threshold value.	• Check the ambient temperature. • Check that the threshold value is appropriate for the usage environment.
Temp Low Alarm		AL_16	0x08, 0x09, 0x0A	The internal temperature is lower than the specified threshold value.	• Check the ambient temperature. • Check that the threshold value is appropriate for the usage environment.
Restriction is clogged		AL_04	0x01	The EPM drive signal has exceeded the normal operation range. • The fixed flow restrictor is clogged. • Air is not supplied. • The valve shaft is galled.	• Clean the fixed flow restrictor. • Check the supply air pressure. • Change the input signal to confirm seamless operation. • (Perform auto setup.)
Deposits on the Nozzle-Flapper		AL_04	0x02	The EPM drive signal has exceeded the normal operation range. • The nozzle is clogged. • The A/M switch is in manual mode.	• Clean the nozzle. • Check that the A/M switch is in auto mode. • Change the input signal to confirm seamless operation.
Total Stroke Alarm		AL_17	0x*1, 0x*3, 0x*5, 0x*7, 0x*9, 0x*b, 0x*d, 0x*F	The cumulated sliding distance is larger than the threshold value.	Check the operation of the control valve.
Cycle Count Alarm		AL_17	0x*2, 0x*3, 0x*6, 0x*7, 0x*A, 0x*b, 0x*E, 0x*F	The number of inversion operations is larger than the threshold value.	Check the operation of the control valve.
Shut Count Alarm		AL_17	0x*4, 0x*5, 0x*6, 0x*7, 0x*c, 0x*d, 0x*E, 0x*F	The number of fully closing operations is larger than the threshold value.	Check the operation of the control valve.
Max Tvl Speed +Alarm		AL_17	0x*8, 0x*9, 0x*A, 0x*b, 0x*c, 0x*d, 0x*E, 0x*F	The maximum operation speed + is larger than the threshold value.	Check the operation of the control valve.

Message	LUI display example	LUI display		Description and cause	Action
		Upper part	Lower part (*: Optional)		
Max Tvl Speed −Alarm		AL_17	0x*1, 0x*3, 0x*5, 0x*7, 0x*9, 0x*b, 0x*d, 0x*F	The maximum operation speed − is smaller than the threshold value.	Check the operation of the control valve.
Po Validity +Alarm		AL_17	0x*2, 0x*3, 0x*6, 0x*7, 0x*A, 0x*b, 0x*E, 0x*F	The output air pressure validity + is larger than the threshold value.	Check the operation of the control valve.
Po Validity −Alarm		AL_17	0x*4, 0x*5, 0x*6, 0x*7, 0x*c, 0x*d, 0x*E, 0x*F	The output air pressure validity − is smaller than the threshold value.	Check the operation of the control valve.
Max Friction Alarm		AL_17	0x*8, 0x*9, 0x*A, 0x*b, 0x*c, 0x*d, 0x*E, 0x*F	The maximum friction is larger than the threshold value.	Check the operation of the control valve.
Stick-Slip High Alarm		AL_18	0x*1, 0x*3, 0x*5, 0x*7	Stick-slip is larger than the “High” threshold value.	Check the operation of the control valve.
Stick-Slip Medium Alarm		AL_18	0x*2, 0x*3, 0x*6, 0x*7	Stick-slip is larger than the “Medium” threshold value.	Check the operation of the control valve.
Stick-Slip Low Alarm		AL_18	0x*4, 0x*5, 0x*6, 0x*7	Stick-slip is larger than the “Low” threshold value.	Check the operation of the control valve.
Deviation +Alarm		AL_18	0x1*, 0x3*, 0x5*, 0x7*, 0x9*, 0xb*, 0xd*, 0xF*	The deviation + is larger than the threshold value.	Check the operation of the control valve.
Deviation −Alarm		AL_18	0x2*, 0x3*, 0x6*, 0x7*, 0xA*, 0xb*, 0xE*, 0xF*	The deviation − is smaller than the threshold value.	Check the operation of the control valve.
Zero Travel +Alarm		AL_18	0x4*, 0x5*, 0x6*, 0x7*, 0xc*, 0xd*, 0xE*, 0xF*	The zero point opening + is larger than the threshold value.	Check the operation of the control valve.
Zero Travel −Alarm		AL_18	0x8*, 0x9*, 0xA*, 0xb*, 0xc*, 0xd*, 0xE*, 0xF*	The zero point opening − is smaller than the threshold value.	Check the operation of the control valve.
PST Start Position Failure		AL_19	0x01	The opening is abnormal when the PST starts.	Check the opening at the beginning.
No change in valve travel in PST		AL_19	0x02	Change of opening was not detected within the specified time.	The opening does not change. Check the operation.
Did not Reach to Target in PST		AL_19	0x04	The target opening was not reached within the specified time.	The target opening was not reached. Check the operating opening.
PST Pressure Failure		AL_19	0x08	The output pressure is lower than the threshold value while the PST is being performed.	The output air pressure dropped below the threshold value. Check the operation.

Message	LUI display example	LUI display		Description and cause	Action
		Upper part	Lower part (*: Optional)		
PST Incomplete		AL_19	0x1*	The PST did not end normally.	The PST did not end normally. Check the operation.
Stick-Slip in PST		AL_19	0x2*	Stick-slip was detected while the PST was performed.	Check for stick-slip operation.
FST Start Position Failure		AL_20	0x01	The opening is abnormal when the FST starts.	Check the opening at the beginning.
No change in valve travel in FST		AL_20	0x02	Change of opening was not detected within the specified time.	The opening does not change. Check the operation.
Did not Reach to Target in FST		AL_20	0x04	The target opening was not reached within the specified time.	The target opening was not reached. Check the operating opening.
FST Pressure Failure		AL_20	0x08	The output pressure is lower than the threshold value while FST is performed.	The output air pressure dropped below the threshold value. Check the operation.
FST Incomplete		AL_20	0x10	The FST did not end normally.	The FST did not end normally. Check the operation.
Travel Cutoff High	—	—		The valve was forcibly fully opened.	Check the forced fully open and closed values and apply the input signal within the setting range.
Travel Cutoff Low	—	—		The valve was forcibly fully closed.	
Factory Settings Restored	—	—		The data set when the device was shipped from the factory was restored. The factory data restoration (Restore factory settings) operation was performed.	Perform appropriate adjustment and setup.
In Use by an Operator	—	—		Settings are being changed through FF communication or with the LUI.	Check who the operator is that is changing the settings.
Local User I/F Abnormal	—	—		LUI module error. Key input is still recognized as ON. The key is being physically pressed down.	Check the key status. Move the device away from any nearby strong magnetic field.
Local User I/F was used in past 10 min.	—	—		The LUI key was operated within the past 10 minutes.	There may be someone near the device. Check the safety in the field.
Rejection of Request for PST	—	—		The request for PST was rejected.	Check the PST execution conditions.
PST Overridden (aborted)	—	—		The PST was aborted by the stop operation.	• Clear the result. • Start a new PST.

Message	LUI display example	LUI display		Description and cause	Action
		Upper part	Lower part (*: Optional)		
PST Timeout	—	—		Change of opening was not detected within the specified time. The target opening was not reached within the specified time. The end opening was not restored within the specified time.	The PST did not end normally. Check the operation.
Rejection of Request for FST	—	—		The request for FST was rejected.	Check the FST execution conditions.
FST Overridden (anorted)	—	—		The FST was aborted by the stop operation.	• Clear the result. • Start a new FST.
FST Timeout	—	—		Change of opening was not detected within the specified time. The target opening was not reached within the specified time. The end opening was not restored within the specified time.	The FST did not end normally. Check the operation.

Chapter 6. Maintenance

This chapter describes periodic maintenance for the device. You can properly use the device by performing appropriate maintenance. In addition, the limited life parts are listed as resale parts in 6-8. Because the replacement frequencies of resale parts differ depending on the usage environment and usage situation of the device, specify appropriate replacement frequencies.

Precautions for safe work

⚠ CAUTION	
	If appropriate maintenance is not performed, an unexpected operation may cause the feedback lever to move, causing an injury. Perform maintenance at appropriate times.
	Maintenance work is dangerous because the valve moves. Be prepared in advance to prevent injury and effects on the process when the valve moves.

6-1. A/M Switch

The maintenance work can be performed by switching between Auto and Manual. The device has a built-in Auto/Manual (A/M) switch.

The A/M switch switches the control method of output air from the positioner between auto operation and manual operation.

1) Auto operation

- The device outputs the output air pressure to control the opening according to the input signal.

2) Manual operation

- The positioner directly outputs the supply air pressure.
- Manual operations with the solenoid valve are possible. (The double-acting actuator does not support manual operation.)

⚠ WARNING

It is dangerous because the valve moves when the A/M switch is operated. Be prepared in advance to prevent injury and effects on the process when the valve moves.

3) Structure of A/M switch

The structure of the A/M switch is shown in the figure below.

Remove the pilot relay cover.

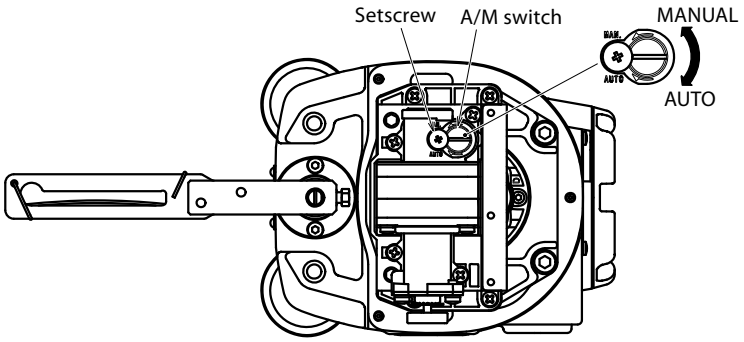


Figure 6-1. Structure of A/M Switch

⚠ CAUTION

Do not loosen the setscrew. If the setscrew is loosened, the A/M switch will pop out due to the air pressure, potentially causing an injury.

4) Procedure for switching from auto operation to manual operation

The procedure for switching from auto operation to manual operation is shown below.

Step	Description
1	Loosen the three screws to remove the pilot relay cover in order to operate the A/M switch.
2	Rotate the A/M switch counterclockwise (in the MAN direction) by one revolution using a flat-head screwdriver. (Confirm that operation has switched by using the output air pressure gauge.)

5) Procedure for switching from manual operation to auto operation

The procedure for switching from auto operation to manual operation is shown below.

Step	Description
1	Securely rotate the A/M switch clockwise (in the AUTO direction) using a flat-head screwdriver until it stops. (Confirm that operation has switched by using the output air pressure gauge.)
2	Attach the pilot relay cover onto the main unit with the three screws.

6-2. Replacement of Filter and Maintenance of Flow Restrictor

The contamination of the flow restrictor section in the device caused by instrumentation air can be removed during maintenance. The replacement and maintenance procedures are described below.

Handling Precautions:

Use clean dry air with solid particles no larger than 3-μm as the instrumentation air.

Step	Description
1	Shut off the supply air to the device.
2	Loosen the three screws to remove the pilot relay cover and remove the setscrew in the A/M switch section.
3	Rotate the A/M switch in the MAN direction to remove.
4	Cut the holder with nippers or other tool to remove the old filter. **Handling Precautions:** • Properly dispose of the old holder and filter.
5	Clean the flow restrictor section using a wire (with a diameter of 0.25 mm) or other tool. **Handling Precautions:** • When cleaning, be careful not to damage the hole of the flow restrictor. Do not use an air gun. Be careful not to let oil get on the cleaned flow restrictor again.
6	Wrap a new filter around the A/M switch and hold it with the holder.
7	Screw in the A/M switch until it stops.
8	Screw the setscrew into the A/M switch section.
9	Attach the pilot relay cover with the three screws.

6-3. Cleaning the Flapper

⚠ CAUTION

If air pressure is supplied to the device, the back pressure of the nozzle changes after the flapper is cleaned, and therefore, the valve opening suddenly changes. Perform cleaning under conditions where the sudden move of the valve will not injure people or disturb plant operation.

If the flapper is contaminated by instrumentation air, clean it as described below.

Step	Description
1	Remove the three screws from the pilot relay cover.
2	Prepare a piece of 0.2-mm thick paper. A typical business card is appropriate.
3	Chip dirt that has accumulated in the space between the nozzle and flapper in the EPM away with the paper.
4	After cleaning, attach the pilot relay cover to the main unit with the three screws.

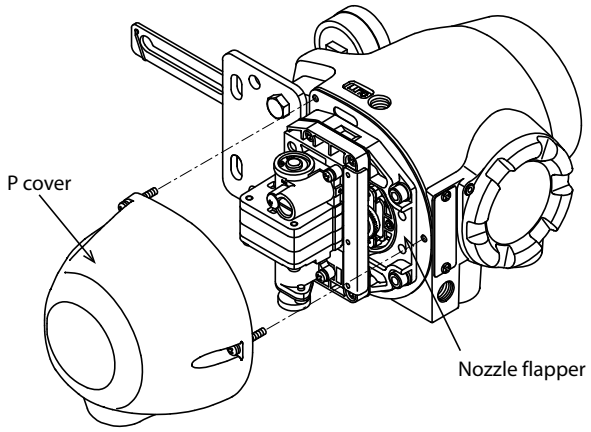


Figure 6-2. Structure

6-4. Adjusting the Pilot Relay

The adjustment method for the pilot relay differs depending on whether the single-acting or double-acting actuator is used.

Perform adjustments suitable for the actuator being used by referring to the procedures described below.

⚠ CAUTION

- When rotating the pilot relay adjustment screw, be careful not to get your finger caught in the space between it and the adapter.
- The adjustment screw may be damaged if you rotate it with excessive force by using a tool.

1) Procedure for adjusting the pilot relay for the double-acting actuator (Adjustment from single-acting type to double-acting type)

Step	Description
1	Rotate the pilot relay adjustment screw clockwise (tightening direction) until it stops. The balance pressure of output air pressures Pout1 and Pout2 is used as the supply air pressure.
2	Perform auto setup. (Use the LUI or communication.) Auto setup configures the double-acting settings and roughly adjusts the zero span. If auto setup fails, refer to 5-1-5, "Auto Setup Failure" to solve the problem. If there is still a problem and auto setup cannot be completed, Pilot Relay Type will not be changed to Double Acting and the pilot relay cannot be used for a double-acting actuator. In this case please stop adjustment and contact us.
3	After confirming that auto setup is completed, apply the input signal to make the opening 50%.
4	While checking output air pressure Pout1 or Pout2 with the LUI or pressure gauge, rotate the pilot relay adjustment screw to adjust the output air pressure to 70 ±10% of the supply air pressure. Rotating the adjustment screw clockwise increases the balance pressure while rotating it counterclockwise decreases the balance pressure. **Handling Precautions:** • If the actuator has a large capacity, it takes time for the balance pressure to stabilize. Rotating the adjustment back a bit facilitates stabilization.
5	Perform auto setup again. The final adjustment value is measured.
6	Perform operation checks including a five-point check (0, 25, 50, 75, 100% opening).

2) Procedure for adjusting the pilot relay for the single-acting actuator (Adjustment from double-acting type to single-acting type)

Step	Description
1	Rotate the pilot relay adjustment screw counterclockwise (loosening direction) until it stops. Output air pressure Pout2 becomes 0.
2	Perform auto setup. If auto setup fails, refer to 5-1-5, "Auto Setup Failure" to solve the problem. If there is still a problem and auto setup cannot be completed, Pilot Relay Type will not be changed to Single Acting and the pilot relay cannot be used for a single-acting actuator. In this case please stop adjustment and contact us.
3	Perform operation checks including a five-point check (0, 25, 50, 75, 100% opening).

6-5. Insulation Resistance Test

⚠ CAUTION

In principle, do not perform the insulation resistance test. This test may damage the built-in varistor for absorbing surge voltage. If it is absolutely necessary to perform this test, carefully follow the specified procedure.

1) Test procedure

- Remove external wiring from the device.
- Short-circuit the FB input signal terminals + and -.
- Perform the test between each of the short-circuited parts and the grounding terminal.
- The applied voltage and evaluation criteria are as shown in the table below.

Handling Precautions:

Do not apply a voltage equal to or higher than the value below to prevent the instrument from being damaged.

2) Evaluation criteria

The evaluation criteria for this test is as shown below.

Test	Evaluation criteria
Insulation resistance	2×10^7 Ω or higher at a test voltage of 25 V DC (at 25°C, 60%RH or less)

6-6. Adjustment Procedure When Using the Device with the Booster Relay Attached

When using the device with the booster relay attached, perform adjustment according to the following procedure.

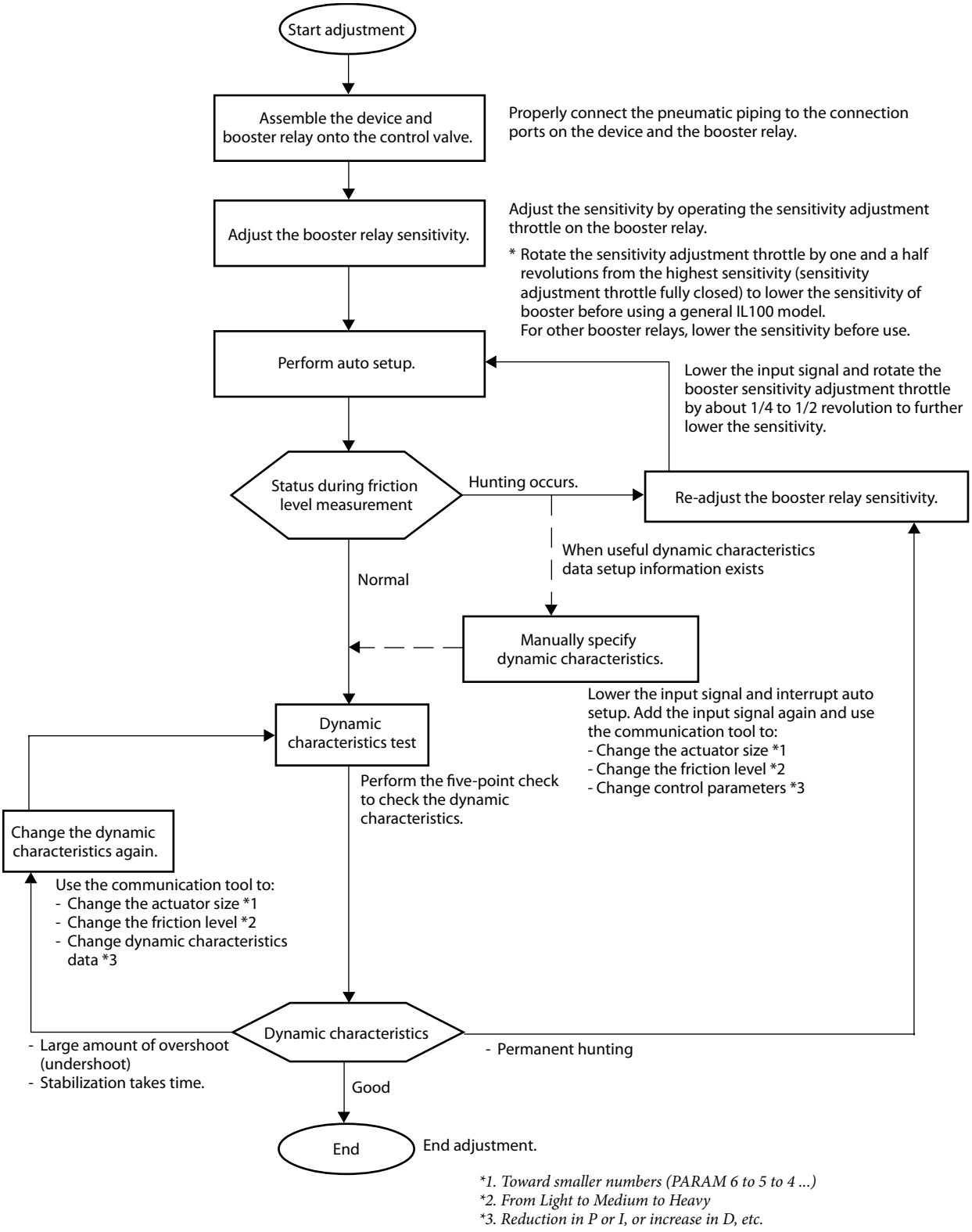


Figure 6-3.

6-7. Internal Block Diagram of the 700 Series

1) Internal block diagram of the 700 Series

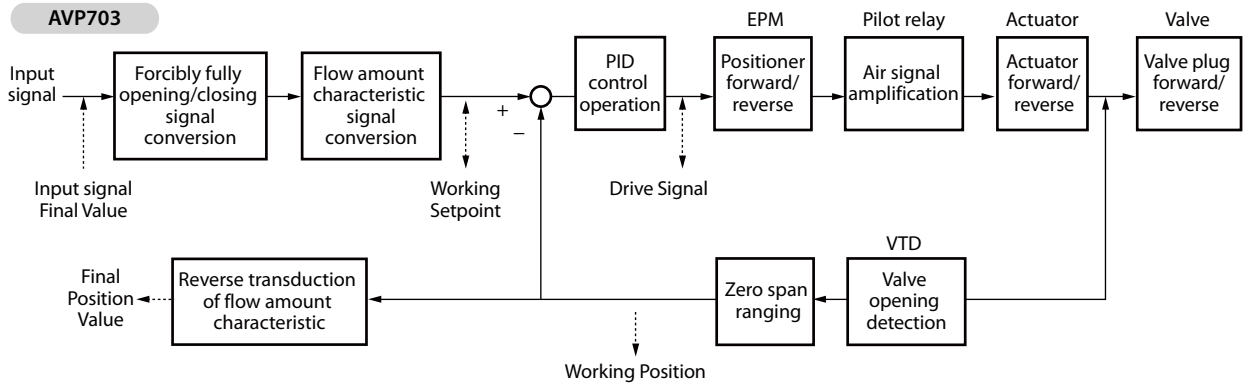


Figure 6-4.

6-8. Resale Parts

The resale parts for maintenance are listed in the table below. For the position of each part, refer to Figure 6-5.

No.	Name	Part no.	Qty.	Recommended replacement period (year)*1	Recommended tightening torque N·m
1	Face cover assembly	80388840-101	1	—	0.9 ±0.1
2	Face cover	80388841-001	1	—	—
3	Hexagon socket flush bolt (for face cover, M4×16)	80388843-101	2	—	0.9 ±0.1
4	Screw retainer ring (for face cover)	80235519-010	2	—	—
5	Switch block assembly	80388910-901	1	5	1.02 ±0.33
6	S-TITE (for switch block, equivalent to M3×6)	80388918-001	2	—	1.02 ±0.33
7	Terminal cover assembly	80388820-001 (finish S) 80388820-002 (finish B) 80388820-003 (finish D)	1	5	—
8	O-ring (AS568-151) (for terminal cover)	803888281-151	1	5	—
9	Hexagon socket bolt (lock screw for terminal cover, M4×8)	314-204-080	1	—	0.9 ±0.1
10	Set of five cross recessed head screws with captive spring washers (terminal screw, M4×8)	80277581-001	5	—	1.5 ±0.2
11	Cross recessed head screws with captive spring washers (external grounding terminal screw, M4×8)	80277581-001	1	—	1.5 ±0.2
12	Exhaust cap	80388823-001 (finish S) 80388823-002 (finish B) 80388823-003 (finish D)	1	—	—
13	S-TITE (equivalent to M3×6) (for exhaust cap)	80388918-001	2	—	1.33 ±0.46
14	P cover assembly (with screw)	80388825-001 (finish S) 80388825-002 (finish B) 80388825-003 (finish D)	1	—	1.5 ±0.2
15	Special cross recessed head screws with captive spring washers (for P cover, M4×16, shank: 9)	80388844-001	3	—	1.5 ±0.2
16	Seal washer (for P cover)	80357789-001	3	—	—
17	Pilot relay assembly (including the A/M screw assembly)	80388850-001 (single acting) 80388850-002 (double acting)	1	5	—

No.	Name	Part no.	Qty.	Recommended replacement period (year)*1	Recommended tightening torque N·m
18	Cross recessed head screws with captive spring washers (for pilot relay, M4×25)	398-204-250	4	—	1.8 ±0.2
19	O-ring (AS568-014) (for pilot relay)	80020935-409	4	5	—
20	O-ring (S7) (for pilot relay)	80020935-323	1	5	—
21	A/M screw assembly	80388885-001	1	4	—
22	Filter	80377077-001	1	4	—
23	Holder	80377078-001	1	—	—
24	Cross recessed truss head screw (for A/M screw, M4×6)	310-240-060	1	—	1.5 ±0.2
25	O-ring (AS568-007) (for A/M screw)	80020935-216	1	5	—
26	O-ring (AS568-010) (for A/M screw)	80020935-324	1	5	—
27	O-ring (AS568-012) (for A/M screw)	80020935-325	1	5	—
28	Feedback lever assembly	80377049-001 (without option M6) 80377049-002 (with option M6)	1	—	—
29	Feedback lever	80377148-001 (with option M6) 80377148-002 (without option M6)	1	—	—
30	Arm spring	80377149-001(with option M6) 80377149-002(without option M6)	1	—	—
31	Hexagon socket bolt with captive spring washer (for feedback lever, M5×8)	80377127-001	2 (4)*2	—	2.9 ±0.3
32	Extension lever	80377142-001 (40 mm extension, without option M6) 80377142-101 (40 mm extension, with option M6) 80377142-002 (80 mm extension, without option M6) 80377142-102 (80 mm extension, with option M6)	1	—	2.9 ±0.3
33	Blind plug/pressure-resistant explosion-proof plug (G1/2)	80377115-001	1	5	—
34	Blind plug/plug (for general use, NPT1/2)	80277971-001	1	—	—
35	Blind plug/plug (for IECEx/ATEX, NPT1/2)	80372545-001	1	—	—
36	Blind plug/plug (for general use/ ATEX, M20)	80377205-001	1	5	—
37	Blind plug/plug (for IECEx, M20)	80372699-001	1	5	—
38	Flameproof cable gland	80388728-002	1 (2)*3	10	—
39	Flameproof elbow (G1/2)	80357206-108	1 (2)*3	10	—
100	LCD cover	80384067-001	1	10	—
101	Pressure gauge elbow	80384049-001	2 (3)*4	—	—

**1. The recommended replacement period assumes standard conditions (JIS C 1804, C 1805). The replacement period may be shorter depending on environmental conditions (such as temperature, humidity, vibration, and air quality) and usage conditions (such as operation frequency and ON/OFF operations).*

**2. If the extension lever is required.*

**3. When using two conduit connection ports.*

**4. When Pilot Relay Type is set to Double Acting.*

Ask our service representative to replace the parts in the table below. Expertise is required to replace these parts.

⚠ CAUTION

Do not replace or desorb the parts in the table below, because it causes the device damage. When you replace or desorb it, ask our service representative to replace the parts.

No.	Name	Part no.	Qty.	Recommended replacement period (year)*	Recommended tightening torque N·m
41	Main cover assembly	80388816-001 (finish S, except for structure V) 80388816-002 (finish B, except for structure V) 80388816-011 (finish S, structure V) 80388816-012 (finish B, structure V)	1	5	—
42	O-ring (AS568-154) (for main cover)	80388828-154 (except for structure V) 80020935-164 (structure V)	1	5	—
44	Hexagon socket bolt (lock screw for main cover, M4×8)	314-204-080	1	—	0.9 ±0.1
45	Guide plate	80388905-001	1	—	—
47	LCD assembly	80388931-001	1	5	—
50	Adapter assembly	80388836-001	1	—	0.9 ±0.1
51	O-ring (AS568-021) (for adapter)	80020935-612	1	5	—
52	Hexagon socket bolt with captive spring washer (for adapter, M3×6)	80377046-001	3	—	0.9 ±0.1
53	Adapter gasket	80388846-001	1	5	—
54	Filter screen	80377087-001	4	—	—
55	Cross recessed head screws with captive spring washer (for adapter, M4×12)	398-204-120	4	—	1.8 ±0.2
56	Case packing	80388847-001	1	10	—
57	Magnet unit assembly (EPM)	80377010-001 (Forward) 80377010-002 (Reverse)	1	—	—
58	O-ring (AS568-007) (for EPM)	80020935-216	1	5	—
59	Hexagon socket bolt with captive spring washer (for EPM, M3×6)	80377046-001	2	—	0.9 ±0.1
60	Sensor board	<Except for structure L,T> 80388935-001 <Structure L,T> 80384101-001	1	—	—
61	Sensor cable	80388944-001	1	—	—
62	O-ring (AS568A-013) (for pressure sensor)	80388829-013	4	10	—
63	Hexagon socket bolt with captive spring washer (for sensor cover, M3×8)	80377047-001	4	—	0.9 ±0.1
64	Hexagon socket bolt with captive spring washer (for coil, M3×8)	80377047-001	2	—	0.9 ±0.1
65	Hexagon socket bolt with captive spring washer (M6×16)	80388845-001	4	—	4.4 ±0.5
66	VTD assembly (with hexagon socket bolt M4×14)	80388909-001, 002	1	—	1.5 ±0.2

* *The recommended replacement period assumes standard conditions (JIS C 1804, C 1805). The replacement period may be shorter depending on environmental conditions (such as temperature, humidity, vibration, and air quality) and usage conditions (such as operation frequency and ON/OFF operations).*

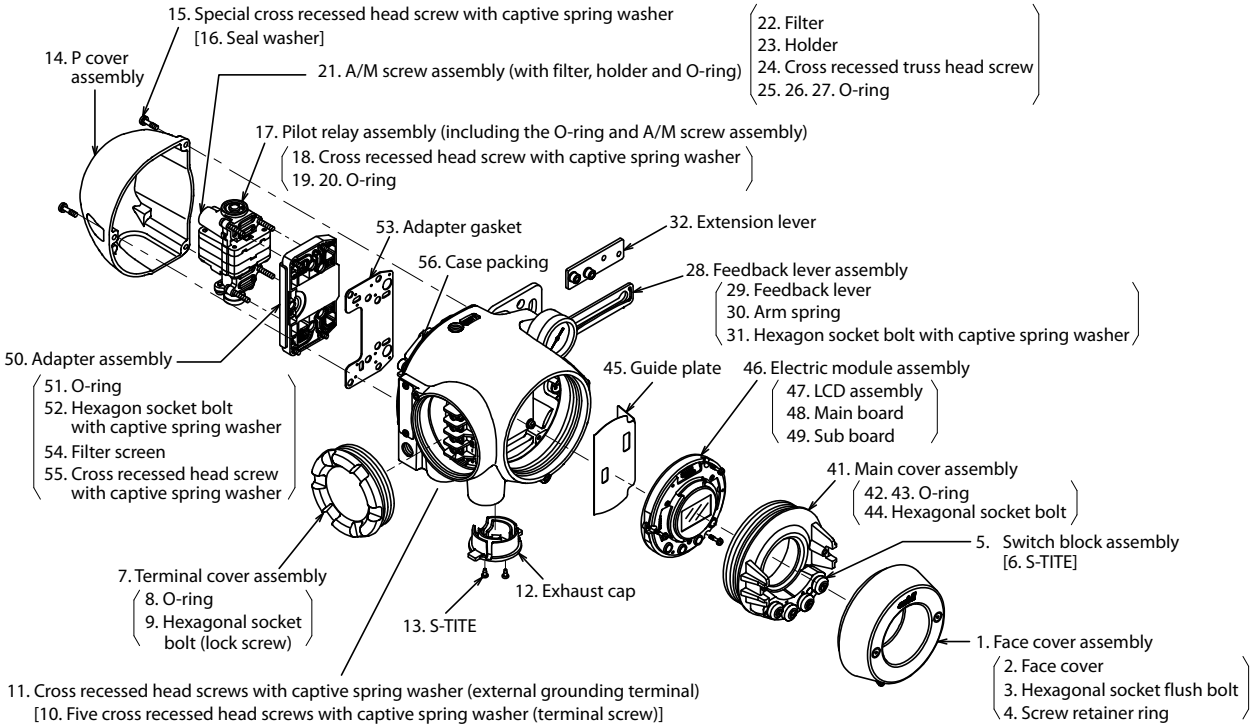


Figure 6-5. Resale Parts

6-8-1. Procedure to Change Switch Block

Step	Description
1	Loosen two screws with a hexagon socket screw keys and remove the face cover (Figure 6-6)
2	Loosen two screws and remove the face cover (Figure 6-7)
3	Tighten a new switch block with two screws. (Torque: 1.02 ±0.33 N·m)
4	Press four buttons and make sure whether the display changes or not.
5	Tighten the face cover with two screws. (Torque: 0.9 ±0.1 N·m)

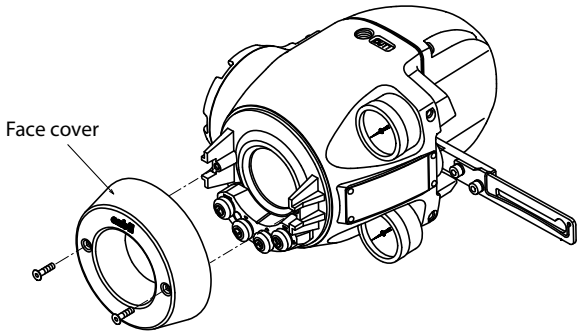


Figure 6-6. Removal of face cover

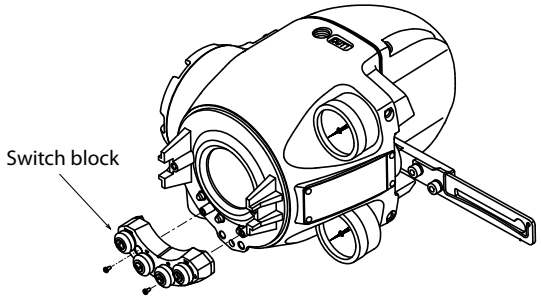


Figure 6-7. Removal of switch block

6-8-2. Procedure to Change Pilot Relay

Step	Description
1	Loosen three screws and remove the P cover. (Figure 6-8)
2	Loosen four screws and remove the pilot relay. (Figure 6-9)
3	Tighten a new pilot relay with four screws. (Torque: 1.8 ±0.2 N·m)
4	Tighten the P cover with three screws. (Torque: 1.5 ±0.2 N·m)

! Handling Precautions:

Please make sure that the O-ring does not fall off when assembling the pilot relay.

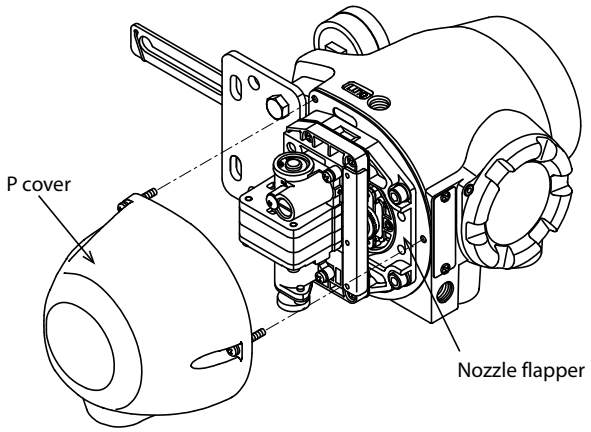


Figure 6-8. Removal of P cover

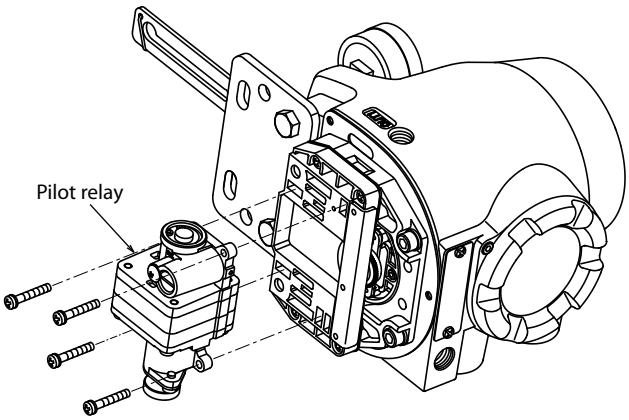


Figure 6-9. Removal of pilot relay

Chapter 7. Notes on the Explosion-Proof 700 Series

This chapter describes the notes on the explosion-proof 700 Series.

When using the explosion-proof 700 Series, sufficiently understand the notes in this section and use it correctly.

7-1. TIIS Flameproof Model

1. Symbol information

IIC T6

Ambient gas with an ignition point of 85°C or higher

Ambient gas with IIC explosion rating

Ambient temperature range: −20 to +55°C

This pressure-resistant explosion-proof product can be installed in Place types 1 or 2 depending on the target gas. Installation in Place type 0 is not possible.

2. Applicable standards

Factory Electrical Facilities Explosion Protection Guidelines (Technical guidelines 2008 that conform to international standards)

3. Precautions for safe work

⚠ WARNING	
⊘	Do not loosen the fixing screws on the cover and angle sensor while the power is applied and within one minute after the power supply is shut off. Doing so may cause an explosion, leading to a severe accident.

⚠ CAUTION	
❗	Be sure to mount the attached (specified) pressure-resistant packing cable adapter onto the signal wiring outlet in the device. Use the attached pressure-resistant elbow if it is necessary to change the orientation of the wiring. To guarantee the explosion-proof specifications, products other than the specified pressure-resistant packing cable adapter and pressure-resistant elbow cannot be used.
❗	Take extra care in handling the device so as not to corrode, deform, or otherwise damage the case or cover. Securely tighten the hexagon socket screws for screw locking on the cover and do not open the cover during use.
❗	When wiring in an environment similar to the low pressure power distribution work in a Class 1 danger zone, perform work following the "(New) Electrical Facilities Explosion-Proofing Guidelines (Gas Explosion-Proofing 1985)" issued by the Technology Institution of Industrial Safety.
❗	Apply the correct supply air pressure in accordance with the Section 2-1 Usage Conditions Installation of the 700 Series. Incorrect pressure may cause abnormal actions of the control valve or damage to the pressure gauge.

7-2. IECEx Flameproof and Dust Ignition Protection

IECEx Flameproof and Dust Ignition Protection

1. Marking information

IECEx DEK 12.0025X

Ex d IIC T6 Gb -30°C ≤ T_{amb} ≤ +75°C IP66

Ex tb IIIC T85°C Db -30°C ≤ T_{amb} ≤ +75°C IP66

2. Applicable standards

- IEC 60079-0:2011
- IEC 60079-1:2007
- IEC 60079-31:2008

3. Special conditions for safe use ⚠ Caution

- The gap between the shaft for magnetic pass and the pneumatic module body has 0.065mm max.
- The terminal cover has at least 7.5 engaged threads.
- The gap between the pneumatic module body and the housing has 0.13mm max.
- The electronic cover has at least 6.8 engaged threads.
- The gap between the housing and the feedback sensor has 0.11mm max.
- The gap between the flame arrestor and the pneumatic module body has 0.145mm max.
- The gap between the sensor housing and the outside sleeve has 0.07mm max.
- The gap between the rotary shaft and the inside sleeve has 0.07mm max.
- The screws used to assemble the pneumatic body to the Ex d housing shall be of class A2-70 or A4-70.
- For the use in the area where EPL Db apparatus is required, electrostatic discharge shall be avoided.

4. Instruction for safe use ⚠ Caution

4.1 Do not open when an explosive atmosphere is present.

4.2 Use supply wires suitable for 5°C above surrounding ambient.

4.3 When Model No. is given with AVP7xx-xyx-x ... ,
if y=N, P, U, C, the thread type of the end of all entries is 1/2NPT, or
if y=M, the thread type of the end of all entries is M20.

4.4 To maintain the degree of protection of at least IP66 in accordance with IEC60529, suitable cable glands, conduit sealing devices or blanking elements must be used and correctly installed.

4.5 Cables glands or conduit sealing devices used must be certified for the IECEx protection mentioned above in item 1.

4.6 Unused openings must be closed with a blanking element certified for the IECEx protection mentioned above in item 1.

4.7 If thread adapters are used these must be certified for the IECEx protection mentioned Above in item 1.
Per entry not more than one thread adapter may be used.

4.8 This equipment shall be mounted in such a manner that it is not been heated by the process medium.

4.9 The cable connection of external grounding terminal shall be used with a cable lug.

*See the section 2-3-3 for the connection.

4.10 This product is shipped with the IECEx certified blanking element only to avoid ingress of solid foreign objects and water during transportation, the certification of this product does not include the blanking element.
When installed, check the conformity of the blanking element to the relevant standards.

7-3. FM Explosionproof/Dust Ignition Protection

1. Explosionproof

Class I, Division 1, Group B, C and D T6;

2. Flameproof

Class I, Zone 1, AEx d IIC T6 Gb

3. Dust ignition

Class II and III, Division 1, Group E, F, and G T6, Zone 21, AEx tb II C T85°C Db

Ambient temperature: −30 to +75°C

Indoor/Outdoor Enclosure IP66

⚠ WARNING

- Install the apparatus only in hazardous (classified) locations for which the apparatus has been approved.
- For division applications:
  Factory sealed, conduit seal not required
  Not including gasoline atmospheres
- Do not open the apparatus enclosure when an explosive atmosphere is present.

⚠ CAUTION

Use supply wires suitable for 5°C above surrounging ambient.

7-4. FM Intrinsically safe (ic) and Nonincendive

1. Intrinsically safe (ic)

Class I, Zone 2, AEx ic IIC T4

FISCO & Entity Parameters: Ui=32V, Ci=4nF, Li=0

2. Nonincendive

Class I, Division 2, Group A, B, C and D, T4

Nonincendive Field Wiring & FNICO Parameters: Vmax=32 V, Ci=4 nF, Li=0

3. Suitable

Class II and Class III, Division 2, Group E, F and G, T4

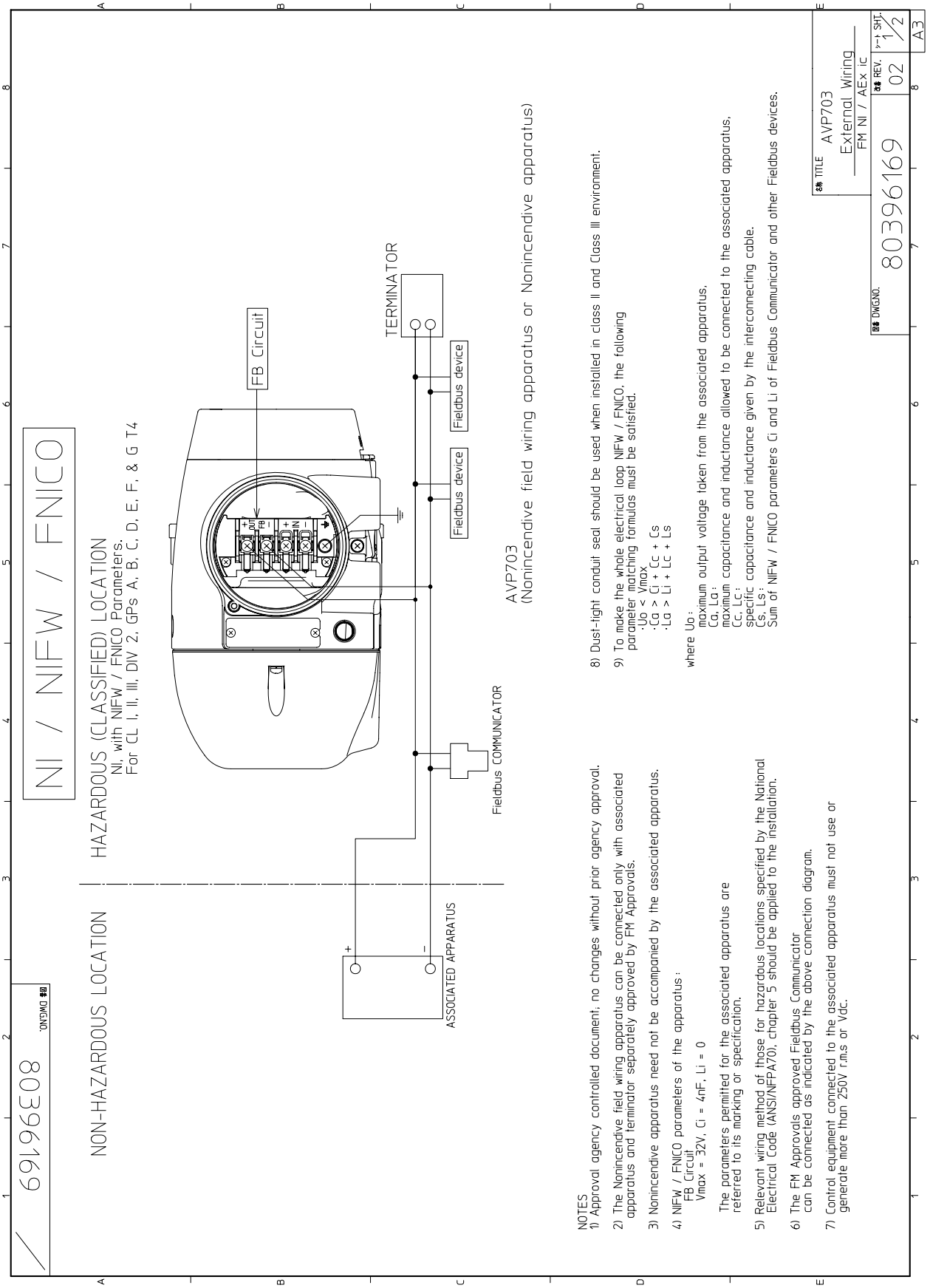
4. Indoor/Outdoor Enclosure

NEMA Type 4X, IP66

Ambient Temperature: −24 to +75°C

5. Instruction for safe use

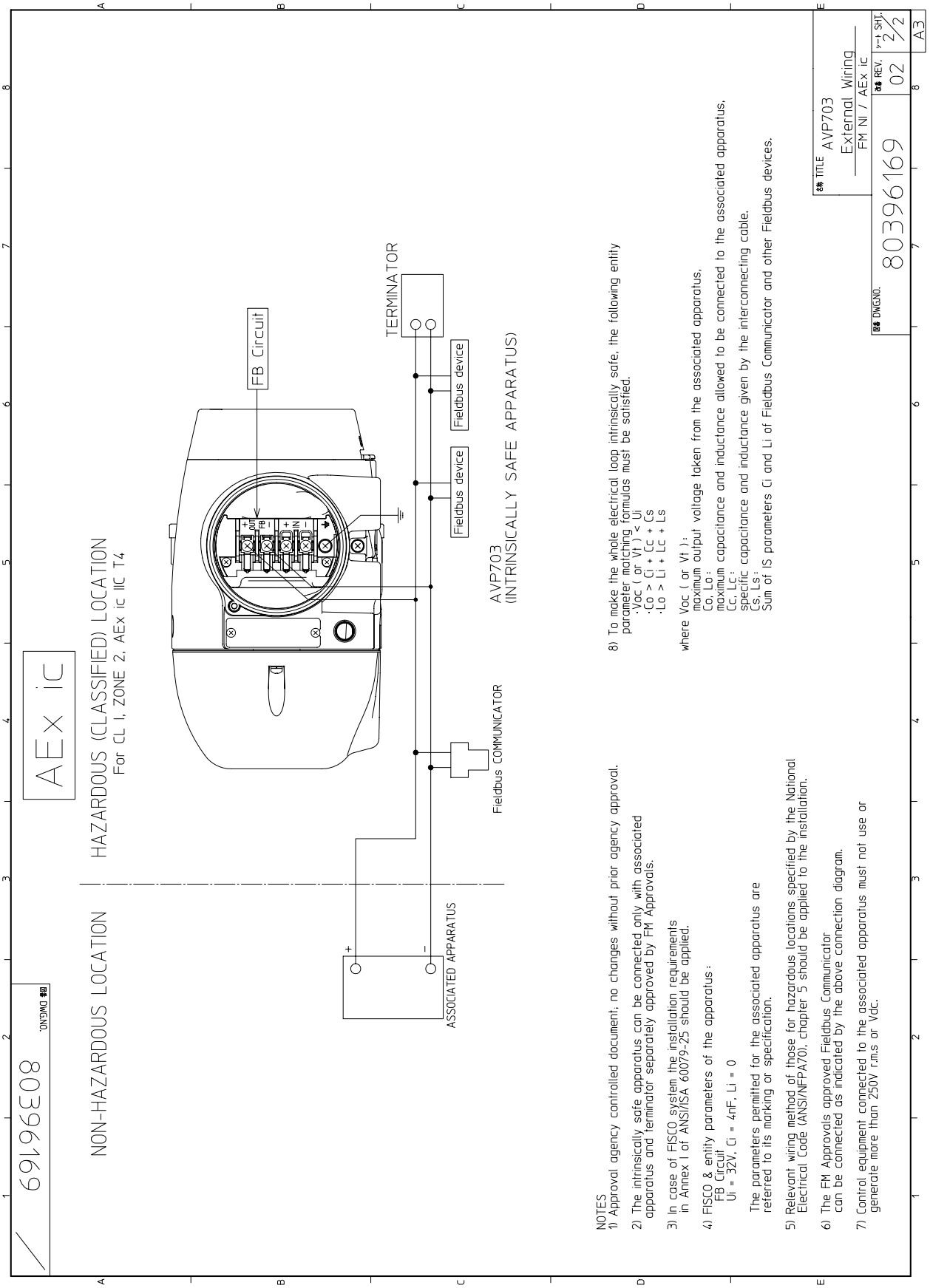
- Models AVP703 shall be installed in accordance with control drawing 80396169.
- Installations in the US shall comply with the relevant requirements of the National Electrical CodeR (ANSI/NFPA-70 (NECR)).
- Tampering and replacement with non-factory components may adversely affect the safe use of the system.
- For guidance on installation in the US, see ANSI/ISA-RP12.06.01, Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations.
- Electrical equipment connected to the Associated Apparatus shall not use or generate more than 250 Volts rms.
- The products discussed in this report were certified by FM Approvals under a Type 3 Certification System as identified in ISO Guide 67.



NOTES
1) Approval agency controlled document, no changes without prior agency approval.
2) The Nonincendive field wiring apparatus can be connected only with associated apparatus and terminator separately approved by FM Approvals.
3) Nonincendive apparatus need not be accompanied by the associated apparatus.
4) NIFW / FNICO parameters of the apparatus :
   FB Circuit
   Vmax = 32V, Ci = 4nF, Li = 0

   The parameters permitted for the associated apparatus are referred to its marking or specification.
5) Relevant wiring method of those for hazardous locations specified by the National Electrical Code (ANSI/NFPA70), chapter 5 should be applied to the installation.
6) The FM Approvals approved Fieldbus Communicator can be connected as indicated by the above connection diagram.
7) Control equipment connected to the associated apparatus must not use or generate more than 250V r.m.s or Vdc.
8) Dust-tight conduit seal should be used when installed in class II and Class III environment.
9) To make the whole electrical loop NIFW / FNICO, the following parameter matching formulas must be satisfied.
   -Uo < Vmax
   -Ca > Ci + Cc + Cs
   -La > Li + Lc + Ls

   where Uo :
   maximum output voltage taken from the associated apparatus,
   Ca, La :
   maximum capacitance and inductance allowed to be connected to the associated apparatus,
   Cc, Lc :
   specific capacitance and inductance given by the interconnecting cable.
   Cs, Ls :
   Sum of NIFW / FNICO parameters Ci and Li of Fieldbus Communicator and other Fieldbus devices.


AEx ic
NON-HAZARDOUS LOCATION
HAZARDOUS (CLASSIFIED) LOCATION
For CL I, ZONE 2, AEx ic IIC T4
FB Circuit
TERMINATOR
Fieldbus device
Fieldbus device
AVP703
(INTRINSICALLY SAFE APPARATUS)
Fieldbus COMMUNICATOR
ASSOCIATED APPARATUS
NOTES
1) Approval agency controlled document, no changes without prior agency approval.
2) The intrinsically safe apparatus can be connected only with associated apparatus and terminator separately approved by FM Approvals.
3) In case of FISCO system the installation requirements in Annex I of ANSI/ISA 60079-25 should be applied.
4) FISCO & entity parameters of the apparatus:
FB Circuit
Ui = 32V, Ci = 4nF, Li = 0
The parameters permitted for the associated apparatus are referred to its marking or specification.
5) Relevant wiring method of those for hazardous locations specified by the National Electrical Code (ANSI/NFPA70), chapter 5 should be applied to the installation.
6) The FM Approvals approved Fieldbus Communicator can be connected as indicated by the above connection diagram.
7) Control equipment connected to the associated apparatus must not use or generate more than 250V r.m.s or Vdc.
8) To make the whole electrical loop intrinsically safe, the following entity parameter matching formulas must be satisfied.
·Voc (or Vt) < Ui
·Co > Ci + Cc + Cs
·Lo > Li + Lc + Ls
where Voc (or Vt):
maximum output voltage taken from the associated apparatus,
Co, Lo:
maximum capacitance and inductance allowed to be connected to the associated apparatus,
Cc, Lc:
specific capacitance and inductance given by the interconnecting cable.
Cs, Ls:
Sum of IS parameters Ci and Li of Fieldbus Communicator and other Fieldbus devices.
TITLE AVP703
External Wiring
FM NI / AEx ic
DWG.NO. 80396169
REV. 02
SHT. 2/2
A3
DWG.NO. 80396169

7-5. FMC Explosionproof/Dust Ignition Protection

1. Explosionproof

Class I, Division 1, Group C and D T6;

2. Flameproof

Class I, Zone 1, Ex d IIB T6 Gb

3. Dust ignition

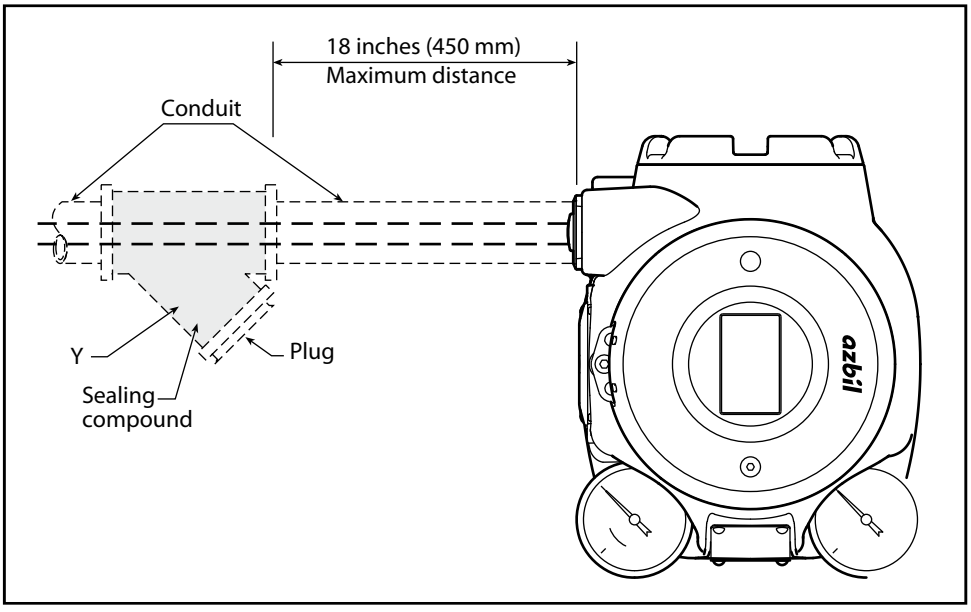
Class II and III, Division 1, Group E, F, and G T6;

Ambient temperature: −30 to +75°C

Indoor/Outdoor Enclosure IP66

⚠ WARNING

- Install the apparatus only in hazardous (classified) locations for which the apparatus has been approved.
- For division applications:
  Factory sealed, conduit seal not required
  Not including gasoline atmospheres
- For zone applications
  Seal all conduits within 450 mm (18 INCHES)
- Do not open the apparatus enclosure when an explosive atmosphere is present.



⚠ CAUTION

Use supply wires suitable for 5°C above surrounging ambient.

7-6. CCC Flameproof/Dust Ignition Protection

CCC 隔爆

1. 防爆标志

Ex db IIC T6 Gb

Ex tb IIIC T85℃ Db

2. 国家防爆标准

GB/T 3836.1-2021 爆炸性环境 第1 部分：设备 通用要求

GB/T 3836.2-2021 爆炸性环境 第2 部分：由隔爆外壳“d”保护的设备

GB/T 3836.31-2021 爆炸性环境 第31 部分: 由防粉尘点燃外壳“t”保护的设备

3. 产品安全使用特殊条件

3-1．涉及隔爆接合面的维修须联系产品制造商。

3-2．隔爆结合面用特殊紧固件性能等级为A2-70/A4-70。

3-3．产品在爆炸性粉尘环境使用时，应采取措施避免传播型刷型放电产生引燃危险。仅允许使用湿布擦拭。

3-4．使用环境温度：-30℃~+75℃。

4. 产品使用注意事项

4-1．产品设有外接地端子，用户在安装使用时应可靠接地。

4-2．产品电缆引入口须配用经国家指定的检验机构认可的、符合国家标准GB/T 3836.1-2021 和GB/T 3836.2-2021 规定的、螺纹规格为M20×1.5 或1/2-14NPT、具有防爆等级为Ex db IIC 的电缆引入装置或封堵件，方可用于爆炸性危险场所。该电缆引入装置或封堵件的使用必须符合使用说明书的要求。冗余电缆引入口应有效封堵。电缆引入装置或封堵件安装后，须确保设备整体外壳防护等级不低于IP66。

4-3．现场使用和维护时，必须遵循“存在爆炸性环境时严禁打开”的原则。

4-4．用户不得自行更换该产品的零部件，应会同产品制造商共同解决运行中出现的故障，以杜绝损坏现象的发生。

4-5．用户应当保持产品外壳表面清洁，以防粉尘堆积，但严禁用压缩空气吹扫。

4-6．产品的安装、使用和维护应同时遵守产品说明书及下列相关标准、规范的要求：

GB/T 3836.13-2021 爆炸性环境 第13 部分：设备的修理、检修、修复和改造

GB/T 3836.15–2017 爆炸性环境 第15 部分：电气装置的设计、选型和安装

GB/T 3836.16–2017 爆炸性环境 第16 部分：电气装置的检查与维护

GB 15577–2018 粉尘防爆安全规程

GB 50257–2014 电气装置安装工程爆炸和火灾危险环境 电气装置施工及验收规范

CCC型号

AVP7xy - ①②③ - ④⑤⑥⑦

where:
x=0(Valve positioner)
x=1(Emergency valve shutdown function with Foundation Fieldbus communication)
x=3(valve travel transmitter only)
x=7(Positioner with emergency valve shutdown function @4.48mA)
x=8(Positioner with emergency valve shutdown function @0.5mA)
x=9(Emergency valve shutdown function only)
y=0(Positioner & contact output for alarm)
y=1(Positioner& Valve travel transmitter)
y=2(no output)
x=3(Foundation Fieldbus communication)
y=4(Positioner & Foundation Fieldbus communication)
AVP7xy 所有组合搭配：AVP700/701/702/703/704/770/771/772/780/781/782/790/791/792/713/731

					Code
① Structure	CCC Flameproof / Dust ignition protection (Electrical connection G1/2 is not available)				N
	CCC Intrinsically Safe				R
② Connection	Electrical connection	Air piping connection	Mounting thread	Pressure gauge thread	
	M20x1.5	1/4NPT	M8	Rc1/8	M
	1/2NPT	1/4NPT	M8	Rc1/8	N
	1/2NPT	1/4NPT	M8	1/8NPT	P
	1/2NPT	1/4NPT	5/16-18UNC	Rc1/8	U
	1/2NPT	1/4NPT	5/16-18UNC	1/8NPT	C
	G1/2	Rc1/4	M8	Rc1/8	G
③ Finish	Standard				S
	Corrosion Proof				B
	Silver Finish				D

④⑤ Display	Display with push button	DX
⑥ Diagnostic	Advanced diagnosis	A
⑦ Overvoltage Protection	None	X
	With overvoltage protection	V

7-7. KCs Flameproof

1. Marking information

Ex d IIC T6 $-30\ °C < T_{amb} < +75\ °C$

2. Special conditions for safe use ⚠ *Caution*

- The gap between the shaft for magnetic pass and the pneumatic module body has 0.065 mm max.
- The terminal cover has at least 7.5 engaged threads.
- The gap between the pneumatic module body and the housing has 0.13 mm max.
- The electronic cover has at least 6.8 engaged threads.
- The gap between the housing and the feedback sensor has 0.11 mm max.
- The gap between the flame arrestor and the pneumatic module body has 0.145 mm max.
- The gap between the sensor housing and the outside sleeve has 0.07 mm max.
- The gap between the rotary shaft and the inside sleeve has 0.07 mm max.
- The screws used to assemble the pneumatic body to the Ex d housing shall be of class A2-70 or A4-70.

3. Instruction for safe use ⚠ *Caution*

3.1 Do not open when an explosive atmosphere is present.

3.2 Use supply wires suitable for 5°C above surrounding ambient.

3.3 When Model No. is given with AVP7xx-xyx-x ... ,
if y=N, P, U, C, the thread type of the end of all entries is 1/2NPT, or if y=M, the thread type of the end of all entries is M20.

3.4 Cables glands or conduit sealing devices used must be certified for the protection mentioned above in item 1.

3.5 Unused openings must be closed with a blanking element certified for the protection mentioned above in item 1.

3.6 If thread adapters are used these must be certified for the protection mentioned Above in item 1.

Per entry not more than one thread adapter may be used.

3.7 This equipment shall be mounted in such a manner that it is not been heated by the process medium.

3.8 The cable connection of external grounding terminal shall be used with a cable lug.

** See the section 2-3-3 for the connection.*

7-8. INMETRO Flameproof/Dust Ignition Protection

Equipamento à prova de explosão do INMETRO

Segurança

Sobre este manual

Este manual contém informações e advertências que devem ser observadas para manter posicionador de válvula smart o AVP7XX que opera seguramente.

Instalação correta, operação correta e manutenção regular são essenciais para assegurar segurança enquanto usando este dispositivo.

Para o uso correto e seguro deste dispositivo é essencial que ambos que operam e pessoal de serviço segue procedimentos de segurança geralmente aceitos além das precauções de segurança especificadas neste manual.

Os símbolos seguintes são usados neste manual para alertar a possíveis perigos:

Advertência

Denota um potencialmente situação perigosa que, se não evitou, poderia resultar em morte ou dano sério.

Precaução

Denota uma situação potencialmente situação perigosa que, se não evitar, poderá resultar em um dano secundário ao operador ou poderá danificar o dispositivo.

~ Informação de nota que pode ser útil ao usuário.

Precauções de segurança

ADVERTINDO

- PERIGO DE CHOQUE ELÉTRICO! Desligue antes de executar qualquer instalação elétrica.
- NUNCA abra a tampa do invólucro do terminal enquanto o AVP7XX está energizado em um ambiente de atmosfera explosiva.
- Não toque o AVP7XX desnecessariamente enquanto estiver em operação.A superfície pode estar muito quente ou muito fria, enquanto dependendo do ambiente operacional.

PRECAUÇÃO

Não pisar, apoiar-se ou subir noAVP7XX. Você pode danificar o aparelho.

1. Marcação conforme a Portaria 179 do INMETRO:

Azbil Corporation

Tipo:AVP 7XX

Ex db llC T6 Gb

Ex tb IIIC T85 ºC Db

−30°C≤Ta≤+75°C

Número de série: ...
NCC 14.3175 X

ATENÇÃO – NÃO ABRA QUANDO UMA ATMOSFERA EXPLOSIVA PUDER ESTAR

PRESENTE

2. Normas conforme a Portaria 179 do INMETRO:

ABNT NBR IEC 60079–0:2013

ABNT NBR IEC 60079–1:2009

ABNT NBR IEC 60079–31:2011

3. Condições especiais para uso seguro:

- As dimensões das juntas à prova de explosão estão detalhadas nos documentos do fabricante.
- Os parafusos usados para montar o corpo pneumático do invólucro 'Ex d' devem ser de classes A2-70 ou A4-70.
- Quando usado em área onde são exigidos equipamentos com nível de proteção EPL Db, deve ser evitada descarga eletrostática.

4. Instruções para o uso seguro

Este produto é expedido com o elemento de vedação certificado por IECEx apenas para evitar a entrada de objetos estranhos sólidos e água durante o transporte.

A certificação deste produto não inclui o elemento de vedação.

Ao instalar, verifique a conformidade do elemento de vedação com os padrões pertinentes.

7-9. EAC Flameproof

Взрывозащищенное исполнение в соответствии с техническим регламентом ТР ТС 012/2011 «О безопасности оборудования для работы во взрывоопасных средах»

1. Маркировка

ЕАЭС RU C-JP.EX01.B.00075/19

1Ex d IIC T6 Gb X -30 °C ≤ Ta ≤ +75 °C IP66

Ex tb IIIC T85°C Db X -30 °C ≤ Ta ≤ +75 °C IP66

2. Применяемые стандарты

- ГОСТ 31610.0-2014 (IEC 60079-0:2011)
- ГОСТ IEC 60079-1-2011
- ГОСТ IEC 60079-31-2013

3. Специальные условия применения

- Зазор между валом магнитного блока и корпусом пневматического модуля должен быть не больше 0,065 мм.
- Крышка клеммной коробки должна быть закручена по резьбе как минимум на 7,5 оборотов.
- Зазор между корпусом пневматического модуля и оболочкой изделия должен быть не больше 0,13 мм.
- Крышка электроники должна быть закручена по резьбе как минимум на 6,8 оборотов.
- Зазор между корпусом изделия и датчиком обратной связи должен быть не больше 0,11 мм.
- Зазор между пламегасителем и корпусом пневматического модуля должен быть не больше 0,145 мм.
- Зазор между корпусом датчика и наружным рукавом должен быть не больше 0,07 мм.
- Зазор между вращающимся валом и внутренним рукавом должен быть не больше 0,07 мм.
- Для крепления пневматического модуля к оболочке Ex d следует использовать винты класса A2-70 или A4-70.
- Корпуса позиционеров способны накапливать электростатический заряд, поэтому они должны устанавливаться в местах, где риск электростатического разряда сведен к минимуму.
- Ремонт взрывонепроницаемых соединений позиционеров допускается, если он произведен изготовителем или его уполномоченным представителем.

4. Инструкции для безопасной эксплуатации

4.1 Не открывайте корпус при наличии взрывоопасной атмосферы.

4.2 Используйте подходящие кабели и кабельные вводы с температурным диапазоном на 5°C выше температуры окружающей среды.

4.3 Чтобы обеспечить степень защиты не ниже IP66 в соответствии со стандартом IEC 60529, необходимо использовать и правильно устанавливать подходящие кабельные вводы, уплотнения кабелепроводов и заглушки.

4.4 Используемые кабельные вводы и уплотнения кабелепроводов должны иметь соответствующий сертификат взрывозащиты.

4.5 Неиспользуемые отверстия должны быть закрыты заглушками, имеющими соответствующий сертификат взрывозащиты.

4.6 Если используются резьбовые переходники, они должны иметь сертификат соответствующий сертификат взрывозащиты. Можно использовать не более одного переходника на каждый ввод.

4.7 Данное оборудование следует устанавливать так, чтобы оно не нагревалось за счет технологической среды.

4.8 Соединительный кабель внешнего заземления должен быть оснащен кабельным наконечником.

* Описание подключения см. в разделе 2-3.

4.9 Данное изделие комплектуется заглушкой с сертификатом IECEx лишь для предотвращения попадания внутрь посторонних предметов и воды во время транспортировки, и эта заглушка не включается в сертификацию изделия. Во время установки убедитесь, что заглушка соответствует надлежащим стандартам.

7-10. ATEX Intrinsic Safety and Dust Ignition Protection(FISCO)

1. Marking information

CE 0344 **Baseefa16ATEX0088X**

FISCO field device

II 1G Ex ia IIC T4 Ga -40°C ≤ Ta ≤ +60°C

II 1D Ex ia IIIC T135°C Da -40°C ≤ Ta ≤ +60°C IP66

2. Applicable standards

- EN IEC 60079-0: 2018
- EN 60079-11: 2012

3. Special conditions for safe use ⚠ Caution

3.1 For Group III, the enclosure must be mounted in a location where the risk of electrostatic discharge is minimised.

3.2 The enclosure of the product is made of aluminium, if it is mounted in an area where the use of EPL Ga apparatus is required, it must be installed such that, even in the event of rare incidents, ignition sources due to impact or friction sparks are excluded.

3.3 The equipment is not capable of passing a 500V dielectric strength test between the power and signal connections and the housing. This shall be taken into account during installation.

4. Instruction for safe use ⚠ Caution

4.1 To maintain the degree of protection of IP66 in accordance with IEC 60529, suitable cable glands, conduit sealing devices or blanking elements must be used and correctly installed.

7-11. IECEx Intrinsic Safety and Dust Ignition Protection (FISCO)

1. Marking information

IECEx BAS 16.0069X

FISCO Field Device

Ex ia IIC T4 Ga -40°C ≤ Ta ≤ +60°C

Ex ia IIIC T135°C Da -40°C ≤ Ta ≤ +60°C IP66

2. Applicable standards

- IEC 60079-0 : 2017
- IEC 60079-11 : 2011

3. Special conditions for safe use ⚠ Caution

3.1 For Group III, the enclosure must be mounted in a location where the risk of electrostatic discharge is minimised.

3.2 The enclosure of the product is made of aluminium, if it is mounted in an area where the use of EPL Ga apparatus is required, it must be installed such that, even in the event of rare incidents, ignition sources due to impact or friction sparks are excluded.

3.3 The equipment is not capable of passing a 500V dielectric strength test between the power and signal connections and the housing. This shall be taken into account during installation.

4. Instruction for safe use ⚠ Caution

4.1 To maintain the degree of protection of IP66 in accordance with IEC 60529, suitable cable glands, conduit sealing devices or blanking elements must be used and correctly installed.

7-12. CCC Intrinsic Safety and Dust Ignition Protection

CCC本安防爆

1. 防爆标志

Ex ia IIC T4 Ga

Ex ia IIIC T_{200}135℃ Da

2. 国家防爆标准

GB/T 3836.1-2021 爆炸性环境 第1部分：设备 通用要求

GB/T 3836.4-2021 爆炸性环境 第4部分：由本质安全型“i”保护的设备

3. 产品安全使用特殊条件

3-1. 当产品安装于要求EPL Ga级的场所时，用户须采取有效措施防止产品外壳由于冲击或摩擦引起的点燃危险。

3-2. 产品在爆炸性粉尘环境使用时，应采取措施避免传播型刷型放电产生引燃危险。仅允许使用湿布擦拭。

3-3. 关联设备应优先选用隔离式安全栅；如选用齐纳式安全栅，应符合GB/T 3836.15-2017标准关于本安电路接地的要求。

3-4. 使用环境温度：-40℃~+60℃。

4. 产品使用注意事项

4-1. 产品使用环境温度范围： - 40℃ ~ + 60℃。

4-2. 产品必须与经防爆检验认可的关联设备配套共同组成本安防爆系统方可使用于现场存在爆炸性气体混合物的危险场所。其系统接线必须同时遵守该产品和所配关联设备的使用说明书要求，接线端子不得接错。产品本安电气参数见下表：

4.2.1 AVP7a 0、AVP7a 1、AVP7a 2

输入信号端子：

最高输入电压	最大输入电流	最大输入功率	最大内部等效参数	
U_i (V)	I_i (mA)	P_i (W)	C_i (nF)	L_i (μH)
30	93	0.9	4	220

输出信号端子：

最高输出电压	最大输入电流	最大输入功率	最大内部等效参数	
U_o (V)	I_o (mA)	P_o (W)	C_o (nF)	L_o (μH)
30	93	0.9	22	220

4-2.2 AVP703型用户端子

最高输入电压	最大输入电流	最大输入功率	最大内部等效参数	
U_i (V)	I_i (mA)	P_i (W)	C_i (nF)	L_i (μH)
17.5	380	5.32	2	近似为0

4-3. 用户不得自行更换该产品的零部件，应会同产品制造商共同解决运行中出现的故障，以杜绝损坏现象的发生。

4-4. 用户应当保持产品外壳表面清洁，以防粉尘堆积，但严禁用压缩空气吹扫。

4-5. 产品的安装、使用和维护应同时遵守产品说明书及下列相关标准、规范的要求：

GB/T 3836.13-2021 爆炸性环境 第13部分：设备的修理、检修、修复和改造

GB/T 3836.15-2017 爆炸性气体环境用电气设备 第15部分：危险场所电气安装（煤矿除外）

GB/T 3836.16-2017 爆炸性气体环境用电气设备 第16部分：电气装置的检查和维护（煤矿除外）

GB/T 3836.18-2017 爆炸性环境 第18部分：本质安全系统

GB 15577–2018 粉尘防爆安全规程

GB 50257–2014 电气装置安装工程爆炸和火灾危险环境 电气装置施工及验收规范

CCC型号

AVP7xy - ①②③ - ④⑤⑥⑦

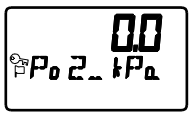
where:
x=0(Valve positioner)
x=1(Emergency valve shutdown function with Foundation Fieldbus communication)
x=3(valve travel transmitter only)
x=7(Positioner with emergency valve shutdown function @4.48mA)
x=8(Positioner with emergency valve shutdown function @0.5mA)
x=9(Emergency valve shutdown function only)
y=0(Positioner & contact output for alarm)
y=1(Positioner& Valve travel transmitter)
y=2(no output)
x=3(Foundation Fieldbus communication)
y=4(Positioner & Foundation Fieldbus communication)
AVP7xy 所有组合搭配：AVP700/701/702/703/704/770/771/772/780/781/782/790/791/792/713/731

					Code
① Structure	CCC Flameproof / Dust ignition protection (Electrical connection G1/2 is not available)				N
	CCC Intrinsically Safe				R
② Connection	Electrical connection	Air piping connection	Mounting thread	Pressure gauge thread	
	M20x1.5	1/4NPT	M8	Rc1/8	M
	1/2NPT	1/4NPT	M8	Rc1/8	N
	1/2NPT	1/4NPT	M8	1/8NPT	P
	1/2NPT	1/4NPT	5/16-18UNC	Rc1/8	U
	1/2NPT	1/4NPT	5/16-18UNC	1/8NPT	C
	G1/2	Rc1/4	M8	Rc1/8	G
③ Finish	Standard				S
	Corrosion Proof				B
	Silver Finish				D

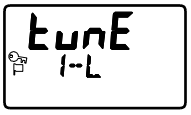
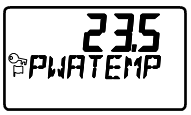
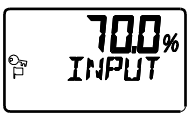
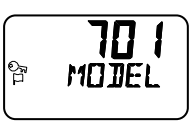
④⑤ Display	Display with push button	DX
⑥ Diagnostic	Advanced diagnosis	A
⑦ Overvoltage Protection	None	X
	With overvoltage protection	V

Appendix A. LUI Display Example

Normal monitor

Guide number	Display	Reading	Item	Remarks
1-1		70.0	Opening	Displays the item value in percentage.
		TRAVEL		Valve opening
1-2		70.0	Input signal	Displays the item value in percentage.
		SP		SetPoint
1-3	—	—	—	—
		—		—
1-4		192.0	Output air pressure OUT1	Displays the item value in kPa.
		Po1_kPa		Pressure OUT1 (kPa)
1-5		0.0	Output air pressure OUT2	Displays the item value in kPa.
		Po2_kPa		Pressure OUT2 (kPa)
1-6		270.0	Supply air pressure Ps	Displays the item value in kPa.
		Ps_kPa		Pressure Supply (kPa)

Details monitor

Guide number	Display	Reading	Item	Remarks
2-1		1.0	Software version	Displays the item value. (The initial setting is the same as that on the seal affixed on the case.)
		S/W_VER		Software Version
2-2		TUNE	Control parameters	Tuning Parameter
		1-L		Left: Actuator Size, Right: Friction Level (Initial setting value: 2-L)
2-3		23.5	Electronic substrate temperature	Displays the item value in degrees.
		PWATEMP		Substrate temperature
2-4		56.5	Electropneumatic transduction module Driving current	Displays the item value in percentage.
		EPM_DRV		EPM Drive Signal (EPM: Electropneumatic transduction module)
2-5		150.5	Electropneumatic transduction module Output air pressure	Displays the item value in kPa.
		Pn_kPa		Pressure Nozzle back in EPM (kPa)
2-6		70.0	Input %	Displays the item value in percentage.
		INPUT		Input Signal
2-7		70.1	Opening (Reverse transduction of flow amount characteristic)	Displays the item value in percentage.
		POS		Position
2-8		O_TYP	Single-acting/double-acting	Output Type
		SINGLE (single-acting) DOUBLE (double-acting)		SINGLE: Single-acting DOUBLE: Double-acting Set during auto setup. (Initial setting: SINGLE)
2-9		P_ACT	Forward/reverse	Positioner Action
		DIRECT (forward) REVERSE (reverse)		DIRECT: Forward REVERSE: Reverse Set during auto setup. (Initial setting: DIRECT)
2-10		15.3	Angle when the valve opening is 0%	Displays the item value in degrees.
		0%.DEG		0% angle (Degree)
2-11		13.2	Angle when the valve opening is 0%	Displays the item value in degrees.
		100%.DEG		100% angle (Degree)
2-12		701	Basic model number	_ _ _ of basic model number AVP_ _ _
		MODEL		Basic model number

Status monitor

Guide number	Display	Reading	Item	Remarks
3-1		SS_00	Status	SS: StatusSummary Numerical value: Status category
		0x01		0x: Hexadecimal format Numerical value: Details of status

FF monitor

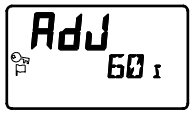
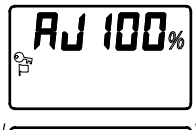
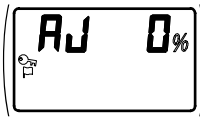
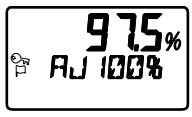
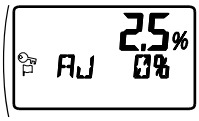
Guide number	Display	Reading	Item	Remarks
4-1		247	Node address	Node address (decimal value)
		ADR_0xF7		Node address (hexadecimal value)
4-2		PD-T1	PD_TAG (1st to 7th characters)	PD_TAG (1)
		AVP700_		PD_TAG (1st to 7th characters)
4-3		PD-T2	PD_TAG (8th to 14th characters)	PD_TAG (2)
		ALPHAPL		PD_TAG (8th to 14th characters)
4-4		PD-T3	PD_TAG (15th to 21st characters)	PD_TAG (3)
		T_VALVE		PD_TAG (15th to 21st characters)
4-5		PD-T4	PD_TAG (22nd to 28th characters)	PD_TAG (4)
		POSITIO		PD_TAG (22nd to 28th characters)
4-6		PD-T5	PD_TAG (29th to 32nd characters)	PD_TAG (5)
		NER_		PD_TAG (29th to 32nd characters)
4-7		Numerical value	Software revision (FF)	Displays the item value. (The initial setting is the same as that on the seal affixed on the case.)
		S/W_REV		Software Revision
4-8		Numerical value	DD File	Displays the item value.
		DD_FILE		DD_FILE_Version

Setup mode

Auto setup

Guide number	Display	Reading	Item	Remarks
7-1		ASU	ASU initial screen	Auto SetUp
		60s		Time until the setup mode automatically ends (Not displayed if the time is longer than 60 seconds.)
7-2		ASU	Waiting for ASU execution	Auto SetUp
		START→→		To perform auto setup, hold down the ENT button.
7-3		ASU	ASU is being performed.	Auto SetUp
		RUNNING		Flashes.
7-4		ASU	Waiting until ASU stops.	Auto SetUp
		STOP→→		To abort auto setup, hold down the ENT button.
7-5		80.5	ASU monitor	Valve opening (%)
		208.5kPa		Output air pressure OUT1
7-6		ASU	ASU successfully completed	Auto SetUp
		SUCCESS		
7-7		ASU	ASU failed	Auto SetUp
		FAIL_01		The numerical value is an error code.

Zero span adjustment

Guide number	Display	Reading	Item	Remarks
8-1		ADJ	ADJ initial screen	Angle Adjustment
		60s		Time until the setup mode automatically ends (Not displayed if the time is longer than 60 seconds.)
8-2		AJ100 (AJ 0)	ADJ adjustment opening selection	AJ100: Adjust 100% Angle (AJ 0: Adjust 0% Angle)
		→		
8-3		AJ100 (AJ 0)	ADJ adjustment angle selection	AJ100: Adjust 100% Angle (AJ 0: Adjust 0% Angle)
		COARSE→ MID → FINE →		Angle adjusted by operating the button once COARSE: 1° MID: 0.1° FINE: 0.01°
8-4		97.5	ADJ is being adjusted	Valve opening (%)
		AJ100% (AJ 0%)		AJ100: Adjust 100% Angle (AJ 0: Adjust 0% Angle)
8-5		99.8	ADJ monitor	Valve opening (%)
		235.0kPa		Output air pressure OUT1
8-6		ST 0 ST100	ADJ Manual Setting adjustment opening selection	ST 0: Set 0% angle ST100: Set 100% angle
		→		
8-7		ST 0 ST100	Waiting until ADJ Manual Setting is performed	ST 0: Set 0% angle ST100: Set 100% angle
		OK?→→		To perform manual setting, hold down the ENT button.
8-8		ST 0 ST100	ADJ Manual Setting completed	ST 0: Set 0% angle ST100: Set 100% angle
		SUCCESS		

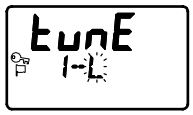
Supply bypass

Guide number	Display	Reading	Item	Remarks
9-1		BPS 60s	BPS initial screen	Supply Bypass Time until the setup mode automatically ends (Not displayed if the time is longer than 60 seconds.)
9-2		BPS : P_MIN→→ : P_MAX→→	BPS pressure selection	Supply Bypass To perform the selected supply bypass, hold down the ENT button.
9-3		BPS : RUN_MIN : RUN_MAX	BPS execution	Supply Bypass Flashes.
9-4		BPS CLEAR→→	BPS stop selection	Supply Bypass To abort the supply bypass, hold down the ENT button.
9-5		BPS CLEARED	BPS stop completed	Supply Bypass
9-6		BPS FAIL_01	BPS execution impossible	Supply Bypass The numerical value is an error code.

PST

Guide number	Display	Reading	Item	Remarks
10-1		PST 60s	PST initial screen	Partial Stroke Test Time until the setup mode automatically ends (Not displayed if the time is longer than 60 seconds.)
10-2		PST START→→	Waiting for PST execution	Partial StrokeT est To perform auto setup, hold down the ENT button.
10-3		PST RUNNING	PST being performed	Partial Stroke Test Flashes.
10-4		PST STOP→→	Waiting until the PST stops	Partial Stroke Test To abort auto setup, hold down the ENT button.
10-5		90.5 220.0kPa	PST monitor	Valve opening (%) Output air pressure OUT1
10-6		PST SUCCESS	PST successfully completed	Partial Stroke Test
10-7		PST FAIL_01	PST failed	Partial Stroke Test The numerical value is an error code.

Control parameters

Guide number	Display	Reading	Item	Remarks
11-1		TUNE 60s	Control parameter initial screen	Tuning Parameter Changes depending on the time until the setup mode automatically ends [Longer than 60 seconds] Current control parameter [60 seconds or less] Time until the setup mode automatically ends (in seconds)
11-2		TUNE 1-L	Control parameter selection	Tuning Parameter To change control parameters, hold down the ENT button.
11-3		TUNE 1-L	Control parameter check	Tuning Parameter

Configuration

Guide number	Display	Reading	Item	Remarks
12-1		CONF 60s	Actuator Type and Valve Closed Position specification initial screen	Valve Configuration Lower section: Time until the setup mode automatically ends (Not displayed if the time is longer than 60 seconds.)
12-2		A_TYPE LINEAR R 90 R OTH R_S 90 R_S OTH	Actuator Type specification screen	Actuator Type Flashes. LINEAR: Linear valve R 90: Rotary valve with an operating angle of 90° R OTH: Rotary valve with an operating angle other than 90° R_S 90: Rotary sub valve with an operating angle of 90° R_S OTH: Rotary sub valve with an operating angle other than 90°
12-3		CLS_P UP DOWN	Valve Closed Position specification screen	Valve Closed Position Flashes.
12-4		A_TYPE LINEAR R 90 R OTH R_S 90 R_S OTH	Actuator Type confirmation screen	Actuator Type Same as 12-2. (Does not flash.)
12-5		CLS_P UP DOWN	Valve Closed Position confirmation screen	Valve Closed Position

Appendix B. Menu List

Menu List

Menu list	Parameter name	Description	Style	Block
Process Variables		Displays the process value and its chart.	WINDOW	Pos_TB
Final Value. Status	FINAL_VALUE.STATUS	Input signal.STATUS	Parameter	Pos_TB
Final Value. Value	FINAL_VALUE.VALUE	Input signal.VALUE	Parameter	Pos_TB
Working Setpoint. Status	WORKING_SP.STATUS	Input signal after characteristic transduction of flow amount.STATUS	Parameter	Pos_TB
Working Setpoint. Value	WORKING_SP.VALUE	Input signal after characteristic transduction of flow amount.VALUE	Parameter	Pos_TB
Working Position. Status	WORKING_POS.STATUS	Opening.STATUS	Parameter	Pos_TB
Working Position. Value	WORKING_POS.VALUE	Opening.VALUE	Parameter	Pos_TB
Final Position Value. Status	FINAL_POSITION_VALUE.STATUS	Opening after characteristic transduction of flow amount. STATUS	Parameter	Pos_TB
Final Position Value. Value	FINAL_POSITION_VALUE.VALUE	Opening after characteristic transduction of flow amount. VALUE	Parameter	Pos_TB
Drive Signal	DRIVE_SIGNAL	EPM drive signal [%]	Parameter	Pos_TB
Pressure Port A	PRESSURE_PORT_A	Output air pressure (OUT1)	Parameter	Pos_TB
Pressure Port B *1	PRESSURE_PORT_B	Output air pressure (OUT2)	Parameter	Pos_TB
Pressure Supply	PRESSURE_SUPPLY	Supply air pressure (SUP)	Parameter	Pos_TB
Pressure Nozzle	PRESSURE_NOZZLE	Nozzle back pressure (Pn)	Parameter	Pos_TB
Internal Temperature	INTERNAL_TEMP	Electric board temperature	Parameter	Pos_TB
Trend	position_chart	Trend chart display	Chart	Pos_TB
Pressure Port A Gauge	pressure_port_a_chart	Po1 output air pressure meter display	Chart	Pos_TB
Pressure Port B Gauge *1	pressure_port_b_chart	Po2 output air pressure meter display	Chart	Pos_TB
Pressure Supply Gauge	pressure_supply_chart	Ps supply air pressure meter display	Chart	Pos_TB
Pressure Nozzle Gauge	pressure_nozzle_chart	Pn nozzle back pressure meter display	Chart	Pos_TB
Device (Block when on the block level menu)		Device setup, adjustment and test	MENU	All
Basic Setup		Basic settings	WINDOW	Pos_TB
Auto Setup	auto_setup_method	Performs auto setup.	Method	Pos_TB
Travel Angle at 100%	TRAVEL_ANGLE_100	100% opening angle	Parameter	Pos_TB
Travel Angle at 0%	TRAVEL_ANGLE_0	0% opening angle	Parameter	Pos_TB
Stroke Time Open	STROKE_TIME_OPEN	Operation time (when open)	Parameter	Pos_TB
Stroke Time Closed	STROKE_TIME_CLOSED	Operation time (when closed)	Parameter	Pos_TB
Stroke Time Average	STROKE_TIME_AVERAGE	Operation time (average)	Parameter	Pos_TB
Friction Index	FRICTION_INDEX	Friction index	Parameter	Pos_TB
Initial Pressure Supply	INITIAL_PRESSURE_SUPPLY	Standard supply pressure	Parameter	Pos_TB
Spring Range High	SPRING_RANGE_HI	Spring range High	Parameter	Pos_TB
Spring Range Low	SPRING_RANGE_LO	Spring range Low	Parameter	Pos_TB
Drive Signal Range High	DRIVE_SIGNAL_RANGE_HI	EPM drive signal range High	Parameter	Pos_TB
Drive Signal Range Low	DRIVE_SIGNAL_RANGE_LO	EPM drive signal range Low	Parameter	Pos_TB
Drive Signal-Pn Gain	DRIVE_SIANAL_PN_GAIN	EPM drive signal gain	Parameter	Pos_TB
Drive Signal-Pn Intercept	DRIVE_SIGNAL_PN_INTERCEPT	EPM drive signal segment	Parameter	Pos_TB
Configuration		Configuration	WINDOW	All
Positioner Configuration		Positioner configuration	PAGE	Pos_TB
Valve System		Setup of valve system	GROUP	Pos_TB
Actuator Type	ACT_TYPE	Actuator type	Parameter	Pos_TB
Valve Closed Position	VALVE_CLOSED_POSITION	Feedback lever position when the opening is 0%	Parameter	Pos_TB
Feedback Lever Motion	FEEDBACK_LEVER_MOTION	Feedback lever operation direction when the output air pressure increases	Parameter	Pos_TB
Pilot Relay Type	PILOT_RELAY_TYPE	Pilot relay operation (single-acting/double-acting)	Parameter	Pos_TB
Positioner Action	POSITIONER_ACTION	Positioner operation (positive/reverse)	Parameter	Pos_TB
Electrical Fail To	ELECTRICAL_FAIL_TO	Valve operation direction when the input signal is disconnected	Parameter	Pos_TB
Air Fail To	AIR_FAIL_TO	Valve operation direction when the supply air pressure is disconnected	Parameter	Pos_TB
Actuator Fail Action	ACT_FAIL_ACTION	Fail safe operation of actuator	Parameter	Pos_TB
Control Configuration		Specification of control parameters	GROUP	Pos_TB
Actuator Size	ACTUATOR_SIZE	Actuator size	Parameter	Pos_TB
Friction Level *2	FRICTION_LEVEL	Friction level	Parameter	Pos_TB
Position Deadband	POS_DEADBAND	Control deadband	Parameter	Pos_TB
Replace Control Parameters *3	replace_control_parameters_method	Replaces the values in Control Parameters with the PID parameters determined based on Actuator Size and Friction Level.	Method	Pos_TB
P Outside of GAP1 *3	P_OUTSIDE_OF_GAP1	Proportional gain (outside the gap)	Parameter	Pos_TB
I Outside of GAP1 *3	I_OUTSIDE_OF_GAP1	Integral time (outside the gap)	Parameter	Pos_TB

Menu list	Parameter name	Description	Style	Block
D Outside of GAP1 *3	D_OUTSIDE_OF_GAP1	Differential time (outside the gap)	Parameter	Pos_TB
GAP1 *3	GAP1	Gap width	Parameter	Pos_TB
P Inside of GAP1 *4	P_INSIDE_OF_GAP1	Proportional gain (within the gap)	Parameter	Pos_TB
I Inside of GAP1*4	I_INSIDE_OF_GAP1	Integral time (within the gap)	Parameter	Pos_TB
D Inside of GAP1 *4	D_INSIDE_OF_GAP1	Differential time (within the gap)	Parameter	Pos_TB
GAP2 *3 *4	GAP2	Dual gap width	Parameter	Pos_TB
P Inside of GAP2 *5	P_INSIDE_OF_GAP2	Proportional gain (within the dual gap)	Parameter	Pos_TB
I Inside of GAP2 *5	I_INSIDE_OF_GAP2	Integral time (within the dual gap)	Parameter	Pos_TB
D Inside of GAP2 *5	D_INSIDE_OF_GAP2	Differential time (within the dual gap)	Parameter	Pos_TB
Characterization		Characterization	GROUP	Pos_TB
Characterization	CHARACTERIZATION	Flow amount characteristic	Parameter	Pos_TB
Custom Curve X Float [1] *6	CUSTOM_CURVE_X_FLOAT[1]	Custom data IN1	Parameter	Pos_TB
|	|	|		
Custom Curve X Float [21] *6	CUSTOM_CURVE_X_FLOAT[21]	Custom data IN21	Parameter	Pos_TB
Custom Curve Y Float [1] *6	CUSTOM_CURVE_Y_FLOAT[1]	Custom data OUT1	Parameter	Pos_TB
|	|	|		
Custom Curve Y Float [21] *6	CUSTOM_CURVE_Y_FLOAT[21]	Custom data OUT21	Parameter	Pos_TB
Final Value Cutoff		Forced fully open/closed setting	GROUP	Pos_TB
Final Value Hi Cutoff	FINAL_VALUE_CUTOFF_HI	Forced fully open value	Parameter	Pos_TB
Final Value Lo Cutoff	FINAL_VALUE_CUTOFF_LO	Forced fully closed value	Parameter	Pos_TB
Limit Switch 1			GROUP	Pos_TB
Limit Switch 1 Value Descrete.Status	LIMIT_SW_1_VALUE_D.STATUS	Limit switch output (Status)	Parameter	Pos_TB
Limit Switch 1 Value Descrete.Value	LIMIT_SW_1_VALUE_D.VALUE	Limit switch output (ON/OFF)	Parameter	Pos_TB
Limit Switch 1 Source	LIMIT_SW_1_SOURCE	Limit switch source (Final Position Value/Working Position)	Parameter	Pos_TB
Limit Switch 1 Mode	LIMIT_SW_1_MODE	Limit switch threshold value type (upper or lower limit)	Parameter	Pos_TB
Limit Switch 1 Threshold	LIMIT_SW_1_THRESHOLD	Limit switch threshold value	Parameter	Pos_TB
Limit Switch 1 Hysteresis	LIMIT_SW_1_HYSTERESIS	Limit switch hysteresis	Parameter	Pos_TB
Limit Switch 2			GROUP	Pos_TB
Limit Switch 2 Value Descrete.Status	LIMIT_SW_2_VALUE_D.STATUS	Limit switch output (Status)	Parameter	Pos_TB
Limit Switch 2 Value Descrete.Value	LIMIT_SW_2_VALUE_D.VALUE	Limit switch output (ON/OFF)	Parameter	Pos_TB
Limit Switch 2 Source	LIMIT_SW_2_SOURCE	Limit switch source (Final Position Value/Working Position)	Parameter	Pos_TB
Limit Switch 2 Mode	LIMIT_SW_2_MODE	Limit switch threshold value type (upper or lower limit)	Parameter	Pos_TB
Limit Switch 2 Threshold	LIMIT_SW_2_THRESHOLD	Limit switch threshold value	Parameter	Pos_TB
Limit Switch 2 Hysteresis	LIMIT_SW_2_HYSTERESIS	Limit switch hysteresis	Parameter	Pos_TB
Units		Units settings	GROUP	Pos_TB
Pressure Unit	PRESSURE_UNITS	Pressure display unit	Parameter	Pos_TB
Internal Temperature Unit	INTERNAL_TEMP_UNITS	Electric board temperature unit	Parameter	Pos_TB
FF Option		Pos_TB setting	PAGE	Pos_TB
Readback Select	READBACK_SELECT	Select FINAL_POSITION_VALUE or WORKING_POS as input to the AO.	Parameter	Pos_TB
Positioner OOS Options	PSNR_OOS_OPT	Operation settings for OOS	Parameter	Pos_TB
PSNR Fault State Option	PSNR_FSTATE_OPT	Operation when Pos_TB is Fault, fail_safe_direction	Parameter	Pos_TB
PSNR Fault State	PSNR_FSTATE_VAL	Position when Pos_TB is Fault	Parameter	Pos_TB
Signal Action	SIGNAL_ACTION	increase to OPEN or CLOSE	Parameter	Pos_TB
Display Configuration (Not displayed in the device menu.)		Display settings	PAGE	Disp_TB
Display Parameter Selection	DISPLAY_PARAM_SELECTION	Display parameter selection	Parameter	Disp_TB
Display Information Selection	DISPLAY_INFO_SELECTION	Display information selection	Parameter	Disp_TB
Display Cycle	DISPLAY_CYCLE	Display refresh cycle	Parameter	Disp_TB
Display Parameter 1			GROUP	Disp_TB
Block Type Selection 1	BLOCK_TYPE_SELECTION_1	Profile number specified for display setting 1	Parameter	Disp_TB
Block Tag Selection 1	BLOCK_TAG_SELECTION_1	BLOCK_TAG of the block that the parameter displayed in display setting 1 belongs to	Parameter	Disp_TB
Parameter Selection 1	PARAM_SELECTION_1	Parameter displayed in display setting 1	Parameter	Disp_TB
Display Tag 1	DISPLAY_TAG_1	Tag displayed in display setting 1	Parameter	Disp_TB
Unit Selection 1	UNIT_SELECTION_1	Units of parameter displayed in display setting 1	Parameter	Disp_TB
Custom Unit 1	CUSTOM_UNIT_1	User-specified units displayed in display setting 1	Parameter	Disp_TB
Exponent Selection 1	EXPONENT_SELECTION_1	User-specified number of decimal places displayed in display setting 1	Parameter	Disp_TB
Display Parameter 2			GROUP	Disp_TB
Block Type Selection 2	BLOCK_TYPE_SELECTION_2	Profile number specified for display setting 2	Parameter	Disp_TB
Block Tag Selection 2	BLOCK_TAG_SELECTION_2	BLOCK_TAG of the block that the parameter displayed in display setting 2 belongs to	Parameter	Disp_TB
Parameter Selection 2	PARAM_SELECTION_2	Parameter displayed in display setting 2	Parameter	Disp_TB

Menu list	Parameter name	Description	Style	Block
Display Tag 2	DISPLAY_TAG_2	Tag displayed in display setting 2	Parameter	Disp_TB
Unit Selection 2	UNIT_SELECTION_2	Units of parameter displayed in display setting 2	Parameter	Disp_TB
Custom Unit 2	CUSTOM_UNIT_2	User-specified units displayed in display setting 2	Parameter	Disp_TB
Exponent Selection 2	EXPONENT_SELECTION_2	User-specified number of decimal places displayed in display setting 2	Parameter	Disp_TB
Display Parameter 3			GROUP	Disp_TB
Block Type Selection 3	BLOCK_TYPE_SELECTION_3	Profile number specified for display setting 3	Parameter	Disp_TB
Block Tag Selection 3	BLOCK_TAG_SELECTION_3	BLOCK_TAG of the block that the parameter displayed in display setting 3 belongs to	Parameter	Disp_TB
Parameter Selection 3	PARAM_SELECTION_3	Parameter displayed in display setting 3	Parameter	Disp_TB
Display Tag 3	DISPLAY_TAG_3	Tag displayed in display setting 3	Parameter	Disp_TB
Unit Selection 3	UNIT_SELECTION_3	Units of parameter displayed in display setting 3	Parameter	Disp_TB
Custom Unit 3	CUSTOM_UNIT_3	User-specified units displayed in display setting 3	Parameter	Disp_TB
Exponent Selection 3	EXPONENT_SELECTION_3	User-specified number of decimal places displayed in display setting 3	Parameter	Disp_TB
Display Parameter 4			GROUP	Disp_TB
Block Type Selection 4	BLOCK_TYPE_SELECTION_4	Profile number specified for display setting 4	Parameter	Disp_TB
Block Tag Selection 4	BLOCK_TAG_SELECTION_4	BLOCK_TAG of the block that the parameter displayed in display setting 4 belongs to	Parameter	Disp_TB
Parameter Selection 4	PARAM_SELECTION_4	Parameter displayed in display setting 4	Parameter	Disp_TB
Display Tag 4	DISPLAY_TAG_4	Tag displayed in display setting 4	Parameter	Disp_TB
Unit Selection 4	UNIT_SELECTION_4	Units of parameter displayed in display setting 4	Parameter	Disp_TB
Custom Unit 4	CUSTOM_UNIT_4	User-specified units displayed in display setting 4	Parameter	Disp_TB
Exponent Selection 4	EXPONENT_SELECTION_4	User-specified number of decimal places displayed in display setting 4	Parameter	Disp_TB
Maintenance		Maintenance	PAGE	All
Travel Calibration		Zero span adjustment	GROUP	Pos_TB
Auto Travel Calibration	auto_travel_calibration_method	Automatically adjusts the zero and span.	Method	Pos_TB
Angle Correction	angle_correction_method	Opening angle adjustment	Method	Pos_TB
Travel Manual Setting	manual_setting_method	Manual adjustment	Method	Pos_TB
Change Travel Angle	change_travel_angle_method	Opening angle setting	Method	Pos_TB
Pressure Sensor Adjustment		Pressure sensor adjustment	GROUP	Pos_TB
Pressure Sensor Zero Adjustment	zero_adjustment_method	Pressure sensor zero adjustment	Method	Pos_TB
Simulation		Simulation	GROUP	Pos_TB
Final Value. Value	FINAL_VALUE.VALUE	Input signal	Parameter	Pos_TB
Working Setpoint. Value	WORKING_SP.VALUE	Opening	Parameter	Pos_TB
Drive Signal	DRIVE_SIGNAL	EPM drive signal	Parameter	Pos_TB
Restart		Restart	GROUP	RB
Restores Factory default blocks	restore_factory_default_blocks_method	Restores the factory data.	Method	RB
Resets transducer block Factory calibration	resets_tb_factory_calibration_methoed	Restores the calibration data at shipment.	Method	RB
Calibration Details		Detailed calibration note	GROUP	Pos_TB
Transducer Calibration Location	XD_CAL_LOC	Calibration location (note)	Parameter	Pos_TB
Transducer Calibration Date	XD_CAL_DATE	Calibration date (note)	Parameter	Pos_TB
Transducer Calibration Who	XD_CAL_WHO	Person who performed calibration (note)	Parameter	Pos_TB
Device Information		Displays or specifies device information.	PAGE	All
Device Image	device_image		Image	RB
Device Identification		Device information	GROUP	RB
Manufacturer Id	MANUFAC_ID	Manufacturer ID	Parameter	RB
Device Type	DEV_TYPE	Device type	Parameter	RB
ITK Version	ITK_VER	ITK version	Parameter	RB
Revisions		Revision	GROUP	RB
Device Revision	DEV_REV	Device revision	Parameter	RB
DD Revision	DD_REV	DD revision	Parameter	RB
Hardware Revision	HARDWARE_REV	Hardware revision	Parameter	RB
Software Revision	SOFTWARE_REV	Software revision	Parameter	RB
Capability Level	CAPABILITY_LEV	Capability level	Parameter	RB
Positioner Information		Positioner information	GROUP	Pos_TB
Positioner Software Revision	POSITIONER_SOFTWARE_REV	Software version for the board in the main body	Parameter	Pos_TB
Positioner Model Number	POSITIONER_MODEL_NUM	Positioner model	Parameter	Pos_TB
Positioner Serial Number	POSITIONER_SN	Serial number of positioner	Parameter	Pos_TB
VTD Sensor Serial Number	VTD_SENSOR_SN	Serial number of angle sensor	Parameter	Pos_TB
Pressure Sensor Serial Number	PRESSURE_SENSOR_SN	Serial number of pressure sensor board	Parameter	Pos_TB
Operating Time	OPERATING_TIME	Operating time	Parameter	Pos_TB
Actuator Information		Actuator information	GROUP	Pos_TB
Actuator Manufacturer Id	ACT_MAN_ID	Actuator manufacturer ID	Parameter	Pos_TB

Menu list	Parameter name	Description	Style	Block
Actuator Model Number	ACT_MODEL_NUM	Actuator model number	Parameter	Pos_TB
Actuator Serial Number	ACT_SN	Serial number of actuator	Parameter	Pos_TB
Valve Information		Valve information	GROUP	Pos_TB
Valve Manufacturer Id	VALVE_MAN_ID	Valve manufacturer ID	Parameter	Pos_TB
Valve Model Number	VALVE_MODEL_NUM	Valve model number	Parameter	Pos_TB
Valve Serial Number	VALVE_SN	Serial number of valve	Parameter	Pos_TB
Valve Type	VALVE_TYPE	Valve type	Parameter	Pos_TB
Write Lock	WRITE_LOCK	Write lock	Parameter	RB
Block Mode		Displays or specifies the mode for each block.	PAGE	All
Resource Block Mode			GROUP	RB
Block Mode.Target	MODE_BLK.TARGET		Parameter	RB
Block Mode.Actual	MODE_BLK.ACTUAL		Parameter	RB
Change Mode to OOS	change_mode_to_oos_method	Sets the Target mode to OOS.	Method	RB
Change Mode to AUTO	change_mode_to_auto_method	Sets the Target mode to AUTO.	Method	RB
Positioner_TB Mode			GROUP	Pos_TB
Block Mode.Target	MODE_BLK.TARGET		Parameter	Pos_TB
Block Mode.Actual	MODE_BLK.ACTUAL		Parameter	Pos_TB
Change Mode to OOS	change_mode_to_oos_method	Sets the Target mode to OOS.	Method	Pos_TB
Change Mode to MAN	change_mode_to_man_method	Sets the Target mode to MAN.	Method	Pos_TB
Change Mode to AUTO	change_mode_to_auto_method	Sets the Target mode to AUTO.	Method	Pos_TB
Display_TB Mode			GROUP	Disp_TB
Block Mode.Target	MODE_BLK.TARGET		Parameter	Disp_TB
Block Mode.Actual	MODE_BLK.ACTUAL		Parameter	Disp_TB
Change Mode to OOS	change_mode_to_oos_method	Sets the Target mode to OOS.	Method	Disp_TB
Change Mode to AUTO	change_mode_to_auto_method	Sets the Target mode to AUTO.	Method	Disp_TB
Diagnostics		Displays or specifies device diagnostics.	MENU	All
Device Alarm		Displays or specifies NAMUR.	WINDOW	RB
Device Alarm Detection		Displays or specifies four NAMUR categories of alert information.	PAGE	RB
Alarm Indication		Displays the current error.	GROUP	RB
Fail Active	FD_FAIL_ACTIVE		Parameter	RB
Offspec Active	FD_OFFSPEC_ACTIVE		Parameter	RB
Maintenance Active	FD_MAINT_ACTIVE		Parameter	RB
Check Active	FD_CHECK_ACTIVE		Parameter	RB
Alarm Detection Enable		Four user-defined NAMUR categories	GROUP	RB
Fail Map	FD_FAIL_MAP		Parameter	RB
Offspec Map	FD_OFFSPEC_MAP		Parameter	RB
Maintenance Map	FD_MAINT_MAP		Parameter	RB
Check Map	FD_CHECK_MAP		Parameter	RB
Field Diagnostic Simulate		NAMUR bit assignment simulation	GROUP	RB
Field Diagnostic Simulate.Diagnostic Simulate Value	FD_SIMULATE.DIAGNOSTIC_SIMULATE_VALUE		Parameter	RB
Field Diagnostic Simulate.Diagnostic Value	FD_SIMULATE.DIAGNOSTIC_VALUE		Parameter	RB
Field Diagnostic Simulate.Simulate En/Disable	FD_SIMULATE.ENABLE_DISABLE		Parameter	RB
Alert Reporting		Alert report to the host	PAGE	RB
Alarm Broadcast Record			GROUP	RB
Fail Diagnostic Alarm			GROUP	RB
Fail Diagnostic Alarm.Unacknowledged	FD_FAIL_ALM.UNACKNOWLEDGED		Parameter	RB
Fail Diagnostic Alarm.Alarm State	FD_FAIL_ALM.ALARM_STATE		Parameter	RB
Fail Diagnostic Alarm.Time Stamp	FD_FAIL_ALM.TIME_STAMP		Parameter	RB
Fail Diagnostic Alarm.Subcode	FD_FAIL_ALM.SUB_CODE		Parameter	RB
Fail Diagnostic Alarm.Value	FD_FAIL_ALM.VALUE		Parameter	RB
Offspec Alarm			GROUP	RB
Offspec Alarm.Unacknowledged	FD_OFFSPEC_ALM.UNACKNOWLEDGED		Parameter	RB
Offspec Alarm.Alarm State	FD_OFFSPEC_ALM.ALARM_STATE		Parameter	RB
Offspec Alarm.Time Stamp	FD_OFFSPEC_ALM.TIME_STAMP		Parameter	RB
Offspec Alarm.Subcode	FD_OFFSPEC_ALM.SUB_CODE		Parameter	RB
Offspec Alarm.Value	FD_OFFSPEC_ALM.VALUE		Parameter	RB
Maintenance Alarm			GROUP	RB
Maintenance Alarm.Unacknowledged	FD_MAINT_ALM.UNACKNOWLEDGED		Parameter	RB
Maintenance Alarm.Alarm State	FD_MAINT_ALM.ALARM_STATE		Parameter	RB
Maintenance Alarm.Time Stamp	FD_MAINT_ALM.TIME_STAMP		Parameter	RB

Menu list	Parameter name	Description	Style	Block
Maintenance Alarm.Subcode	FD_MAINT_ALM.SUB_CODE		Parameter	RB
Maintenance Alarm.Value	FD_MAINT_ALM.VALUE		Parameter	RB
Check Alarm			GROUP	RB
Check Alarm.Unacknowledged	FD_CHECK_ALM.UNACKNOWLEDGED		Parameter	RB
Check Alarm.Alarm State	FD_CHECK_ALM.ALARM_STATE		Parameter	RB
Check Alarm.Time Stamp	FD_CHECK_ALM.TIME_STAMP		Parameter	RB
Check Alarm.Subcode	FD_CHECK_ALM.SUB_CODE		Parameter	RB
Check Alarm.Value	FD_CHECK_ALM.VALUE		Parameter	RB
Alarm Broadcast Enable			GROUP	RB
Fail Mask	FD_FAIL_MASK		Parameter	RB
Offspec Mask	FD_OFFSPEC_MASK		Parameter	RB
Maintenance Mask	FD_MAINT_MASK		Parameter	RB
Check Mask	FD_CHECK_MASK		Parameter	RB
Priority			GROUP	RB
Fail Priority	FD_FAIL_PRI		Parameter	RB
Offspec Priority	FD_OFFSEPC_PRI		Parameter	RB
Maintenance Priority	FD_MAINT_PRI		Parameter	RB
Check Priority	FD_CHECK_PRI		Parameter	RB
Valve Stroke Test		VST	WINDOW	Pos_TB
VST Mode	VST_MODE		Parameter	Pos_TB
Partial Stroke Test		PST settings	PAGE	Pos_TB
PST Enabled	PST_ENABLED	Allows or prohibits starting the PST.	Parameter	Pos_TB
PST Initial Travel	PST_INITIAL_TRAV	Normal opening (opening before the PST starts)	Parameter	Pos_TB
Partial Stroke Travel	PST_STRK_TRAV	Target position that the valve travels during PST [%]	Parameter	Pos_TB
VST Pause	VST_PAUSE	Wait time after the opening reaches the setting value	Parameter	Pos_TB
Partial Stroke Ramp Rate	PST_RAMP_RATE	Speed at which the opening setting value changes	Parameter	Pos_TB
Partial Stroke Init Start Time	PST_INITIAL_START_TIME	Initial start time of PST	Parameter	Pos_TB
Partial Stroke Interval	PST_INTERVAL	Test execution period	Parameter	Pos_TB
Partial Stroke Breakout Timeout	PST_BREAKOUT_TIMEOUT	Allowable PST_BREAKOUT_TIME	Parameter	Pos_TB
Partial Stroke Travel Timeout	PST_STRK_TRAV_TIMEOUT	Allowable time until the opening reaches the setting value	Parameter	Pos_TB
PST Completion Timeout	PST_COMPLETION_TIMEOUT	Allowable time until the test ends	Parameter	Pos_TB
PST Pressure Threshold	PST_PRESSURE_THRESHOLD	Threshold value for abnormal pressure evaluation	Parameter	Pos_TB
PST Stick-Slip Threshold	PST_STICK_SLIP_THRESHOLD	Y/X threshold values	Parameter	Pos_TB
PST Stick-Slip Alarm Enabled	diag_alarms_enabled[BIT_12_4BYTE]	Whether to allow the PST stick-slip alarm to be issued	bit	Pos_TB
Partial Stroke Options	PST_OPTIONS	Select the value read back to the AO (current value or retained value).	Parameter	Pos_TB
Execute PST	execute_pst_method	Performs the PST.	Method	Pos_TB
Abort PST	abort_pst_method	Aborts the PST.	Method	Pos_TB
Full Stroke Test		FST settings	PAGE	Pos_TB
VST Pause	VST_PAUSE	Wait time after the opening reaches the setting value	Parameter	Pos_TB
Full Stroke Ramp Rate	FST_RAMP_RATE	Speed at which the opening setting value changes	Parameter	Pos_TB
Full Stroke Breakout Timeout	FST_BREAKOUT_TIMEOUT	Allowable FST_BREAKOUT_TIME	Parameter	Pos_TB
Full Stroke Travel Timeout	FST_STRK_TRAV_TIMEOUT	Allowable time until the opening reaches the setting value	Parameter	Pos_TB
Full Stroke Completion Timeout	FST_COMPLETION_TIMEOUT	Allowable time until the test ends	Parameter	Pos_TB
FST Pressure Threshold	FST_PRESSURE_THRESHOLD	Threshold value for abnormal pressure evaluation	Parameter	Pos_TB
Execute FST	execute_fst_method	Performs the FST.	Method	Pos_TB
Result		VST result	PAGE	Pos_TB
VST Result	VST_RESULT	VST result	Parameter	Pos_TB
VST Detailed Result	VST_DETAILED_RESULT	Detailed VST result	Parameter	Pos_TB
Reset VST Result	reset_vst_result_method	Resets the VST result.	Method	Pos_TB
PST Result			GROUP	Pos_TB
Partial Stroke Breakout Time	PST_BREAKOUT_TIME	Time after the test starts until the valve moves	Parameter	Pos_TB
PST Start Travel	PST_START_TRAVEL	Opening when the PST starts	Parameter	Pos_TB
PST Start Pressure	PST_START_PRESSURE	Pressure when the PST starts	Parameter	Pos_TB
PST Pause Travel	PST_PAUSE_TRAVEL	Opening when the PST pauses	Parameter	Pos_TB
PST Pause Pressure	PST_PAUSE_PRESSURE	Pressure when the PST pauses	Parameter	Pos_TB
PST End Travel	PST_END_TRAVEL	Opening when the PST ends	Parameter	Pos_TB
PST End Pressure	PST_END_PRESSURE	Pressure when the PST ends	Parameter	Pos_TB
FST Result			GROUP	Pos_TB
Full Stroke Breakout Time	FST_BREAKOUT_TIME	Time after the test starts until the valve moves	Parameter	Pos_TB
FST Stroke Travel Time	FST_STRK_TRAV_TIME	Time actually taken to fully close the valve during FST	Parameter	Pos_TB

Menu list		Parameter name	Description	Style	Block
FST Start Travel		FST_START_TRAVEL	Opening when the FST starts	Parameter	Pos_TB
FST Start Pressure		FST_START_PRESSURE	Pressure when the FST starts	Parameter	Pos_TB
FST Pause Travel		FST_PAUSE_TRAVEL	Opening when the FST pauses	Parameter	Pos_TB
FST Pause Pressure		FST_PAUSE_PRESSURE	Pressure when the FST pauses	Parameter	Pos_TB
FST End Travel		FST_END_TRAVEL	Opening when the FST ends	Parameter	Pos_TB
FST End Pressure		FST_END_PRESSURE	Pressure when the FST ends	Parameter	Pos_TB
Diagnostic Status			Diagnostic status	WINDOW	Pos_TB
Positioner Diagnostic Status	Block_err_desc value	30–24: Failure 23–21: Offspec 15: Maintenance	Positioner diagnostic status	PAGE	Pos_TB
Main Board Communications Error	30	block_err_desc_1_pos[BIT_31_4BYTE]	IO section error (data reception impossible)	bit	Pos_TB
VTD Failure	29	VTD_FAILURE_LABEL		GROUP	Pos_TB
Valve Travel Detector Failure		block_err_desc_1_pos[BIT_30_4BYTE]	VTD all resistor threshold values exceeded	bit	Pos_TB
Valve Travel Detector Out of Range		block_err_desc_1_pos[BIT_29_4BYTE]	VTD angle threshold value exceeded	bit	Pos_TB
Main Board Failure	28	MAIN_BOARD_FAILURE_LABEL		GROUP	Pos_TB
Main Board CPU Failure		block_err_desc_1_pos[BIT_28_4BYTE]	AVP_CPU CPU diagnostic error	bit	Pos_TB
Main Board RAM Failure		block_err_desc_1_pos[BIT_27_4BYTE]	AVP_CPU RAM diagnostic error	bit	Pos_TB
Main Board ROM Failure		block_err_desc_1_pos[BIT_26_4BYTE]	AVP_CPU ROM diagnostic error	bit	Pos_TB
A/D Conversion Module 1 Failure		block_err_desc_1_pos[BIT_25_4BYTE]	ADC1 diagnostic error	bit	Pos_TB
A/D Conversion Module 2 Failure		block_err_desc_1_pos[BIT_24_4BYTE]	ADC2 diagnostic error	bit	Pos_TB
Main Board Non-Volatile Memory Failure		block_err_desc_1_pos[BIT_23_4BYTE]	AVP_CPU NVM diagnostic error	bit	Pos_TB
Pressure Sensor Failure	27	PRESSURE_SENSOR_FAILURE_LABEL		GROUP	Pos_TB
Pressure Port A Sensor Failure		block_err_desc_1_pos[BIT_22_4BYTE]	Po1 sensor error	bit	Pos_TB
Pressure Port B Sensor Failure		block_err_desc_1_pos[BIT_21_4BYTE]	Po2 sensor error	bit	Pos_TB
Pressure Supply Sensor Failure		block_err_desc_1_pos[BIT_20_4BYTE]	Ps sensor error	bit	Pos_TB
Pressure Nozzle Sensor Failure		block_err_desc_1_pos[BIT_19_4BYTE]	Pn sensor error	bit	Pos_TB
Temperature Sensor Failure	26	block_err_desc_1_pos[BIT_17_4BYTE]	Temperature sensor error	bit	Pos_TB
Internal Program Execution Error	25	block_err_desc_1_pos[BIT_16_4BYTE]	Program execution error	bit	Pos_TB
Failure of Scheduled PST	None	block_err_desc_1_pos[BIT_15_4BYTE]	PST start impossible	bit	Pos_TB
VTD Angle Span Out of Range	23	block_err_desc_2_pos[BIT_31_4BYTE]	The angle span is outside of the range.	bit	Pos_TB
Temperature Out of Range	22	TEMPERATURE_OUT_OF_RANGE_LABEL		GROUP	Pos_TB
Temperature Out of Range		block_err_desc_2_pos[BIT_30_4BYTE]	Main board temperature error	bit	Pos_TB
VTD Temperature Out of Range		block_err_desc_2_pos[BIT_28_4BYTE]	VTD temperature error	bit	Pos_TB
Pressure Supply Out of Range	21	block_err_desc_2_pos[BIT_29_4BYTE]	Supply pressure error	bit	Pos_TB
Failure Response is Executing	16	block_err_desc_2_pos[BIT_11_4BYTE]	Fail processing in progress (ACT_FAIL_ACTION is being performed when a major fault occurs.)	bit	Pos_TB
Positioner Air Circuit Alarm	15	POSITIONER_AIR_CIRCUIT_ALARM_LABEL		GROUP	Pos_TB
Restriction is clogged		block_err_desc_3_pos[BIT_31_4BYTE]	Pilot relay error	bit	Pos_TB
Deposits on the Nozzle-Flapper		block_err_desc_3_pos[BIT_30_4BYTE]	Nozzle flapper clogged	bit	Pos_TB
Valve Diagnostic Status			Valve diagnostic status	PAGE	Pos_TB
FF Standard Diagnostic Status			FF diagnostic status	GROUP	Pos_TB
Working Position High Alarm		block_err_desc_2_pos[BIT_27_4BYTE]	Opening error high alarm	bit	Pos_TB
Working Position Low Alarm		block_err_desc_2_pos[BIT_26_4BYTE]	Opening error low alarm	bit	Pos_TB
Final Value High Alarm		block_err_desc_2_pos[BIT_25_4BYTE]	Setting value error high alarm	bit	Pos_TB
Final Value Low Alarm		block_err_desc_2_pos[BIT_24_4BYTE]	Setting value error low alarm	bit	Pos_TB
Closed Position Alarm		block_err_desc_2_pos[BIT_23_4BYTE]	Zero point opening error alarm	bit	Pos_TB
Deviation Alarm		block_err_desc_2_pos[BIT_22_4BYTE]	Deviation error alarm	bit	Pos_TB
Travel Accumulation Alarm		block_err_desc_2_pos[BIT_21_4BYTE]	Cumulative sliding distance alarm	bit	Pos_TB
Cycle Counter Alarm		block_err_desc_2_pos[BIT_20_4BYTE]	Number of inversion operations alarm	bit	Pos_TB
Stroke Time Closed Alarm		block_err_desc_2_pos[BIT_19_4BYTE]	Fully closing operation time error alarm	bit	Pos_TB
Stroke Time Open Alarm		block_err_desc_2_pos[BIT_18_4BYTE]	Fully opening operation time error alarm	bit	Pos_TB
Trip Timeout Alarm		block_err_desc_2_pos[BIT_17_4BYTE]	Emergency shutoff operation time error alarm	bit	Pos_TB
Self-Diagnostic Status			Azbil diagnostic - error diagnostic status	GROUP	Pos_TB
Pressure Supply High Alarm		block_err_desc_2_pos[BIT_16_4BYTE]	Supply pressure high alarm	bit	Pos_TB
Pressure Supply Low Alarm		block_err_desc_2_pos[BIT_15_4BYTE]	Supply pressure low alarm	bit	Pos_TB
Temperature High Alarm		block_err_desc_2_pos[BIT_14_4BYTE]	High temperature error alarm	bit	Pos_TB
Temperature Low Alarm		block_err_desc_2_pos[BIT_13_4BYTE]	Low temperature error alarm	bit	Pos_TB
Stick-Slip High Alarm		block_err_desc_3_pos[BIT_21_4BYTE]	Stick-slip high alarm	bit	Pos_TB
Stick-Slip Medium Alarm		block_err_desc_3_pos[BIT_20_4BYTE]	Stick-slip medium alarm	bit	Pos_TB
Stick-Slip Low Alarm		block_err_desc_3_pos[BIT_19_4BYTE]	Stick-slip low alarm	bit	Pos_TB
Zero Travel +Alarm		block_err_desc_3_pos[BIT_16_4BYTE]	Zero point opening error positive alarm	bit	Pos_TB
Zero Travel –Alarm		block_err_desc_3_pos[BIT_15_4BYTE]	Zero point opening error negative alarm	bit	Pos_TB
Deviation +Alarm		block_err_desc_3_pos[BIT_18_4BYTE]	Deviation error positive alarm	bit	Pos_TB

Menu list	Parameter name	Description	Style	Block
Deviation –Alarm	block_err_desc_3_pos[BIT_17_4BYTE]	Deviation error negative alarm	bit	Pos_TB
Trend Diagnostic Status		Azbil diagnostic - tendency diagnostic status	GROUP	Pos_TB
Po Validity +Alarm	block_err_desc_3_pos[BIT_24_4BYTE]	Positive maximum pressure misalignment alarm	bit	Pos_TB
Po Validity –Alarm	block_err_desc_3_pos[BIT_23_4BYTE]	Negative maximum pressure misalignment alarm	bit	Pos_TB
Max Friction Alarm	block_err_desc_3_pos[BIT_22_4BYTE]	Maximum friction alarm	bit	Pos_TB
Total Stroke Alarm	block_err_desc_3_pos[BIT_29_4BYTE]	Cumulative sliding distance alarm	bit	Pos_TB
Cycle Count Alarm	block_err_desc_3_pos[BIT_28_4BYTE]	Number of inversion operations alarm	bit	Pos_TB
Shut Count Alarm	block_err_desc_3_pos[BIT_27_4BYTE]	Number of fully closing operations alarm	bit	Pos_TB
Max Travel Speed +Alarm	block_err_desc_3_pos[BIT_26_4BYTE]	Positive maximum operation speed alarm	bit	Pos_TB
Max Travel Speed –Alarm	block_err_desc_3_pos[BIT_25_4BYTE]	Negative maximum operation speed alarm	bit	Pos_TB
Diagnostic Setup		Diagnostic settings	MENU	Pos_TB
FF Standard Diagnostic Setup		Standard valve diagnostics settings	WINDOW	Pos_TB
Working Position Alarm	123		GROUP	Pos_TB
Stop Hi Position	STOP_HI_POS	Hi Alarm threshold value for WORKING_POS	Parameter	Pos_TB
Stop Lo Position	STOP_LO_POS	Low Alarm threshold value for WORKING_POS	Parameter	Pos_TB
Final Value Alarm	120		GROUP	Pos_TB
Position Alert High	POS_ALERT_HI	Hi Alarm threshold value for FINAL_VALUE	Parameter	Pos_TB
Position Alert Low	POS_ALERT_LO	Low Alarm threshold value for FINAL_VALUE	Parameter	Pos_TB
Closed Position	159		GROUP	Pos_TB
Closed Position Shift	CLOSED_POS_SHIFT	Shift amount to the fully closed position	Parameter	Pos_TB
Closed Position Deadband	CLOSED_POS_DEADBAND	Deadband of shift amount to the fully closed position	Parameter	Pos_TB
Deviation	119		GROUP	Pos_TB
Deviation Value	DEVIATION_VALUE	Difference between WORKING_SP and WORKING_POS	Parameter	Pos_TB
Deviation Deadband	DEVIATION_DEADBAND	Deadband setting value for deviation	Parameter	Pos_TB
Deviation Time	DEVIATION_TIME	Window time before the deviation alarm is issued	Parameter	Pos_TB
Travel Accumulator	125	Cumulative sliding distance (tendency diagnostics)	GROUP	Pos_TB
Travel Accumulator	TRAVEL_ACCUM	Cumulative sliding distance (variable units, reset not allowed)	Parameter	Pos_TB
Travel Accumulator Deadband	TRAVEL_ACCUM_DEADBAND	Cumulative sliding distance (1) (variable units)	Parameter	Pos_TB
Travel Accumulator Limit	TRAVEL_ACCUM_LIM	Threshold value for cumulative sliding distance (variable units, reset not allowed)	Parameter	Pos_TB
Travel Accumulation Unit	TRAVEL_ACCUM_UNITS	Units for cumulative sliding distance	Parameter	Pos_TB
Rated Travel	RATED_TRAVEL	Valve operation rated value (The units can be specified.)	Parameter	Pos_TB
Travel Unit	TRAVEL_UNITS	Units for sliding distance	Parameter	Pos_TB
Cycle Counter	129	Cumulative cycle counter	GROUP	Pos_TB
Cycle Counter	CYCLE_CNTR	Cumulative cycle count value (FF definition)	Parameter	Pos_TB
Cycle Counter Deadband	CYCLE_CNTR_DEADBAND	Deadband for the inversion count operation	Parameter	Pos_TB
Cycle Counter Limit	CYCLE_CNTR_LIM	Upper limit setting value for the inversion count	Parameter	Pos_TB
Stroke Time	201		GROUP	Pos_TB
Limit Stroke Time Open	STROKE_TIME_OPEN_LIM	Upper limit operation time from the fully closed status to the fully open status	Parameter	Pos_TB
Limit Stroke Time Close	STROKE_TIME_CLOSE_LIM	Upper limit operation time from the fully open status to the fully closed status	Parameter	Pos_TB
Trip Timeout	178		GROUP	Pos_TB
Trip Timeout	TRIP_TIMEOUT	Upper limit operation time when forcibly fully closing or opening the valve	Parameter	Pos_TB
Friction	172		GROUP	Pos_TB
Friction	FRICTION	Variation of pressure for the opening	Parameter	Pos_TB
Friction Unit	FRICTION_UNITS	Friction units specification	Parameter	Pos_TB
Internal Temperature	205		GROUP	Pos_TB
Maximum Internal Temperature	INTERNAL_TEMP_MAX	Actual highest temperature of electric board (Unit conversion is allowed.)	Parameter	Pos_TB
Minimum Internal Temperature	INTERNAL_TEMP_MIN	Actual lowest temperature of electric board (Unit conversion is allowed.)	Parameter	Pos_TB
Self-Diagnostic Setup		Error diagnostic settings	WINDOW	Pos_TB
Positioner Air Circuit		Positioner air circuit diagnostics (positioner diagnostics)	PAGE	Pos_TB
Drive Signal Max Shift +	DRIVE_SIGNAL_MAX_SHIFT_P	Maximum positive duty misalignment	Parameter	Pos_TB
Drive Signal Max Shift –	DRIVE_SIGNAL_MAX_SHIFT_M	Maximum negative duty misalignment	Parameter	Pos_TB
Reset Drive Signal Max Shift	reset_drive_signal_max_shift_method	Clears the Drive Sig Max Shift +/– value to zero.	Method	Pos_TB
Drive Signal Shift Threshold +	DRIVE_SIGNAL_SHIFT_THRESHOLD_P	Positive alarm threshold value	Parameter	Pos_TB
Drive Signal Shift Threshold –	DRIVE_SIGNAL_SHIFT_THRESHOLD_M	Negative alarm threshold value	Parameter	Pos_TB
Drive Signal Stable Threshold	DRIVE_SIGNAL_STABLE_THRESHOLD	Inclination threshold value for duty stability check	Parameter	Pos_TB
Pn Stable Threshold	PN_STABLE_THRESHOLD	Inclination threshold value for Pn stability check	Parameter	Pos_TB
Drive Signal +Alarm Count	DRIVE_SIGNAL_P_ALARM_COUNT	Number of positive alarms	Parameter	Pos_TB

Menu list	Parameter name	Description	Style	Block
Drive Signal –Alarm Count	DRIVE_SIGNAL_M_ALARM_COUNT	Number of negative alarms	Parameter	Pos_TB
Positioner Air Circuit Alarms Enabled	diag_alarms_enabled[BIT_8_4BYTE]	Whether to allow the positioner air circuit error alarm to be issued	bit	Pos_TB
Stick-Slip		Stick-slip diagnostics	PAGE	Pos_TB
Stick-Slip Graph	stick_slip_graph	Stick-slip graph	Graph	Pos_TB
Stick-Slip X[1]	STICK_SLIP_X[1]	Opening stick-slip index X [1]	Parameter	Pos_TB
Stick-Slip Y[1]	STICK_SLIP_Y[1]	Opening stick-slip index Y [1]	Parameter	Pos_TB
Stick-Slip Validity[1]	STICK_SLIP_VALIDITY[1]	Opening stick-slip index [1]	Parameter	Pos_TB
Stick-Slip Updated Time[1]	STICK_SLIP_UPDATED_TIME[1]	Index update date/time [1]	Parameter	Pos_TB
Stick-Slip High Alarm Count	STICK_SLIP_HI_ALARM_COUNT	Number of positive alarms H	Parameter	Pos_TB
Stick-Slip Medium Alarm Count	STICK_SLIP_MID_ALARM_COUNT	Number of positive alarms M	Parameter	Pos_TB
Stick-Slip Low Alarm Count	STICK_SLIP_LO_ALARM_COUNT	Number of positive alarms L	Parameter	Pos_TB
Stick-Slip Threshold High	STICK_SLIP_THRESHOLD_HI	Y/X threshold values H	Parameter	Pos_TB
Stick-Slip Threshold Medium	STICK_SLIP_THRESHOLD_MID	Y/X threshold values M	Parameter	Pos_TB
Stick-Slip Threshold Low	STICK_SLIP_THRESHOLD_LO	Y/X threshold values L	Parameter	Pos_TB
Stick-Slip Alarms Enabled	diag_alarms_enabled[BIT_9_4BYTE]	Whether to allow the stick-slip alarm (Low, Medium, and High) to be issued	bit	Pos_TB
Stick-Slip Grid	stick_slip_grid	Stick-slip data grid display	Grid	Pos_TB
Zero Travel		Zero point opening diagnostics	GROUP	Pos_TB
Zero Travel Max	ZERO_TRAVEL_MAX	Maximum zero point opening	Parameter	Pos_TB
Zero Travel Min	ZERO_TRAVEL_MIN	Minimum zero point opening	Parameter	Pos_TB
Reset Zero Travel Max/Min	reset_zero_travel_max_min_method	Clears the Zero Travel Max/Min value to zero.	Method	Pos_TB
Zero Travel Stable Threshold	ZERO_TRAVEL_STABLE_THRESHOLD	Inclination threshold value for opening stability check	Parameter	Pos_TB
Zero Travel Static Time	ZERO_TRAVEL_STATIC_TIME	Threshold value for the opening stability continuation time	Parameter	Pos_TB
Zero Travel Error Waiting Time	ZERO_TRAVEL_ERROR_WAITING_TIME	Threshold value for the wait time after fully closing the valve	Parameter	Pos_TB
Zero Travel Threshold +	ZERO_TRAVEL_THRESHOLD_P	Positive threshold value	Parameter	Pos_TB
Zero Travel Threshold –	ZERO_TRAVEL_THRESHOLD_M	Negative threshold value	Parameter	Pos_TB
Zero Travel Waiting Time	ZERO_TRAVEL_WAITING_TIME	Threshold value for the error continuation time	Parameter	Pos_TB
Zero Travel +Alarm Count	ZERO_TRAVEL_P_ALARM_COUNT	Number of positive alarms	Parameter	Pos_TB
Zero Travel –Alarm Count	ZERO_TRAVEL_M_ALARM_COUNT	Number of negative alarms	Parameter	Pos_TB
Zero Travel Alarms Enabled	diag_alarms_enabled[BIT_11_4BYTE]	Whether to allow the zero point deviation alarm (+/–) to be issued	bit	Pos_TB
Deviation			GROUP	Pos_TB
Deviation Time Max +	DEVIATION_TIME_MAX_P	Maximum continuation time of positive deviation	Parameter	Pos_TB
Deviation Time Max –	DEVIATION_TIME_MAX_M	Maximum continuation time of negative deviation	Parameter	Pos_TB
Reset Deviation Time Max	reset_deviation_time_max_method	Clears the Deviation Time Max +/– value to zero.	Method	Pos_TB
Deviation Threshold +	DEVIATION_THRESHOLD_P	Positive threshold value	Parameter	Pos_TB
Deviation Threshold –	DEVIATION_THRESHOLD_M	Negative threshold value	Parameter	Pos_TB
Deviation Waiting Time	DEVIATION_WAITING_TIME	Threshold value for the deviation continuation time	Parameter	Pos_TB
Deviation +Alarm Count	DEVIATION_P_ALARM_COUNT	Number of positive alarms	Parameter	Pos_TB
Deviation –Alarm Count	DEVIATION_M_ALARM_COUNT	Number of negative alarms	Parameter	Pos_TB
Deviation Alarms Enabled	diag_alarms_enabled[BIT_10_4BYTE]	Whether to allow the positive deviation continuation alarm (+/–) to be issued	bit	Pos_TB
Pressure Supply		Supply pressure diagnostics	GROUP	Pos_TB
Pressure Supply Max	PRESSURE_SUPPLY_MAX	Highest supply pressure (variable units)	Parameter	Pos_TB
Pressure Supply Min	PRESSURE_SUPPLY_MIN	Lowest supply pressure (variable units)	Parameter	Pos_TB
Reset Pressure Supply Max/Min	reset_pressure_supply_max_min_method	Clears the Pressure Supply Max/Min value to zero.	Method	Pos_TB
Pressure Supply Threshold High	PRESSURE_SUPPLY_THRESHOLD_HI	High pressure alarm threshold value (variable units)	Parameter	Pos_TB
Pressure Supply Threshold Low	PRESSURE_SUPPLY_THRESHOLD LO	Low pressure alarm threshold value (variable units)	Parameter	Pos_TB
Pressure Supply High Alarm Count	PRESSURE_SUPPLY_HI_ALARM_COUNT	Number of high pressure alarms	Parameter	Pos_TB
Pressure Supply Low Alarm Count	PRESSURE_SUPPLY_LO_ALARM_COUNT	Number of low pressure alarms	Parameter	Pos_TB
Pressure Supply Alarms Enabled	diag_alarms_enabled[BIT_7_4BYTE]	Whether to allow the supply pressure error alarm (High/Low) to be issued	bit	Pos_TB
Temperature		Temperature diagnostics	GROUP	Pos_TB
Temperature Max	TEMPERATURE_MAX	Highest temperature (fixed units)	Parameter	Pos_TB
Temperature Min	TEMPERATURE_MIN	Lowest temperature (fixed units)	Parameter	Pos_TB
Reset Temperature Max/Min	reset_temp_max_min_method	Clears the Temp Max/Min value to zero.	Method	Pos_TB
Temperature Threshold High	TEMPERATURE_THRESHOLD_HI	Hot alarm threshold value (variable units)	Parameter	Pos_TB
Temperature Threshold Low	TEMPERATURE_THRESHOLD_LO	Cold alarm threshold value (variable units)	Parameter	Pos_TB
Temperature High Alarm Count	TEMPERATURE_HI_ALARM_COUNT	Number of hot alarms	Parameter	Pos_TB
Temperature Low Alarm Count	TEMPERATURE_LO_ALARM_COUNT	Number of cold alarms	Parameter	Pos_TB
Temperature Alarms Enabled	diag_alarms_enabled[BIT_6_4BYTE]	Whether to allow the temperature error alarm to be issued	bit	Pos_TB

Menu list	Parameter name	Description	Style	Block
Trend Diagnostic Setup		Valve tendency diagnostics setting	WINDOW	Pos_TB
Force Balance		Pressure balance diagnostics (tendency diagnostics)	PAGE	Pos_TB
Po Validity		Output air pressure validity	GROUP	Pos_TB
Po Validity +	PO_VALIDITY_P	Positive maximum pressure misalignment	Parameter	Pos_TB
Po Validity –	PO_VALIDITY_M	Negative maximum pressure misalignment	Parameter	Pos_TB
Po Validity Threshold +	PO_VALIDITY__THRESHOLD_P	Threshold value for the positive maximum pressure misalignment alarm	Parameter	Pos_TB
Po Validity Threshold –	PO_VALIDITY__THRESHOLD_M	Threshold value for the negative maximum pressure misalignment alarm	Parameter	Pos_TB
Po Validity Alarms Enabled	diag_alarms_enabled[BIT_4_4BYTE]	Whether to allow the maximum pressure misalignment alarm (+/–) to be issued	bit	Pos_TB
Max Friction		Maximum friction	PAGE	Pos_TB
Max Friction	MAX_FRICTION	Maximum friction	Parameter	Pos_TB
Max Friction Threshold	MAX_FRICTION_THRESHOLD	Threshold value for the maximum friction alarm	Parameter	Pos_TB
Max Friction Alarm Enabled	diag_alarms_enabled[BIT_5_4BYTE]	Whether to allow the maximum friction alarm to be issued	bit	Pos_TB
Common Parameters		Common parameters	PAGE	Pos_TB
Po Stable Threshold	PO_STABLE_THRESHOLD	Pressure inclination stability threshold value	Parameter	Pos_TB
Travel Stable Threshold	TRAVEL_STABLE_THRESHOLD	Opening inclination stability threshold value	Parameter	Pos_TB
Travel Upper Limit	TRAVEL_UPPER_LIM	Upper limit of opening to be calculated	Parameter	Pos_TB
Travel Lower Limit	TRAVEL_LOWER_LIM	Lower limit of opening to be calculated	Parameter	Pos_TB
Force Balance Grid	force_balance_grid		Grid	Pos_TB
Reset Force Balance Parameters	reset_force_balance_paraemters_method	Clears the Po Validity, Unbalance Force, Max Friction, Friction Seg, and Po Max/Min values to zero.	Method	Pos_TB
Total Stroke		Cumulative sliding distance (tendency diagnostics)	GROUP	Pos_TB
Total Stroke Graph	total_stroke_chart	Cumulative sliding distance graph	Chart	Pos_TB
Total Stroke	TOTAL_STROKE	Cumulative sliding distance (fixed units, reset allowed)	Parameter	Pos_TB
Total Stroke Threshold	TOTAL_STROKE_THRESHOLD	Threshold value for cumulative sliding distance (fixed units, reset allowed)	Parameter	Pos_TB
Travel Accumulator Deadband	TRAVEL_ACCUM_DEADBAND	Cumulative sliding distance (1) (variable units)	Parameter	Pos_TB
Travel Accumulation Unit	TRAVEL_ACCUM_UNITS	Units for cumulative sliding distance	Parameter	Pos_TB
Total Stroke Alarm Enabled	diag_alarms_enabled[BIT_0_4BYTE]	Whether to allow the sliding distance integration value alarm to be issued	bit	Pos_TB
Cycle Count		Number of inversion operations (tendency diagnostics)	GROUP	Pos_TB
Cycle Count Graph	cycle_count_chart	Number of inversion operations graph	Chart	Pos_TB
Cycle Count	CYCLE_COUNT	Number of inversion operations	Parameter	Pos_TB
Cycle Count Deadband High	CYCLE_COUNT_DEADBAND_HI	Upper deadband	Parameter	Pos_TB
Cycle Count Deadband Low	CYCLE_COUNT_DEADBAND_LO	Lower deadband	Parameter	Pos_TB
Cycle Count Threshold	CYCLE_COUNT_THRESHOLD	Threshold value for the number of inversion operations alarm	Parameter	Pos_TB
Cycle Count Alarm Enabled	diag_alarms_enabled[BIT_1_4BYTE]	Whether to allow the number of inversion operations alarm to be issued	bit	Pos_TB
Shut Count		Cumulative number of fully closing operations (tendency diagnostics)	GROUP	Pos_TB
Shut Count Graph	shut_count_chart	Graph of the cumulative number of fully closing operations	Chart	Pos_TB
Shut Count	SHUT_COUNT	Number of fully closing operations	Parameter	Pos_TB
Shut Count Threshold	SHUT_COUNT_THRESHOLD	Threshold value for the number of fully closing operations alarm	Parameter	Pos_TB
Shut Count Alarm Enabled	diag_alarms_enabled[BIT_2_4BYTE]	Whether to allow the number of fully closing operations alarm to be issued	bit	Pos_TB
Max Travel Speed		Maximum operation speed (tendency diagnostics)	PAGE	Pos_TB
Max Travel Speed Graph	max_travel_speed_chart	Graph of maximum operation speed	Chart	Pos_TB
Max Travel Speed +	MAX_TRAVEL_SPEED_P	Positive maximum operation speed	Parameter	Pos_TB
Max Travel Speed –	MAX_TRAVEL_SPEED_M	Negative maximum operation speed	Parameter	Pos_TB
Reset Max Travel Speed	reset_max_travel_speed_method	Clears the Max Tvl Speed +/– value to zero.	Method	Pos_TB
Max Travel Speed Threshold +	MAX_TRAVEL_SPEED_THRESHOLD_P	Threshold value for the positive maximum speed alarm	Parameter	Pos_TB
Max Travel Speed Threshold –	MAX_TRAVEL_SPEED_THRESHOLD_M	Threshold value for the negative maximum speed alarm	Parameter	Pos_TB
Max Travel Speed Alarms Enabled	diag_alarms_enabled[BIT_3_4BYTE]	Whether to allow the maximum operation speed alarm (+/–) to be issued	bit	Pos_TB
Travel Histogram		Frequency distribution by opening (tendency diagnostics)	PAGE	Pos_TB
Travel Histogram Graph	travel_histogram_graph	Graph of frequency distribution by opening	Chart	Pos_TB
Travel Histogram Grid	travel_histogram_grid	Grid display of frequency distribution by opening	Grid	Pos_TB
Reset Travel Histogram	reset_travel_histogram_method	Clears the per-opening frequency distribution value to zero.	Method	Pos_TB

Menu list	Parameter name	Description	Style	Block
Operator Action Records			WINDOW	Disp_TB
Erase Operator Action Records	erase_operator action_records_method	Clears the operation history.	Method	Disp_TB
Operator Action Record 1			GROUP	Disp_TB
Operator Action Record 1.Date	OPERATOR_ACTION_RECORD_1.REC_DATE		Parameter	Disp_TB
Operator Action Record 1.Value	OPERATOR_ACTION_RECORD_1.VALUE		Parameter	Disp_TB
Operator Action Record 2			GROUP	Disp_TB
Operator Action Record 2.Date	OPERATOR_ACTION_RECORD_2.REC_DATE		Parameter	Disp_TB
Operator Action Record 2.Value	OPERATOR_ACTION_RECORD_2.VALUE		Parameter	Disp_TB
Operator Action Record 3			GROUP	Disp_TB
Operator Action Record 3.Date	OPERATOR_ACTION_RECORD_3.REC_DATE		Parameter	Disp_TB
Operator Action Record 3.Value	OPERATOR_ACTION_RECORD_3.VALUE		Parameter	Disp_TB
Operator Action Record 4			GROUP	Disp_TB
Operator Action Record 4.Date	OPERATOR_ACTION_RECORD_4.REC_DATE		Parameter	Disp_TB
Operator Action Record 4.Value	OPERATOR_ACTION_RECORD_4.VALUE		Parameter	Disp_TB
Operator Action Record 5			GROUP	Disp_TB
Operator Action Record 5.Date	OPERATOR_ACTION_RECORD_5.REC_DATE		Parameter	Disp_TB
Operator Action Record 5.Value	OPERATOR_ACTION_RECORD_5.VALUE		Parameter	Disp_TB
Operator Action Record 6			GROUP	Disp_TB
Operator Action Record 6.Date	OPERATOR_ACTION_RECORD_6.REC_DATE		Parameter	Disp_TB
Operator Action Record 6.Value	OPERATOR_ACTION_RECORD_6.VALUE		Parameter	Disp_TB
Operator Action Record 7			GROUP	Disp_TB
Operator Action Record 7.Date	OPERATOR_ACTION_RECORD_7.REC_DATE		Parameter	Disp_TB
Operator Action Record 7.Value	OPERATOR_ACTION_RECORD_7.VALUE		Parameter	Disp_TB
Operator Action Record 8			GROUP	Disp_TB
Operator Action Record 8.Date	OPERATOR_ACTION_RECORD_8.REC_DATE		Parameter	Disp_TB
Operator Action Record 8.Value	OPERATOR_ACTION_RECORD_8.VALUE		Parameter	Disp_TB
Operator Action Record 9			GROUP	Disp_TB
Operator Action Record 9.Date	OPERATOR_ACTION_RECORD_9.REC_DATE		Parameter	Disp_TB
Operator Action Record 9.Value	OPERATOR_ACTION_RECORD_9.VALUE		Parameter	Disp_TB
Operator Action Record 10			GROUP	Disp_TB
Operator Action Record 10.Date	OPERATOR_ACTION_RECORD_10.REC_DATE		Parameter	Disp_TB
Operator Action Record 10.Value	OPERATOR_ACTION_RECORD_10.VALUE		Parameter	Disp_TB
Block Diagnostics		Block diagnostics	WINDOW	All
Resource Block Diagnostics			GROUP	RB
Block Error	BLOCK_ERR		—	RB
Positioner_TB Diagnostics			GROUP	Pos_TB
Block Error	BLOCK_ERR		—	Pos_TB
Block Error Description 1	BLOCK_ERR_DESC_1		—	Pos_TB
Block Error Description 2	BLOCK_ERR_DESC_2		—	Pos_TB
Block Error Description 3	BLOCK_ERR_DESC_3		—	Pos_TB
Block Error Description 4	BLOCK_ERR_DESC_4		—	Pos_TB
Display_TB Diagnostics			GROUP	Disp_TB
Block Error	BLOCK_ERR		—	Disp_TB
Block Error Description	BLOCK_ERR_DESC_1		—	Disp_TB

Note 1: These parameters are updated when the auto setup is carried out.

Note 2: When "1.$", "<<<", ">>>" or "1.#INF" is displayed, the value is non-numeric character or infinite.

**1. Displayed only when Pilot Relay Type is Double Acting.*

**2. Displayed only when Actuator Size is Param 1 to 6, and Param A to C.*

**3. Displayed only when Actuator Size is Custom.*

**4. Displayed when Actuator Size is Custom and GAP1 is not 0.*

**5. Displayed when Actuator Size is Custom and GAP1 and GAP2 are not 0.*

**6. Displayed only when Characterization is Custom.*

Appendix C. Parameter List

Parameter List

This appendix provides lists of parameters in the Resource Block, Positioner Transducer Block, and Display Transducer Block.

For other function blocks, refer to the "Fieldbus Integration Manual" (No. CM2-FBS100-2001 *).

The items in the parameter list for each block are described below.

** For detailed information, please contact one of our service representatives.*

Item	Specifications
Parameter name	Standard parameter name defined by the Fieldbus Foundation. Parameters specific to Azbil have their own names.
Description	Description of each parameter.
Subparameter name	Some parameters have a hierarchical structure. The subparameter name is used for subordinate items in the hierarchy.
Access attribute	Indicates the attribute related to parameter access by using the following letters. S: Static data - The parameter value is not overwritten while the block that the parameter belongs to is being executed. (e.g. data fixed in each device or various configuration data) This type of value is not lost due to power interruption. D: Dynamic data - While the block that the parameter belongs to is being executed, the parameter value is change by the block or user. These parameters temporarily or continuously change during operation depending on the status of the process, device, or system and are lost due to power interruption. (e.g. process measurement value or device execution status parameter) N: Nonvolatile data - This type of parameter changes during operation like dynamic data but is saved in the non-volatile memory. Therefore, the final value is not lost in the event of a power interruption. (e.g. PID setting value or other parameters the final value of which is needed to restart after power interruption) R: The parameter value can be read but not written. R/W: The parameter value can be read and written.
Size	Block size in bytes.
Range	(Upper and lower limits) of the range for each parameter value. Although this value is specified in the standard specifications, some values may not be used depending on the status of the device or block and may be further limited within the defined range.
Initial value	Initial value at the time of shipment from factory.
Units	Engineering units of parameters. If a parameter name such as "PV" is shown in this field, the units of that parameter are used.

Parameters in the Resource Block (Base INDEX: 1000)

Index	Parameter name	Description	Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
1	ST_REV	Indicates how many times static parameters in the Resource Block have been changed. This parameter increases by 1 (0x0001) every time a parameter with access attribute "S-" is changed.	—	S-R	2	0 ≤ X ≤ 65535	—	Dimensionless number
2	TAG_DESC	User-defined tag name for the Resource Block. This parameter is to be referenced by a higher-level device and does not affect the operation of the function block.	—	S-R/W	32		Space	Dimensionless number
3	STRATEGY	Arbitrary group number for the Resource Block. This parameter does not affect the operation of the function block.	—	S-R/W	2	0 ≤ X ≤ 65535	0	Dimensionless number
4	ALERT_KEY	Identification number of the device in the related plant. This parameter does not affect the operation of the function block.	—	S-R/W	1	1 ≤ X ≤ 255	—	Dimensionless number
5	MODE_BLK	Group of mode parameters in the Resource Block. The configuration is shown below. • Target: Parameter for mode specification from a higher-level device. • Actual: Current mode value. • Permitted: Mode value used in the function block. • Normal: Mode value that should be in the steady status	Target	N-R/W	1	bit 3: Auto bit 7: OOS	0x08 bit 3: Auto	Dimensionless number
			Actual	D-R	1	bit 3: Auto bit 7: OOS	—	
			Permitted	S-R/W	1	bit 3: Auto bit 7: OOS	0x88 bit 3: Auto bit 7: OOS	
			Normal	S-R/W	1	bit 3: Auto bit 7: OOS	0x08 bit 3: Auto	
6	BLOCK_ERR	Indicates the error status related to the Resource Block.	—	D-R	2	0: Other 1: Block Configuration Error 2: Link Configuration Error 3: Simulate Active 5: Device Fault State Set 6: Device Needs Maintenance Soon 9: Memory Failure 10: Lost Static Data 11: Lost NV Data 13: Device Needs Maintenance Now 14: Power -up 15: Out-of-Se		Dimensionless number
7	RS_STATE	Indicates the operation status of the device.	—	D-R	1	0: Undefined 1: Start/Restart 2: Initialization 3: Online Linking 4: Online 5: Standby 6: Failure	—	Dimensionless number
8	TEST_RW	Parameter for communication software compatibility test. The user does not use this parameter.	Value 1	D-R/W	1		—	Dimensionless number
			Value 2		1		—	
			Value 3		2		—	
			Value 4		4		—	
			Value 5		1		—	
			Value 6		2		—	
			Value 7		4		—	
			Value 8		4		—	
			Value 9		32		—	
			Value 10		32		—	
			Value 11		7		—	
			Value 12		6		—	
			Value 13		6		—	
			Value 14		2		—	
			Value 15		8		—	
9	DD_RESOURCE	(Unused)	—	S-R	32		spaces	Dimensionless number
10	MANUFAC_ID	Identification number specific to a manufacturer registered with Fieldbus Foundation.	—	S-R	4	0x0DFC96	0x0DFC96	Dimensionless number

Index	Parameter name	Description	Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
11	DEV_TYPE	Identification number that indicates the device model defined by the manufacturer.	—	S-R	2	0 ≤ X ≤ 0xFFFF	0x1701	Dimensionless number
12	DEV_REV	Device revision defined by the manufacturer.	—	S-R	1	0 ≤ X ≤ 0xFF	0x01	Dimensionless number
13	DD_REV	Revision of the DD file that applies to this device	—	S-R	1	0 ≤ X ≤ 0xFF	0x01	Dimensionless number
14	GRANT_DENY	Parameter that allows or prohibits parameters in this block to be accessed from the MMI or other higher-level devices.	Grant	S-R/W	1	bit 0: Program bit 1: Tune bit 2: Alarm bit 3: Local bit 4: Operate bit 5: Service bit 6: Diagnostic	0	Dimensionless number
			Deny	S-R/W	1	bit 0: Program Denied bit 1: Tune Denied bit 2: Alarm Denied bit 3: Local Denied bit 4: Operate Denied bit 5: Service Denied bit 6: Diagnostics Denied	0	
15	HARD_TYPES	Indicates the type of hardware that contains the Resource_ Block.	—	S-R	2	bit 1: Scalar Output	0x02 bit 1: Scalar Output	Dimensionless number
16	RESTART	Manually restarts the device. The specifications provide several restart types.	—	D-R/W	1	1: Run 2: Restart resource 3: Restart with defaults 4: Restart processor 11: Restores Factory default blocks 12: Resets transducer block Factory calibration	—	Dimensionless number
17	FEATURES	Specifies the options that can be selected in FEATURE_SEL as part of the option settings for device use.	—	S-R	2	bit 0: Unicode strings bit 1: Reports supported bit 2: Fault State supported bit 3: Soft Write lock supportedx bit 5: Output readback supported bit 7: Change of BYPASS in an automatic mode bit 10: Multi-bit Alarm(Bit-Alarm) Support bit 12: Deferral of Inter-Parameter Write Checks	0x14AF bit 0: Unicode strings bit 1: Reports supported bit 2: Fault State supported bit 3: Soft Write lock supportedx bit 5: Output readback supported bit 7: Change of BYPASS in an automatic mode bit 10: Multi-bit Alarm(Bit-Alarm) Support bit 12: Deferral of Inter-Parameter Write Checks	Dimensionless number
18	FEATURE_SEL	Configures option settings for device use.	—	S-R/W	2	bit 0: Unicode strings bit 1: Reports supported bit 2: Fault State supported bit 3: Soft Write lock supportedx bit 5: Output readback supported bit 7: Change of BYPASS in an automatic mode bit 10: Multi-bit Alarm(Bit-Alarm) Support bit 12: Deferral of Inter-Parameter Write Checks	0x102A bit 1: Reports supported bit 3: Soft Write lock supportedx bit 5: Output readback supported bit 12: Deferral of Inter-Paramter Write Checks	Dimensionless number
19	CYCLE_TYPE	Indicates the current operation status based on the setting in CYCLE_SEL in the function block execution method.	—	S-R	2	bit 0: Scheduled	0x0001 bit 0: Scheduled	Dimensionless number
20	CYCLE_SEL	Specifies the function block execution method.	—	S-R/W	2	bit 0: Scheduled	0	Dimensionless number
21	MIN_CYCLE_T	Indicates the minimum period in which the function block can be executed.	—	S-R	4	4000	4000	1/32 msec
22	MEMORY_SIZE	Indicates the available memory capacity as a guideline for adding function blocks. (Unused)	—	S-R	2	0	0	Kbytes
23	NV_CYCLE_T	Indicates the minimum necessary time to write an "N-" type parameter to the non-volatile memory. (Unused)	—	S-R	4	345600000 (3 h)	345600000 (3 hr)	1/32 msec
24	FREE_SPACE	Indicates the available free memory capacity as a guideline for adding to the configuration.	—	D-R	4	0 ≤ X ≤ 100		%
25	FREE_TIME	Indicates the load status showing the percentage of the free time in the function block execution time. (Unused)	—	D-R	4	0 ≤ X ≤ 100		%

Index	Parameter name	Description	Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
26	SHED_RCAS	Specifies the timeout time for writing changes to the setting value (SPC) from a higher level operation device connected with the RCAS_IN parameter when MODE for the function block is RCAS. If the setting value is not written within this time, the function block automatically changes to the mode preset in the SHED_OPT parameter in the function block.	—	S-R/W	4	0 ≤ X ≤ 0xFFFFFFFF	640000 (20 sec)	1/32 msec
27	SHED_ROUT	Specifies the timeout time for writing changes to the output value (DDC) from a higher level operation device connected with the ROUT_IN parameter when MODE for the function block is ROUT. If the setting value is not written within this time, the function block automatically changes to the mode preset in the SHED_OPT parameter in the function block.	—	S-R/W	4	0 ≤ X ≤ 0xFFFFFFFF	640000 (20 sec)	1/32 msec
28	FAULT_STATE	Indicates the fail safe status.	—	N-R	1	1: Clear 2: Active	1: Clear	Dimensionless number
29	SET_FSTATE	Starts the fail safe status.	—	D-R/W	1	1: Off 2: Set	1: Off	Dimensionless number
30	CLR_FSTATE	Clears the fail safe status.	—	D-R/W	1	1: Off 2: Set	1: Off	Dimensionless number
31	MAX_NOTIFY	Maximum amount of alert information that can be retained.	—	S-R	1	3	3	Dimensionless number
32	LIM_NOTIFY	Limit on the amount of alert information. The user can prevent the host from overflowing by setting a limit to restrict the number of alerts notified to the host.	—	S-R/W	1	0 ≤ X ≤ 3	3	Dimensionless number
33	CONFIRM_TIME	Parameter for specifying the wait time for confirmation of alert.	—	S-R/W	4	0 ≤ X ≤ 0xFFFFFFFF	640000 (20 sec)	1/32 msec
34	WRITE_LOCK	Prohibits writing of setting values from outside.	—	S-R/W	1	1: Unlocked 2: Locked	1: Unlocked	Dimensionless number
35	UPDATE_EVT	Parameter for the alert generated when static data, the access attribute of which is "S-," is changed in the Resource Block. The configuration is shown below. • Unacknowledged: Confirmed status • Update_State: Changed status • Time_stamp: Change time • Static_Revision: Revision after change • Relative_Index: Identification number of changed parameter	Unacknowledged	D-R/W	1	0: Undefined 1: Acknowledged 2: Unacknowledged	—	Dimensionless number
			Update State	D-R	1	0: Undefined 1: Update reported 2: Update not reported	—	
			Time Stamp	D-R	8		—	
			Static Revision	D-R	2	0 ≤ X ≤ 65535	—	
36	BLOCK_ALM	Parameter for the alert generated when static data, the access attribute of which is "S-," is changed in the Resource Block. The configuration is shown below. • Unacknowledged: Confirmed status • Update_State: Changed status • Time_stamp: Change time • Static_Revision: Revision after change • Relative_Index: Identification number of changed parameter	Relative Index	D-R	2	0 ≤ X ≤ 65535	—	Dimensionless number
			Unacknowledged	D-R/W	1	0: Undefined 1: Acknowledged 2: Unacknowledged	—	
			Alarm State	D-R	1	0: Undefined 1: Clear - reported 2: Clear - not reported 3: Active - reported 4: Active - not reported	—	
			Time Stamp	D-R	8		—	
			Subcode	D-R	2		—	
37	ALARM_SUM	• Parameter that comprehensively indicates the status of BLOCK_ALM in the Resource Block. The configuration is shown below. • Current: Current generation status • Unacknowledged: Alarm confirmation status • Unreported: Report status to the higher-level device • Disabled: Alarm detection prohibition status	Value	D-R	1	0: Discrete alarm 7: Block Alarm 8: Fail Alarm 9: Off Spec Alarm 10: Maintenance Alarm 11: Check Alarm	—	Dimensionless number
			Current	D-R	2		—	
			Unacknowledged	D-R	2		—	
			Unreported	D-R	2		—	
			Disabled	S-R/W	2		0	

Index	Parameter name	Description	Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
38	ACK_OPTION	Allows or prohibits automatic confirmation of BLOCK_ALM generation in the Resource Block. Automatic confirmation means treating the communication acknowledgment without operator's intervention equivalent to confirmation by the operator.	—	S-R/W	2	0: Auto Ack Disabled 1: Auto Ack Enabled	0: Auto Ack Disabled	Dimensionless number
39	WRITE_PRI	Specifies the priority of WRITE_ALM. In addition to priority, this parameter can be set to disable alarm notifications or make acknowledgement unnecessary.	—	S-R/W	1	0 ≤ X ≤ 15	0	Dimensionless number
40	WRITE_ALM	An alarm occurs when WRITE_LOCK is cleared.	Unacknowledged	D-R/W	1	0: Undefined 1: Acknowledged 2: Unacknowledged	—	Dimensionless number
			Alarm State	D-R	1	0: Undefined 1: Clear - reported 2: Clear - not reported 3: Active - reported 4: Active - not reported	—	
			Time Stamp	D-R	8		—	
			Subcode	D-R	2		—	
			Value	D-R	1		—	
41	ITK_VER	Indicates the version of FF certification test (interoperability test) that the device went through.	—	S-R	2	Set by FF	* Major version when the ITK was acquired.	Dimensionless number
42	FD_VER		—	S-R	2		1	Dimensionless number
43	FD_FAIL_ACTIVE	Current FAIL error	—	D-R	4	* See the explanation for the Field Diagnostic bit	—	Dimensionless number
44	FD_OFFSPEC_ ACTIVE	Current error in OFFSPEC	—	D-R	4	* See the explanation for the Field Diagnostic bit	—	Dimensionless number
45	FD_MAINT_ACTIVE	Current error in MAINTENANCE	—	D-R	4	* See the explanation for the Field Diagnostic bit	—	Dimensionless number
46	FD_CHECK_ACTIVE	Current error in CHECK	—	D-R	4	* See the explanation for the Field Diagnostic bit	—	Dimensionless number
47	FD_FAIL_MAP	What errors are categorized as FAIL	—	S-R/W	4	* See the explanation for the Field Diagnostic bit	0xFF000000 bit 31/bit 30/bit 29/bit 28/ bit 27/bit 26/bit 25/bit 24	Dimensionless number
48	FD_OFFSPEC_MAP	What errors are categorized as OFFSPEC	—	S-R/W	4	* See the explanation for the Field Diagnostic bit	0x00FF0000 bit 23/bit 22/bit 21/bit 20/ bit 19/bit 18/bit 17/bit 16	Dimensionless number
49	FD_MAINT_MAP	What errors are categorized as MAINTENANCE	—	S-R/W	4	* See the explanation for the Field Diagnostic bit	0x0000F800 bit 15/bit 14/bit 13/bit 12/ bit 11	Dimensionless number
50	FD_CHECK_MAP	What errors are categorized as CHECK	—	S-R/W	4	* See the explanation for the Field Diagnostic bit	0x000000FE bit 7/bit 6/bit 5/bit 4/bit 3/ bit 2/bit 1	Dimensionless number
51	FD_FAIL_MASK	Whether to notify the host of FAIL errors	—	S-R/W	4	* See the explanation for the Field Diagnostic bit	0x00000000	Dimensionless number
52	FD_OFFSPEC_MASK	Whether to notify the host of OFFSPEC errors	—	S-R/W	4	* See the explanation for the Field Diagnostic bit	0x00000000	Dimensionless number
53	FD_MAINT_MASK	Whether to notify the host of MAINTENANCE errors	—	S-R/W	4	* See the explanation for the Field Diagnostic bit	0x00000000	Dimensionless number
54	FD_CHECK_MASK	Whether to notify the host of CHECK errors	—	S-R/W	4	* See the explanation for the Field Diagnostic bit	0x00000000	Dimensionless number
55	FD_FAIL_ALM	Whether the host recognized a FAIL error	Unacknowledged	D-R/W	1	0: Undefined 1: Acknowledged 2: Unacknowledged	—	Dimensionless number
			Alarm State	D-R	1	0: Undefined 1: Clear - reported 2: Clear - not reported 3: Active - reported 4: Active - not reported	—	
			Time Stamp	D-R	8		—	
			Subcode	D-R	4		—	

Index	Parameter name	Description	Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
56	FD_OFFSPEC_ALM	Whether the host recognized an OFFSPEC error	Value	D-R	1		—	Dimensionless number
			Unacknowledged	D-R/W	1	0: Undefined 1: Acknowledged 2: Unacknowledged	—	
			Alarm State	D-R	1	0: Undefined 1: Clear - reported 2: Clear - not reported 3: Active - reported 4: Active - not reported	—	
			Time Stamp	D-R	8		—	
			Subcode	D-R	4		—	
57	FD_MAINT_ALM	Whether the host recognized a MAINTENANCE error	Value	D-R	1		—	Dimensionless number
			Unacknowledged	D-R/W	1	0: Undefined 1: Acknowledged 2: Unacknowledged	—	
			Alarm State	D-R	1	0: Undefined 1: Clear - reported 2: Clear - not reported 3: Active - reported 4: Active - not reported	—	
			Time Stamp	D-R	8		—	
			Subcode	D-R	4		—	
58	FD_CHECK_ALM	Whether the host recognized a CHECK error	Value	D-R	1		—	Dimensionless number
			Unacknowledged	D-R/W	1	0: Undefined 1: Acknowledged 2: Unacknowledged	—	
			Alarm State	D-R	1	0: Undefined 1: Clear - reported 2: Clear - not reported 3: Active - reported 4: Active - not reported	—	
			Time Stamp	D-R	8		—	
			Subcode	D-R	4		—	
			Value	D-R	1		—	
59	FD_FAIL_PRI	Priority of FAIL alarm	—	S-R/W	1	0 ≤ X ≤ 15	0	Dimensionless number
60	FD_OFFSPEC_PRI	Priority of OFFSPEC alarm	—	S-R/W	1	0 ≤ X ≤ 15	0	Dimensionless number
61	FD_MAINT_PRI	Priority of MAINTENANCE alarm	—	S-R/W	1	0 ≤ X ≤ 15	0	Dimensionless number
62	FD_CHECK_PRI	Priority of CHECK alarm	—	S-R/W	1	0 ≤ X ≤ 15	0	Dimensionless number
63	FD_SIMULATE	NAMUR bit assignment simulation	Diagnostic Simulate Value	D-R/W	4	* See the explanation for the Field Diagnostic bit	—	Dimensionless number
			Diagnostic Value	D-R	4	* See the explanation for the Field Diagnostic bit	—	
			Simulate En/ Disable	D-R/W	1	0: Not Initialized 1: Simulation Disabled 2: Simulation Active	1: Simulation Disabled	
64	FD_RECOMMEN_ ACT	Indicates the action that the user should take.	—	D-R	2	0: Uninitialized (Uninitialized) 1: No Action Required (No action) 2: Replace H/W (H/W replacement) 3: Check PST Schedule (PST setting check) 4: Check VTD (Perform Auto Setup) (VTD check (auto setup required)) 5: Check Operating Conditions (Environment check) 6: Requires Further Investigation (Detailed investigation required) 7: Requires	—	Dimensionless number
65	CAPABILITY_LEV	Indicates the capability level of the device.	—	S-R	1	0: capability level not supported	0: capability level not supported	Dimensionless number
66	HARDWARE_REV	Indicates the hardware revision of the device.	—	S-R	32		spaces	Dimensionless number
67	SOFTWARE_REV	Indicates the software revision of the device.	—	S-R	32		*S/W version	Dimensionless number
68	SIM_ACTIVE_SW	Selects whether to enable or disable the simulation function. Select Set Simulate Active to enable the simulation function.	—	D-R/W	2	0: Disabled 1: Active	0: Disabled	Dimensionless number

Field Diagnostic bit

Bit	Explanation
31	Fieldbus Board CPU Failure
30	Main Board Communications Error
29	VTD Failure
28	Main Board Failure
27	Pressure Sensor Failure
26	Temperature Sensor Failure
25	Internal Program Execution Error
24	Failure of Scheduled PST
23	VTD Angle Span Out of Range
22	Temperature Out of Range
21	Pressure Supply Out of Range
20	Working Position Alarm
19	Final Value Alarm
18	FF Standard Diagnostics Alarm
17	Operation Condition Alarm
16	Failure Response is Executing
15	Positioner Air Circuit Alarm
14	Valve Trend Diagnostics Alarm
13	Valve Self-Diagnostics Alarm
12	Partial Stroke Test Alarm
11	Full Stroke Test Alarm
10	—
9	—
8	—
7	Local User I/F Active
6	Simulation is Executing
5	Auto Calibration is Executing
4	Step Response Test is Executing
3	Valve Signature is Executing
2	Partial Stroke Test is Executing
1	Full Stroke Test is Executing
0	Check

Parameters in the Positioner Transducer Block (Base INDEX: 1100)

Index	Parameter name	Description	Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
1	ST_REV	Indicates the revision of static data in the Positioner TB. This parameter increases by 1 (0x0001) every time a parameter with the access attribute "S-" is changed.	—	S-R	2	0 to 65535	0	Dimensionless number
2	TAG_DESC	User-defined tag name for the Positioner TB. This parameter is to be referenced by a higher-level device and is not related to the operation of the function block.	—	S-R/W	32		32 digits space	Dimensionless number
3	STRATEGY	Arbitrary group number for the Positioner TB. This parameter is not related to the operation of the block. This parameter is used to arbitrarily group blocks so that they can be easily identified during later database searches or other operations.	—	S-R/W	2	0 to 65535	0	Dimensionless number
4	ALERT_KEY	Identification number of the device in the related plant. This parameter is not related to the operation of the block. This parameter is used to arbitrarily group blocks so that they can be easily identified during later database searches or other operations.	—	S-R/W	1	1 to 255	0	Dimensionless number
5	MODE_BLK	Group of mode parameters in the Positioner TB. This parameter consists of the following elements. • Target: Parameter for mode specification from a higher-level device. • Actual: Current mode value. • Permitted: Mode value used in the function block. • Normal: Mode value that should be in the steady status.	Target	N-R/W	1	AUTO MAN OOS	OOS	Dimensionless number
			Actual	D-R	1			
			Permitted	S-R/W	1			
			Normal	S-R/W	1			
6	BLOCK_ERR	Indicates the error status related to the Positioner TB.	—	D-R	2			Dimensionless number
7	UPDATE_EVT	Parameter for the alert generated when static data, the access attribute of which is "S-" or "N-," is changed in the Positioner TB. This parameter consists of the following elements. • Unacknowleged: Confirmation status • Update State: Change status • Time Stamp: Change time • Static Revision: Revision after change • Relative Index: Identification number of changed parameter	Unacknowleged	D-R/W	1	"Unacknowldged": 0= Undifined (No change) 1= Acknowledged (Confirmed) 2= Unacknowleged (Not confirmed yet) "Update State": 0= Undefined (No change) 1= Update records (Change reported) 2= Update not reported (Change not reported yet)		Dimensionless number
			Update State	D-R	1			
			Time Stamp	D-R	8			
			Static Revision	D-R	2			
			Relative Index	D-R	2			
8	BLOCK_ALM	Parameter that indicates the error status of the configuration and execution related to the Positioner TB. This parameter consists of the following elements. • Unacknowledged: Generation confirmed • Alarm State: Alert generated • Time Stamp: Alert generation/restoration time • Subcode: Alert details subcode • Value: Alert value	Unacknowleged	D-R/W	1			Dimensionless number
			Alarm State	D-R	1			
			Time Stamp	D-R	8			
			Subcode	D-R	2			
			Value	D-R	1			
9	TRANSDUCER_ DIRECTORY	Header information in the Positioner TB. The user does not directly use this parameter.	—	S-R	2			Dimensionless number
10	TRANSDUCER_TYPE	Indicates the device type (such as pressure, temperature, or valve positioner).	—	S-R	2	106: Standard Analog Positioner Valve	106	Dimensionless number
11	TRANSDUCER_TYPE_ VER	Version of device identified with TRANSDUCER_TYPE. This parameter has the format 0xAABB, where AA is the main revision number of the device specifications and BB is a number assigned by the device manufacturer.	—	N-R	2	0x0200	0x0200	Dimensionless number
12	XD_ERROR	Error information generated in the Positioner TB.	—	D-R	1	0: Good 19: Configuration error 20: Electronics Failure 21: Mechanical Failure 22: I/O Failure 24: Software Error		Dimensionless number
13	COLLECTION_ DIRECTORY	This is the definition information on the parameter group that allows the higher-level device to efficiently access parameters with similar attributes. (Unused)	—	S-R	4			Dimensionless number
14	FINAL_VALUE	Latest final output value that is sent to the control valve, dumper, or other operation terminal.	Status	N-R	1			Dimensionless number
			Value	N-R/W	4	−400 to +400	0	%

Index	Parameter name	Description	Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
15	FINAL_VALUE_ RANGE	Range, units, and decimal point position of FINAL_VALUE. This parameter is fixed to 0.0–100.0% in the 700 Series.	EU at 100%	S-R	4	100	100	%
			EU at 0%	S-R	4	0	0	%
			Units Index	S-R	2	1342: %	1342	Dimensionless number
			Decimal Point	S-R	1	1	1	Dimensionless number
16	FINAL_VALUE_ CUTOFF_HI	Forced fully open setting value for FINAL_VALUE.	—	S-R/W	4	50 to 200	109	%
17	FINAL_VALUE_ CUTOFF_LO	Forced fully closed setting value for FINAL_VALUE.	—	S-R/W	4	−200 to +50	0.5	%
18	FINAL_POSITION_ VALUE	Opening feedback value from the control valve, dumper, or other operation terminal.	Status	D-R	1			Dimensionless number
			Value	D-R	4			%
19	WORKING_POS	This is the opening feedback value actually measured before reverse characteristic conversion of FINAL_POSITION_ VALUE.	Status	D-R	1			Dimensionless number
			Value	D-R	4			%
20	WORKING_SP	Value actually used for control operation after characteristic conversion of FINAL_ VALUE.	Status	N-R	1			Dimensionless number
			Value	N-R/W	4	−400 to +400	0	%
21	DEVIATION_ DEADBAND	Threshold value for generation of user-defined DEVIATION_VALUE alarm. Specify the time until the alarm is issued with DEVIATION_TIME.	—	S-R/W	4	0 to 120	5	%
22	DEVIATION_TIME	If the user-defined DEVIATION_VALUE remains above DEVIATION_ DEADBAND for this time period, an alarm is issued.	—	S-R/W	4	0 to 100	10	Sec
23	DEVIATION_VALUE	Deviation between WORKING_SP and WORKING_POS.	—	D-R	4			%
24	POS_ALERT_HI	Threshold value for generation of user-defined FINAL_VALUE upper limit alarm.	—	S-R/W	4	−400 to +400	110	%
25	POS_ALERT_LO	Threshold value for generation of user-defined FINAL_VALUE lower limit alarm.	—	S-R/W	4	−400 to +400	−10	%
26	RATED_TRAVEL	User-defined reference distance for the actuator and valve. This parameter is used to convert TRAVEL_ACCUM or other parameters to actual distance.	—	S-R/W	4	0 ≤ X	1	According to TRAVEL_ UNITS.
27	STOP_HI_POS	Threshold value for generation of user-defined WORKING_POS upper limit alarm.	—	S-R/W	4	−400 to +400	110	%
28	STOP_LO_POS	Threshold value for generation of user-defined WORKING_POS lower limit alarm.	—	S-R/W	4	−400 to +400	−10	%
29	TRAVEL_ACCUM	Cumulative valve sliding distance.	—	N-R	4		0	According to TRAVEL_ ACCUM_ UNITS.
30	TRAVEL_UNITS	Units of RATED_TRAVEL.	—	S-R/W	2	1010: m 1012: cm 1013: mm 1018: feet 1019: inch	1013: mm	According to TRAVEL_ UNITS.
31	PSNR_FSTATE_VAL	Final output value when the status of the user-defined transducer is error. This parameter is enabled when PSNR_FSTATE_OPT is set to 3: PSNR_ FSTATE_VAL.	—	S-R/W	4	−400 ≤ X ≤ +400	0	%
32	PSNR_FSTATE_OPT	Operation when the status of the user-defined transducer is error.	—	S-R/W	1	0: Hold Last Value 1: Fail Closed 2: Fail Open 3: PSNR_FSTATE_VAL	0	Dimensionless number
33	CYCLE_CNTR	Cumulative number of valve inversion operations.	—	N-R/W	4	X = 0	0	Count
34	SIGNAL_ACTION	Operation direction of actuator when FINAL_VALUE increases as a result of specification by the user.	—	S-R/W	1	0: Increase to Open 1: Increase to Close	0	Dimensionless number
35	READBACK_SELECT	Select WORKING_POS or FINAL_ POSITION_VALUE as the opening feedback value.	—	S-R/W	1	0: Final Position Value 1: Working Position Value	0	Dimensionless number
36	PSNR_COMMAND	Command that executes the adjustment function in the 700 Series.	—	D-R/W	2	0: Normal Operation 8: Auto Set Up Execute 9: Auto Set Up Cancel 16: Auto Travel Calibration Execute 17: Auto Travel Calibration Cancel 32: Valve Open Set 40: Valve Shut Set 64: Pressure Sensor Zero Adjustment	0	Dimensionless number

Index	Parameter name	Description	Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
37	PSNR_COMMAND_STATE	Status of processing executed by PSNR_COMMAND.	—	D-R	2	0: Normal Operation 8: Auto Set Up Executing 9: Auto Set Up Canceled 10: Auto Set Up Success 11: Auto Set Up Failed 16: Auto Travel Calibration Executing 17: Auto Travel Calibration Canceled 18: Auto Travel Calibration Success 19: Auto Travel Calibration Failed 32: Valve Open Set Success 33: Valve Open Set Failed 40: Valve Shut Set Success 41: Valve Shut Set Failed 64: Pressure Sensor Zero Adjustment Success 65: Pressure Sensor Zero Adjustment Failed	0	Dimensionless number
38	PSNR_OOS_OPT	Operation when the Positioner TB is O/S. This parameter is fixed to 0:Hold Last Value in the 700 Series.	—	S-R/W	1	0: Hold Last Value	0	Dimensionless number
39	POS_FEATURES	Function group supported by the Positioner TB.	—	S-R	2	bit 0: Group A bit 1: Group B bit 2: Group C bit 3: Group D bit 4: Group E bit 5: Group F bit 6: Group G bit 7: Group H bit 8: Group I bit 9: Group J bit 10: Group K bit 11: Group L	(0x0F7B)	Dimensionless number
40	ACT_FAIL_ACTION	Status where a major fault occurs. Only the status determined during auto setup can be written in the 700 Series.	—	S-R/W	1	1: Self-closing 2: Self-opening	1	Dimensionless number
41	ACT_MAN_ID	Manufacturer of actuator.	—	S-R/W	32		(spaces)	Dimensionless number
42	ACT_MODEL_NUM	Model of actuator.	—	S-R/W	32		(spaces)	Dimensionless number
43	ACT_SN	Serial number of actuator.	—	S-R/W	32		(spaces)	Dimensionless number
44	ACT_TYPE	Type of actuator.	—	S-R/W	2	1: Linear 32768: Rotary/90 deg 32769: Rotary/Other 32770: Rotary (sub)/90 deg 32771: Rotary (sub)/Other	1	Dimensionless number
45	VALVE_MAN_ID	Manufacturer of valve.	—	S-R/W	32		(spaces)	Dimensionless number
46	VALVE_MODEL_NUM	Model of valve.	—	S-R/W	32		(spaces)	Dimensionless number
47	VALVE_SN	Serial number of valve.	—	S-R/W	32		(spaces)	Dimensionless number
48	VALVE_TYPE	Type of valve.	—	S-R/W	1	0: Globe 1: Gate 2: Butterfly 3: Ball 4: Plug 5: Diaphragm 6: Float 7: Check 8: Triple offset 255: Other	1	Dimensionless number
49	XD_CAL_LOC	Parameter for recording the location where the positioner was calibrated the last time.	—	S-R/W	32		(spaces)	Dimensionless number
50	XD_CAL_DATE	Parameter for recording the time when the positioner was calibrated the last time.	—	S-R/W	7			Dimensionless number
51	XD_CAL_WHO	Parameter for recording the ID (or name) of the person who calibrated the positioner the last time.	—	S-R/W	32		(spaces)	Dimensionless number
52	BLOCK_ERR_DESC_1	Detailed information on the error reported by BLOCK_ERR.	—	D-R	4		0	Dimensionless number
53	BLOCK_ERR_DESC_2	Detailed information on the error reported by BLOCK_ERR.	—	D-R	4		0	Dimensionless number

Index	Parameter name	Description	Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
54	BLOCK_ERR_DESC_3	Detailed information on the error reported by BLOCK_ERR.	—	D-R	4		0	Dimensionless number
55	BLOCK_ERR_DESC_4	Detailed information on the error reported by BLOCK_ERR.	—	D-R	4		0	Dimensionless number
56	VST_COMMAND	Command that executes VST (PST or FST).	—	D-R/W	1	0: Un-initialized 1: Execute VST (store as reference) 2: Execute VST (store as current) 3: Abort stroke test 4: Reset VST_RESULT to "no initial result"	0	Dimensionless number
57	VST_MODE	Specifies the VST execution mode.	—	S-R/W	1	0: Disable 1: PST for ESD valves 2: FST for ESD valves	0	Dimensionless number
58	VST_PAUSE	Time after the VST ramps to the target position and before it starts ramping to the original position.	—	S-R/W	4	0 ≤ X ≤ 100	5	Sec
59	VST_RESULT	Latest VST result.	—	N-R	1	0: No initial results 1: Last VST successful 2: Last VST failed	0	Dimensionless number
60	VST_DETAILED_ RESULT	Details of the cause of failure in VST_ RESULT.	—	N-R	2	bit 0: Test command rejected bit 1: Time Limit Exceeded bit 2: Pres Limit Exceeded bit 3: Friction Limit Exceeded bit 4: PST Travel Limit Exceeded bit 5: Overridden (abort due to external event) bit 8: VST Start Position Failure bit 9: No change in valve travel in VST bit 10: Did not Reach to Target in VST bit 11: VST Pressure Failure bit 12: VST Incomplete bit 13: Stick-Slip in VST	0	Dimensionless number
61	CLOSED_POS_ DEADBAND	Threshold value for generation of user-defined CLOSED_POS_SHIFT alarm.	—	S-R/W	4	0 ≤ X ≤ 100	10	%
62	CLOSED_POS_SHIFT	Shift amount of the fully closed position after the last adjustment.	—	N-R	4		0	%
63	CUSTOM_CURVE_ DESCRIPTION	Upper and lower limit numbers of data items and data type of custom curve. Both the upper and lower limit numbers of data items are 21 and the data type is the float type in the 700 Series.	—	S-R	4			Dimensionless number
64	CUSTOM_CURVE_XY_ NUM_PTS	Number of effective data items on the custom curve. Only 21 can be written in the 700 Series.	—	S-R/W	1	X = 21	21	Dimensionless number
65	CUSTOM_CURVE_ SCALING_FACTOR	(Unused)	—	S-R/W	1	*Not Support	1	Dimensionless number
66	CUSTOM_CURVE_X	(Unused)	—	S-R/W	112	*Not Support	[0]	Dimensionless number
67	CUSTOM_CURVE_Y	(Unused)	—	S-R/W	112	*Not Support	[0]	Dimensionless number
68	CUSTOM_CURVE_X_ FLOAT	Float-type X-axis data on the user-defined custom curve. This parameter is enabled when CHARACTERIZATION is set to 3: Custom.	—	S-R/W	112	0 ≤ X ≤ 100	(Equivalent to Liner.)	Dimensionless number
69	CUSTOM_CURVE_Y_ FLOAT	Float-type Y-axis data on the user-defined custom curve. This parameter is enabled when CHARACTERIZATION is set to 3: Custom.	—	S-R/W	112	0 ≤ X ≤ 100	(Equivalent to Liner.)	Dimensionless number
70	CYCLE_CNTR_ DEADBAND	Threshold value of user-defined valve inversion operation evaluation. CYCLE_ CNTR is counted if the opening changes by this value or more between a valve operation inversion and the next operation inversion.	—	S-R/W	4	0 ≤ X ≤ 99	5	%
71	FRICTION_UNITS	Friction units.	—	S-R/W	2	kPa MPa bar psi kgf/cm^2	1133: kPa	According to FRICTION_ UNITS.
72	FRICTION	Friction.	—	N-R	4		0	According to FRICTION_ UNITS.
73	HYSTERISIS	(Unused)	—	N-R/W	4	0 ≤ X *Not affective	0	%
74	POS_DEADBAND	Deadband for the control operation.	—	S-R/W	4	0 ≤ X ≤ 10	0.05	%

Index	Parameter name	Description	Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
75	STROKE_TIME_ CLOSED	Operation time for which the opening changes from 90% to 10% during auto setup.	—	S-R	4		0	Sec
76	STROKE_TIME_OPEN	Operation time for which the opening changes from 10% to 90% during auto setup.	—	S-R	4		0	Sec
77	TRAVEL_ACCUM_ DEADBAND	Threshold value of user-defined valve sliding distance evaluation. If the opening changes by this value or more, the distance is added to TRAVEL_ACCUM.	—	S-R/W	4	0 ≤ X ≤ 100	0.5	%
78	TRIP_TIMEOUT	Timeout time at emergency shutoff based on user definition. If the time until emergency shutoff is equal to or more than this value, an alarm is issued.	—	S-R/W	4	1 ≤ X	99	Sec
79	PSNR_COMMAND_ FLAGS	(Unused)	—	D-R/W	2	Not affective 0: No Procedure Selected	0	Dimensionless number
80	CYCLE_CNTR_LIM	Threshold value for alarm generation of user-defined CYCLE_CNTR.	—	S-R/W	4	0 ≤ X ≤ 10000000	200,000	Count
81	PST_BREAKOUT_ TIME	Time until the opening begins changing after PFST is executed.	—	N-R	4		0	Sec
82	PST_BREAKOUT_ TIMEOUT	If PST_ BREAKOUT_TIME exceeds this value, an alarm is issued.	—	S-R/W	4	0 ≤ X ≤ 600	5	Sec
83	PST_INITIAL_START_ TIME	Time when PST is executed for the first time in the schedule.	—	S-R/W	7	yymmddhhmm0000	0 (Invalid value)	Year/month/ day/hour/ minute
84	PST_INTERVAL	Time interval for which PST is executed for the second and subsequent times in the schedule.	—	S-R/W	4	X = 0 or 0.1 ≤ X ≤ 365	0	Days
85	PST_OPTIONS	Setting for behavior of feedback value during execution of PST. Only bit 0: Freeze analog Feedback is enabled in the 700 Series. When 1 is set, the values of FINAL_POSITION_VALUE and WORKING_POS immediately before PST is executed are retained.	—	S-R/W	2	bit 0: Freeze analog Feed-back bit 1: Freeze discrete Feed-back	0	Dimensionless number
86	PST_RAMP_RATE	PST opening operation speed.	—	S-R/W	4	0.05 ≤ X ≤ 10	2	%/s
87	PST_STRK_TRAV	Target value of opening move at the PST.	—	S-R/W	4	0 ≤ X ≤ 100	90	%
88	PST_STRK_TRAV_ TIMEOUT	If the time to reach the target opening move at the PST exceeds this value, an alarm is issued.	—	S-R/W	4	0 ≤ X ≤ 1400	10	Sec
89	PST_COMPLETION_ TIMEOUT	If the time to complete the PST exceeds this value, an alarm is issued.	—	S-R/W	4	0 ≤ X ≤ 1600	22	Sec
90	FST_BREAKOUT_ TIME	Time until the opening begins changing after FST is executed.	—	N-R	4		0	Sec
91	FST_BREAKOUT_ TIMEOUT	If FST_BREAKOUT_TIME exceeds this value, an alarm is issued.	—	S-R/W	4	0 ≤ X ≤ 200	1	Sec
92	FST_RAMP_RATE	FST opening operation speed.	—	S-R/W	4	0.5 ≤ X ≤ 2000	2000	%/s
93	FST_STRK_TRAV_ TIMEOUT	If the time to reach the target opening move at the FST exceeds this value, an alarm is issued.	—	S-R/W	4	0 ≤ X ≤ 600	5	Sec
94	FST_COMPLETION_ TIMEOUT	If the time to complete the FST exceeds this value, an alarm is issued.	—	S-R/W	4	0 ≤ X ≤ 800	11	Sec
95	PRESSURE_PORT_A	Output air pressure (OUT1) value.	—	D-R	4		0	According to PRESSURE_ UNITS.
96	PRESSURE_PORT_B	Output air pressure (OUT2) value.	—	D-R	4		0	According to PRESSURE_ UNITS.
97	PRESSURE_UNITS	Pressure unit.	—	S-R/W	2	kPa MPa bar psi kgf/cm²	1133: kPa	According to PRESSURE_ UNITS.
98	PRESSURE_SUPPLY	Supply air pressure (SUP) value.	—	D-R	4		0	According to PRESSURE_ UNITS.
99	CHARACTERIZATION	Setting for the flow amount characteristic. Select from the following options: • Linear • Equal Percentage • Quick Opening • Custom Curve	—	S-R/W	1	0: Linear 1: Equal Percentage 2: Quick Opening 3: Custom Curve	0	Dimensionless number
100	STROKE_TIME_ CLOSE_LIM	Threshold value for alarm generation of user-defined STROKE_TIME_CLOSE.	—	S-R/W	4	0 ≤ X ≤ 1000	100	Sec
101	STROKE_TIME_ OPEN_LIM	Threshold value for alarm generation of user-defined STROKE_TIME_OPEN.	—	S-R/W	4	0 ≤ X ≤ 1000	100	Sec
102	TRAVEL_ACCUM_LIM	Threshold value for alarm generation of user-defined TRAVEL_ACCUM.	—	S-R/W	4	0 ≤ X	20000000	According to TRAVEL_ ACCUM_ UNITS.

Index	Parameter name	Description	Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
103	TRAVEL_ACCUM_ UNITS	Units for TRAVEL_ACCUM and TRAVEL_ACCUM_LIM.	—	S-R/W	2	mm cm m feet inch %	1342: %	According to TRAVEL_ ACCUM_ UNITS.
104	INTERNAL_TEMP	Temperature in the positioner.	—	N-R	4		0	According to INTERNAL_ TEMP_UNITS.
105	INTERNAL_TEMP_ MAX	Highest temperature in the positioner.	—	N-R	4		−50	According to INTERNAL_ TEMP_UNITS.
106	INTERNAL_TEMP_ MIN	Lowest temperature in the positioner.	—	N-R	4		90	According to INTERNAL_ TEMP_UNITS.
107	INTERNAL_TEMP_ UNITS	Units for the temperature in the positioner.	—	S-R/W	2	°C (deg C) °F (deg F)	1001: °C	According to INTERNAL_ TEMP_UNITS.
108	POSITIONER_ SOFTWARE_REV	Version of CPU software in the positioner function processing section. The version of CPU software in the Fieldbus communication processing section is included in the Resource Block.	—	S-R	32			Dimensionless number
109	POSITIONER_ MODEL_NUM	Positioner model.	—	S-R/W	32		AVP703-***-****-**	Dimensionless number
110	POSITIONER_SN	Serial number of positioner.	—	S-R/W	32			Dimensionless number
111	VTD_SENSOR_SN	Serial number of angle sensor (VTD) and transducer section.	—	S-R	32			Dimensionless number
112	PRESSURE_SENSOR_ SN	Serial number of pressure sensor.	—	S-R	32			Dimensionless number
113	LIMIT_SW_1_ VALUE_D	Indicates the output value and status of limit switch 1.	Status	D-R	1			Dimensionless number
			Value	D-R	1			Dimensionless number
114	LIMIT_SW_1_SOURCE	Indicates the source (evaluation target) of limit switch 1.	—	S-R/W	1	18: FINAL_POSITION_ VALUE 19: WORKING_POS	18	Dimensionless number
115	LIMIT_SW_1_MODE	Indicates the mode (evaluation direction) of limit switch 1.	—	S-R/W	1	0: LO 1: HI	1	Dimensionless number
116	LIMIT_SW_1_ THRESHOLD	Threshold value for limit switch 1.	—	S-R/W	4	−100 ≤ X ≤ +200	110	%
117	LIMIT_SW_1_ HYSTERESIS	Hysteresis value for limit switch 1.	—	S-R/W	4	0 ≤ X ≤ 10	1	%
118	LIMIT_SW_2_ VALUE_D	Indicates the output value and status of limit switch 2.	Status	D-R	1			Dimensionless number
			Value	D-R	1			Dimensionless number
119	LIMIT_SW_2_SOURCE	Indicates the source (evaluation target) of limit switch 2.	—	S-R/W	1	18: FINAL_POSITION_ VALUE 19: WORKING_POS	18	Dimensionless number
120	LIMIT_SW_2_MODE	Indicates the mode (evaluation direction) of limit switch 2.	—	S-R/W	1	0: LO 1: HI	0	Dimensionless number
121	LIMIT_SW_2_ THRESHOLD	Threshold value for limit switch 2.	—	S-R/W	4	−100 ≤ X ≤ +200	−10	%
122	LIMIT_SW_2_ HYSTERESIS	Hysteresis value for limit switch 2.	—	S-R/W	4	0 ≤ X ≤ 10	1	%
123	BOOSTER_RELAY	Specifies whether the booster is attached.	—	S-R/W	1	0: Without 1: With	0	Dimensionless number
124	PILOT_RELAY_TYPE	Pilot relay type (single-acting/double-acting).	—	S-R	1	0: Single 1: Double	0	Dimensionless number
125	POSITIONER_ACTION	Positioner operation direction (forward/reverse).	—	S-R	1	0: Direct 1: Reverse	0	Dimensionless number
126	VALVE_CLOSED_ POSITION	Feedback lever direction (up/down) when the control valve is closed.	—	S-R/W	1	0: Up 1: Down	1	Dimensionless number
127	FEEDBACK_LEVER_ MOTION	Feedback lever direction (up/down) when the output air pressure (OUT1) increases.	—	S-R/W	1	0: Up 1: Down	0	Dimensionless number
128	ACTUATOR_SIZE	Size of actuator.	—	S-R/W	1	0: CUSTOM 1: PARAM_1 2: PARAM_2 3: PARAM_3 4: PARAM_4 5: PARAM_5 6: PARAM_6 7: PARAM_7 8: PARAM_8 9: PARAM_9	2	Dimensionless number

Index	Parameter name	Description		Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
129	FRICTION_LEVEL	Friction index value for the control valve.		—	S-R/W	1	0: Heavy 1: Medium 2: Light	2	Dimensionless number
130	BODY_TYPE	Type of positioner (integrated/separated).		—	S-R/W	1	0: Normal 1: Remote	0	Dimensionless number
131	ELECTRICAL_FAIL_TO	Operation direction of control valve when an electrical signal fails.		—	D-R	1	0: Close 1: Open	0	Dimensionless number
132	AIR_FAIL_TO	Operation direction of control valve when the supply air pressure fails.		—	D-R	1	0: Close 1: Open	0	Dimensionless number
133	DRIVE_SIGNAL	Indicates the current value that flows through the coil in the electropneumatic transduction section (control output in the positioner) in percentage.		—	D-R/W	4	0 ≤ X ≤ 100	0	%
134	VTD_ANGLE	Angle of angle sensor, which detects the opening.		—	D-R	4		0	deg
135	PRESSURE_NOZZLE	Nozzle back pressure (Pn).		—	D-R	4		0	According to PRESSURE_ UNITS.
136	VTD_TEMP	Temperature in the angle sensor.		—	D-R	4		0	According to INTERNAL_ TEMP_UNITS.
137	DRIVE_SIGNAL_ RANGE_HI	Range (high) of DRIVE_SIGNAL.		—	D-R	4		50	%
138	DRIVE_SIGNAL_ RANGE_LO	Range (low) of DRIVE_SIGNAL.		—	D-R	4		50	%
139	P_OUTSIDE_OF_GAP1	PID constant.	Proportional gain outside GAP1.	—	S-R/W	4	0 ≤ X ≤ 9999	0.3	Dimensionless number
140	I_OUTSIDE_OF_GAP1		Integral time outside GAP1.	—	S-R/W	4	0.1 ≤ X ≤ 9999	8	Sec
141	D_OUTSIDE_OF_GAP1		Differential time outside GAP1.	—	S-R/W	4	0 ≤ X ≤ 9999	0.25	Sec
142	GAP1		Gap width 1.	—	S-R/W	4	0 ≤ X ≤ 100	5.0	%
143	P_INSIDE_OF_GAP1		Proportional gain in GAP1.	—	S-R/W	4	0 ≤ X ≤ 9999	0.8	Dimensionless number
144	I_INSIDE_OF_GAP1		Integral time in GAP1.	—	S-R/W	4	0.1 ≤ X ≤ 9999	4.5	Sec
145	D_INSIDE_OF_GAP1		Differential time in GAP1.	—	S-R/W	4	0 ≤ X ≤ 9999	0.18	Sec
146	GAP2		Gap width 2.	—	S-R/W	4	0 ≤ X ≤ 100	1.0	%
147	P_INSIDE_OF_GAP2		Proportional gain in GAP2.	—	S-R/W	4	0 ≤ X ≤ 9999	1.3	Dimensionless number
148	I_INSIDE_OF_GAP2		Integral time in GAP2.	—	S-R/W	4	0.1 ≤ X ≤ 9999	5	Sec
149	D_INSIDE_OF_GAP2		Differential time in GAP2.	—	S-R/W	4	0 ≤ X ≤ 9999	0.15	Sec
150	TRAVEL_ANGLE_100	Angle when the opening of the control valve is 100%.		—	S-R/W	4	−30 ≤ X ≤ +30	8	deg
151	TRAVEL_ANGLE_0	Angle when the opening of the control valve is 0%.		—	S-R/W	4	−30 ≤ X ≤ +30	−8	deg
152	FRICTION_INDEX	Friction index value for the control valve.		—	N-R	4		0	Dimensionless number
153	OPERATING_TIME	Operating time of the positioner (time for which the power is applied).		—	N-R/W	4	0 ≤ X ≤ 0xFFFFFFFF	0	Sec
154	DIAG_ALARMS_ ENABLED	Specifies whether to allow or prohibit the control valve diagnostic item alarm to be issued.			S-R/W	4		0x00000100	Dimensionless number
155	INITIAL_PRESSURE_ SUPPLY	Measurement during auto setup.	Standard supply air pressure.		S-R	4		280	kPa
156	SPRING_RANGE_HI	Parameter	Spring range High		S-R	4		240	kPa
157	SPRING_RANGE_LO		Spring range Low		S-R	4		80	kPa
158	STROKE_TIME_ AVERAGE		Average operation time (average value of STROKE_ TIME_CLOSE_LIM and STROKE_TIME_OPEN_ LIM)		S-R	4		0	Sec
159	RESET_DIAG_ PARAMETERS	Clears the parameters related to control valve diagnostics.			D-R/W	1		0	Dimensionless number
160	PST_START_PRESSURE	PST	Output air pressure (OUT1) when the PST starts.		D-R	4		0	kPa
161	PST_PAUSE_PRESSURE		Output air pressure (OUT1) when the wait ends after the target opening is reached.		D-R	4		0	kPa
162	PST_END_PRESSURE		Output air pressure (OUT1) when the PST ends.		D-R	4		0	kPa
163	PST_START_TRAVEL		Opening measured when the PST starts.		D-R	4		0	%
164	PST_PAUSE_TRAVEL		Opening when the wait time ends after the target opening is reached.		D-R	4		0	%
165	PST_END_TRAVEL		Opening when the PST ends		D-R	4		0	%
166	PST_ENABLED		Specify whether to allow or prohibit the PST.		S-R/W	1		1	Dimensionless number

Index	Parameter name	Description		Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
167	PST_INITIAL_TRAV	PST	Opening when the PST starts as determined during auto setup.		S-R	4		100	%
168	PST_PRESSURE_ THRESHOLD		Threshold value for output air pressure (OUT1) error evaluation during the PST.		S-R/W	4		208	kPa
169	PST_STICK_SLIP_ THRESHOLD		Threshold value for stick slip evaluation during the PST.		S-R/W	4		10	Dimensionless number
170	FST_START_PRESSURE	FST	Output air pressure (OUT1) when the FST starts.		D-R	4		0	kPa
171	FST_PAUSE_PRESSURE		Output air pressure (OUT1) when the wait ends after the target opening is reached.		D-R	4		0	kPa
172	FST_END_PRESSURE		Output air pressure (OUT1) when the FST ends.		D-R	4		0	kPa
173	FST_START_TRAVEL		Opening when the FST starts		D-R	4		0	%
174	FST_PAUSE_TRAVEL		Opening when the wait time ends after the target opening is reached.		D-R	4		0	%
175	FST_END_TRAVEL		Opening when the FST ends.		D-R	4		0	%
176	FST_STRK_TRAV_ TIME		Full stroke operation time at the FST.		N-R	4		0	Sec
177	FST_PRESSURE_ THRESHOLD		Threshold value for output air pressure (OUT1) error evaluation during the FST.		S-R/W	4		-10	kPa
178	TEMPERATURE_MAX	Temperature error diagnostics	Highest temperature.		D-R	4		–INF	°C
179	TEMPERATURE_MIN		Lowest temperature.		D-R	4		+INF	°C
180	TEMPERATURE_ THRESHOLD_HI		Threshold value for temperature error evaluation on the high temperature side.		S-R/W	4		80	°C
181	TEMPERATURE_ THRESHOLD_LO		Threshold value for temperature error evaluation on the low temperature side.		S-R/W	4		–40	°C
182	TEMPERATURE_HI_ ALARM_COUNT		Number of hot alarms.		N-R/W	2		0	Count
183	TEMPERATURE_LO_ ALARM_COUNT		Number of cold alarms.		N-R/W	2		0	Count
184	PRESSURE_SUPPLY_ MAX	Supply air pressure diagnostics	Highest supply air pressure.		D-R	4		–INF	kPa
185	PRESSURE_SUPPLY_ MIN		Lowest supply air pressure.		D-R	4		+INF	kPa
186	PRESSURE_SUPPLY_ THRESHOLD_HI		Threshold value for supply air pressure error evaluation on the high pressure side.		S-R/W	4		308	kPa
187	PRESSURE_SUPPLY_ THRESHOLD_LO		Threshold value for supply air pressure error evaluation on the low pressure side.		S-R/W	4		252	kPa
188	PRESSURE_SUPPLY_ HI_ALARM_COUNT		Number of high pressure alarms.		N-R/W	2		0	Count
189	PRESSURE_SUPPLY_ LO_ALARM_COUNT		Number of low pressure alarms.		N-R/W	2		0	Count
190	SUPPLY_TRAVEL_ STABLE_THRESHOLD		Threshold value to determine whether the opening is stable.		S-R/W	4		0.25	%/s
191	SUPPLY_TRAVEL_ STABLE_TIME		Elapsed time to determine whether the opening is stable.		S-R/W	4		10	Sec
192	DRIVE_SIGNAL_MAX_ SHIFT_P	Air circuit diagnostics	Maximum shift value of EPM drive signal on the positive side.		D-R	4		0	%
193	DRIVE_SIGNAL_MAX_ SHIFT_M		Maximum shift value of EPM drive signal on the negative side.		D-R	4		0	%
194	DRIVE_SIGNAL_P_ ALARM_COUNT		Number of positive alarms.		N-R/W	2		0	Count
195	DRIVE_SIGNAL_M_ ALARM_COUNT		Number of negative alarms.		N-R/W	2		0	Count
196	DRIVE_SIGNAL_ SHIFT_THRESHOLD_P		Threshold value for positive alarm.		S-R/W	4		25	%
197	DRIVE_ SIGNAL_SHIFT_ THRESHOLD_M		Threshold value for negative alarm.		S-R/W	4		–25	%
198	DRIVE_SIGNAL_PN_ GAIN		EPM drive signal gain.		S-R	4		0.18	Dimensionless number
199	DRIVE_SIGNAL_PN_ INTERCEPT		Intercept of EPM drive signal.		S-R	4		22	Dimensionless number

Index	Parameter name	Description		Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
200	DRIVE_SIGNAL_ STABLE_THRESHOLD	Air circuit diagnostics	Inclination threshold value for duty stability check		S-R/W	4		1	Dimensionless number
201	PN_STABLE_ THRESHOLD		Inclination threshold value for Pn stability check		S-R/W	4		0.5	Dimensionless number
202	STICK_SLIP_X	Stick-slip diagnostics	Stick-slip index value X.		D-R	100		[0]	(%/s)^2
203	STICK_SLIP_Y		Stick-slip index value Y.		D-R	100		[0]	(%/s)^2
204	STICK_SLIP_VALIDITY		Indicates the validity of the stick-slip index value.		D-R	25		[0xFF]	Dimensionless number
205	STICK_SLIP_ UPDATED_TIME		Time when the stick-slip value is updated.		D-R	100		[0]	Sec
206	STICK_SLIP_HI_ ALARM_COUNT		Number of HI alarms.		N-R/W	2		0	Count
207	STICK_SLIP_MID_ ALARM_COUNT		Number of MID alarms.		N-R/W	2		0	Count
208	STICK_SLIP_LO_ ALARM_COUNT		Number of LO alarms.		N-R/W	2		0	Count
209	STICK_SLIP_ THRESHOLD_HI		Threshold value for HI alarm.		S-R/W	4		10	Dimensionless number
210	STICK_SLIP_ THRESHOLD_MID		Threshold value for MID alarm.		S-R/W	4		5.5	Dimensionless number
211	STICK_SLIP_ THRESHOLD_LO		Threshold value for LO alarm.		S-R/W	4		3	Dimensionless number
212	DEVIATION_TIME_ MAX_P	Deviation diagnostics	Maximum continuation time of positive deviation.		D-R	4		0	Sec
213	DEVIATION_TIME_ MAX_M		Maximum continuation time of negative deviation.		D-R	4		0	Sec
214	DEVIATION_P_ ALARM_COUNT		Number of positive alarms.		N-R/W	2		0	Count
215	DEVIATION_M_ ALARM_COUNT		Number of negative alarms.		N-R/W	2		0	Count
216	DEVIATION_ THRESHOLD_P		Threshold value for positive alarm.		S-R/W	4		5	%
217	DEVIATION_ THRESHOLD_M		Threshold value for negative alarm.		S-R/W	4		-5	%
218	DEVIATION_ WAITING_TIME		Wait time for deviation alarm.		S-R/W	4		10	Sec
219	ZERO_TRAVEL_MAX	Zero point opening diagnostics	Maximum zero point opening.		D-R	4		0	%
220	ZERO_TRAVEL_MIN		Minimum zero point opening.		D-R	4		0	%
221	ZERO_TRAVEL_P_ ALARM_COUNT		Number of positive zero point opening alarms.		N-R/W	2		0	Count
222	ZERO_TRAVEL_M_ ALARM_COUNT		Number of negative zero point opening alarms.		N-R/W	2		0	Count
223	ZERO_TRAVEL_ THRESHOLD_P		Threshold value for positive zero point opening alarm.		S-R/W	4		1	%
224	ZERO_TRAVEL_ THRESHOLD_M		Threshold value for negative zero point opening alarm.		S-R/W	4		−3	%
225	ZERO_TRAVEL_ STATIC_TIME		Stability time of zero point opening.		S-R/W	4		10	Sec
226	ZERO_TRAVEL_ ERROR_WAITING_ TIME		Wait time for zero point opening error.		S-R/W	4		40	Sec
227	ZERO_TRAVEL_ WAITING_TIME		Wait time for zero point opening.		S-R/W	4		10	Sec
228	ZERO_TRAVEL_ STABLE_THRESHOLD		Threshold value for stabilization of zero point opening.		S-R/W	4		0.25	Dimensionless number
229	TRAVEL_HISTOGRAM	Frequency distribution by opening.			D-R	104		[0]	%
230	TOTAL_STROKE	Accumulation of sliding distance	Cumulative sliding distance.		N-R/W	4		0	%
231	TOTAL_STROKE_ THRESHOLD		Threshold value for cumulative sliding distance alarm.		S-R/W	4		20000000	%
232	CYCLE_COUNT	Accumulation of inversion operations	Number of inversion operations.		N-R/W	4		0	Count
233	CYCLE_COUNT_ DEADBAND_HI		Setting value on the HI side for counting the number of inversion operations.		S-R/W	4		95	%
234	CYCLE_COUNT_ DEADBAND_LO		Setting value on the LO side for counting the number of inversion operations.		S-R/W	4		5	%
235	CYCLE_COUNT_ THRESHOLD		Threshold value for the inversion operation count alarm.		S-R/W	4		200000	Count
236	SHUT_COUNT	Accumulation of fully closing operations	Number of fully closing operations.		N-R/W	4		0	Count
237	SHUT_COUNT_ THRESHOLD		Threshold value for the fully closing count alarm.		S-R/W	4		100000	Count

Index	Parameter name	Description		Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
238	MAX_TRAVEL_ SPEED_P	Maximum operation speed.	Positive maximum operation speed.		D-R	4		0	%/s
239	MAX_TRAVEL_ SPEED_M		Negative maximum operation speed.		D-R	4		0	%/s
240	MAX_TRAVEL_ SPEED_ THRESHOLD_P		Threshold value for the maximum operation speed alarm on the positive side.		S-R/W	4		1000	%/s
241	MAX_TRAVEL_ SPEED_ THRESHOLD_M		Threshold value for the maximum operation speed alarm on the negative side.		S-R/W	4		−1000	%/s
242	PO_MAX_SEG	Pressure balance/ maximum friction	Maximum output air pressure value by opening.		D-R	104		−INF	kPa
243	PO_MIN_SEG		Minimum output air pressure value by opening.		D-R	104		+INF	kPa
244	UNBALANCE_FORCE_ SEG	Pressure balance	Fluid reaction force value by opening.		D-R	104		−INF	kPa
245	PO_VALIDITY_P		Positive output air pressure validity index value.		D-R	4		−INF	kPa
246	PO_VALIDITY_M		Negative output air pressure validity index value.		D-R	4		+INF	kPa
247	PO_VALIDITY_ THRESHOLD_P		Alarm threshold value for the positive output air pressure validity index value.		S-R/W	4		40	kPa
248	PO_VALIDITY_ THRESHOLD_M		Alarm threshold value for the negative output air pressure validity index value.		S-R/W	4		−80	kPa
249	PO_STABLE_ THRESHOLD	Pressure balance/ maximum friction	Threshold value for stabilization of output air pressure.		S-R/W	4		0.5	Dimensionless number
250	TRAVEL_STABLE_ THRESHOLD		Threshold value for stabilization of opening.		S-R/W	4		0.25	Dimensionless number
251	TRAVEL_UPPER_LIM		Upper limit value of opening to be calculated.		S-R/W	4		109	%
252	TRAVEL_LOWER_LIM		Lower limit value of opening to be calculated.		S-R/W	4		1	%
253	FRICTION_SEG	Maximum friction	Friction by opening.		D-R	104		−INF	kPa
254	MAX_FRICTION		Maximum friction.		D-R	4		+INF	kPa
255	MAX_FRICTION_ THRESHOLD		Threshold value for the maximum friction alarm.		S-R/W	4		40	kPa

Parameters in the Display Transducer Block (Base INDEX: 1500)

The Display Transducer Block is the block for displaying the output values from the specified block and device diagnostic information on the LUI.

The display is switched according to the specified display contents, the specified display method, display switching period, LUI operation history and settings, and the status of the device.

Index	Parameter name	Description	Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
1	ST_REV	Indicates how many times static parameters in the DISPLAY_TB have been changed. This parameter increases by 1 (0x0001) every time a parameter with access attribute "S-" is changed.	—	S-R	2	0 ≤ X ≤ 65535	—	Dimensionless number
2	TAG_DESC	User-defined tag name for the DISPLAY_TB. This parameter is to be referenced by a higher-level device and does not affect the operation of the function block.	—	S-R/W	32		spaces	Dimensionless number
3	STRATEGY	Arbitrary group number for the DISPLAY_TB. This parameter does not affect the operation of the function block.	—	S-R/W	2		0	Dimensionless number
4	ALERT_KEY	Identification number of the device in the related plant. This parameter does not affect the operation of the function block.	—	S-R/W	1	1 ≤ X ≤ 255	0	Dimensionless number
5	MODE_BLK	Group of mode parameters in the DISPLAY_TB. The configuration is shown below. • Target: Parameter for mode specification from a higher-level device. • Actual: Current mode value. • Permitted: Mode value used in the function block. • Normal: Mode value that should be in the steady status	Target	N-R/W	1	O/S, AUTO	bit 3: AUTO 0x08	Dimensionless number
			Actual	D-R	1		bit 3: AUTO 0x08	
			Permitted	S-R/W	1		bit 3: AUTO bit 7: O/S 0x88	
			Normal	S-R/W	1		bit 3: AUTO 0x08	
6	BLOCK_ERR	Indicates the error status related to the DISPLAY_TB.	—	D-R	2	bit 0: Other bit 1: Block Configuration Error bit 15: Out-of-Service	—	Dimensionless number
7	UPDATE_EVT	Parameter for the alert generated when static data, the access attribute of which is "S-" or "N-," is changed in the DISPLAY_TB. The configuration is shown below. • Unacknowledged: Confirmed status • Update_State: Changed status • Time_stamp: Change time • Static_Revision: Revision after change • Relative_Index: Identification number of changed parameter	Unacknowledged	D-R/W	1	(0: Undefined) 1: Acknowledged 2: Unacknowledged	—	Dimensionless number
			Update State	D-R	1	0: Undefined 1: Update reported 2: Update not reported	—	
			Time Stamp	D-R	8		—	
			Static Revision	D-R	2		—	
			Relative Index	D-R	2		—	
8	BLOCK_ALM	Parameter that indicates the error status of configuration and execution related to the DISPLAY_TB. The configuration is shown below. • Unacknowledged: Generation confirmed • Alarm_State: Alert generated • Time_stamp: Alert generation/restoration time • Subcode: Alert details subcode • Value: Alert value	Unacknowledged	D-R/W	1	(0=Undefined) 1=Acknowledged 2=Unacknowledged	—	Dimensionless number
			Alarm State	D-R	1	0=Undefined 1=Clear - reported 2=Clear - not reported 3=Active - reported 4=Active - not reported	—	
			Time Stamp	D-R	8		—	
			Subcode	D-R	2		—	
			Value	D-R	1		—	
9	TRANSDUCER_DIRECTORY	Header information in the DISPLAY_TB. The user does not directly use this parameter.	—	S-R	2		0	Dimensionless number
10	TRANSDUCER_TYPE	Type of DISPLAY_TB.	—	S-R	2		0xffff	Dimensionless number
11	TRANSDUCER_TYPE_VER	Version of DISPLAY_TB.	—	N-R	2		0x0001	Dimensionless number
12	XD_ERROR	Indicates the device-specific error status.	—	D-R	1	19: Configration Error	0	Dimensionless number
13	COLLECTION_DIRECTORY	This is the definition information on the parameter group that allows the higher-level device to efficiently access parameters with similar attributes.	—	S-R	4		0	Dimensionless number

Index	Parameter name	Description	Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
14	BLOCK_ERR_DESC_1	Indicates the details of BLOCK_ERR.	—	D-R	4	bit 0: Selection 1 Configuration Error bit 1: Selection 2 Configuration Error bit 2: Selection 3 Configuration Error bit 3: Selection 4 Configuration Error bit 4: Parameter/Information Selection Error	—	Dimensionless number
15	DISPLAY_PARAM_SELECTION	Select the parameter that should be displayed from the following four display formats.	—	S-R/W	1	bit 0: Selection 1 Enable bit 1: Selection 2 Enable bit 2: Selection 3 Enable bit 3: Selection 4 Enable	0x03	Dimensionless number
16	DISPLAY_INFO_SELECTION	Select one or more displayed parameters from TAG, status, or unit.	—	S-R/W	1	bit 0: Tag Display Enable bit 1: Unit Display Enable bit 2: Status Display Enable	0x07	Dimensionless number
17	DISPLAY_CYCLE	Select the display the refresh period.	—	S-R/W	1	1 ≤ X ≤ 10	5	[s]
18	BLOCK_TYPE_SELECTION_1	Displays the block type of the block selected with BLOCK_TAG_SEL_1.	—	D-R	2	*DS1 0x0000: — 0x0101: Analog Input (AI) 0x0108: Proportional-Integral-Differential (PID) 0x0127: Arithmetic (AR) 0x0144: Totalizer (TOT) 0x0113: Flow 0x8018: Diagnostic 0x0145: Positioner_TB 0x0102: Analog Output (AO) 0x0126: Input Selector (IS) 0x011C: Output Separa	0x0145	Dimensionless number
19	BLOCK_TAG_SELECTION_1	Enter the Block TAG for the parameter displayed on screen 1.	—	S-R/W	32		"POSITIONER_TB"	Dimensionless number
20	PARAM_SELECTION_1	Select the parameter displayed on screen 1.	—	S-R/W	1	*DS2 BLOCK_TYPE_SEL_n/Range 0x0101 8: OUT 0x0102 9: OUT 17: CAS_IN 26: RCAS_IN 25: BKCAL_OUT 28: RCAS_OUT	20	Dimensionless number
21	DISPLAY_TAG_1	Enter the parameter name (TAG) displayed on screen 1.	—	S-R/W	*DS3	1 ≤ X ≤ 32	"W_SP"	Dimensionless number
22	UNIT_SELECTION_1	Enter the units for the parameter displayed on screen 1.	—	S-R/W	1	0: Auto 1: Custom	0	Dimensionless number
23	CUSTOM_UNIT_1	Freely specify the units for the parameter displayed on screen 1.	—	S-R/W	*DS4	1 ≤ X ≤ 32	spaces	Dimensionless number
24	EXPONENT_SELECTION_1	Select the exponent for the parameter displayed on screen 1.	—	S-R/W	1	0: None 1: 1 2: 2 3: 3 0 ≤ MGG ≤ 6 4: 4 0 ≤ AVP ≤ 4 5: 5 6: 6	0	Dimensionless number
25	BLOCK_TYPE_SELECTION_2	Displays the block type of the block selected with BLOCK_TAG_SEL_2.	—	D-R	2	*DS1	0	Dimensionless number
26	BLOCK_TAG_SELECTION_2	Enter the Block TAG for the parameter displayed on screen 2.	—	S-R/W	32		"POSITIONER_TB"	Dimensionless number
27	PARAM_SELECTION_2	Select the parameter displayed on screen 2.	—	S-R/W	1	*DS2	19	Dimensionless number
28	DISPLAY_TAG_2	Enter the parameter name (TAG) displayed on screen 2.	—	S-R/W	*DS3	1 ≤ X ≤ 32	"W_POS"	
29	UNIT_SELECTION_2	Enter the units for the parameter displayed on screen 2.	—	S-R/W	1	0: Auto 1: Custom	0	Dimensionless number
30	CUSTOM_UNIT_2	Freely specify the units for the parameter displayed on screen 2.	—	S-R/W	*DS4	1 ≤ X ≤ 32	spaces	Dimensionless number
31	EXPONENT_SELECTION_2	Select the exponent for the parameter displayed on screen 2.	—	S-R/W	1	0: None 1: 1 2: 2 3: 3 0 ≤ MGG ≤ 6 4: 4 0 ≤ AVP ≤ 4 5: 5 6: 6	0	Dimensionless number
32	BLOCK_TYPE_SELECTION_3	Displays the block type of the block selected with BLOCK_TAG_SEL_3.	—	D-R	2	*DS1	0	Dimensionless number
33	BLOCK_TAG_SELECTION_3	Enter the Block TAG for the parameter displayed on screen 3.	—	S-R/W	32		spaces	Dimensionless number
34	PARAM_SELECTION_3	Select the parameter displayed on screen 3.	—	S-R/W	1	*DS2	0	Dimensionless number

Index	Parameter name	Description	Sub parameter name	Access attribute	Size (bytes)	Range	Initial value	Units
35	DISPLAY_TAG_3	Enter the parameter name (TAG) displayed on screen 3.	—	S-R/W	*DS3	1 ≤ X ≤ 32	spaces	Dimensionless number
36	UNIT_SELECTION_3	Enter the units for the parameter displayed on screen 3.	—	S-R/W	1	0: Auto 1: Custom	0	Dimensionless number
37	CUSTOM_UNIT_3	Freely specify the units for the parameter displayed on screen 3.	—	S-R/W	*DS4	1 ≤ X ≤ 32	spaces	Dimensionless number
38	EXPONENT_ SELECTION_3	Select the exponent for the parameter displayed on screen 3.	—	S-R/W	1	0: None 1: 1 2: 2 3: 3 0 ≤ MGG ≤ 6 4: 4 0 ≤ AVP ≤ 4 5: 5 6: 6	0	Dimensionless number
39	BLOCK_TYPE_ SELECTION_4	Displays the block type of the block selected with BLOCK_TAG_SEL_4.	—	D-R	2	*DS1	0	Dimensionless number
40	BLOCK_TAG_ SELECTION_4	Enter the Block TAG for the parameter displayed on screen 4.	—	S-R/W	32		spaces	Dimensionless number
41	PARAM_SELECTION_4	Select the parameter displayed on screen 4.	—	S-R/W	1	*DS2	0	Dimensionless number
42	DISPLAY_TAG_4	Enter the parameter name (TAG) displayed on screen 4.	—	S-R/W	*DS3	1 ≤ X ≤ 32	spaces	Dimensionless number
43	UNIT_SELECTION_4	Enter the units for the parameter displayed on screen 4.	—	S-R/W	1	0: Auto 1: Custom	0	Dimensionless number
44	CUSTOM_UNIT_4	Freely specify the units for the parameter displayed on screen 4.	—	S-R/W	*DS4	1 ≤ X ≤ 32	spaces	Dimensionless number
45	EXPONENT_ SELECTION_4	Select the exponent for the parameter displayed on screen 4.	—	S-R/W	1	0: None 1: 1 2: 2 3: 3 0 ≤ MGG ≤ 6 4: 4 0 ≤ AVP ≤ 4 5: 5 6: 6	0	Dimensionless number
46	ERASE_OPERATOR_ ACTION_RECORDS	Deletes the operation history from the data setting device.	—	S-R/W		0: None 1: Erase	0	Dimensionless number
47	OPERATOR_ACTION_ RECORD_1	Saves the time and the new mode when the LUI input mode is changed.	Date	N-R	8		0	Dimensionless number
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0	Dimensionless number
48	OPERATOR_ACTION_ RECORD_2	Saves the time and the new mode when the LUI input mode is changed.	Date	N-R	8		0	Dimensionless number
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0	Dimensionless number
49	OPERATOR_ACTION_ RECORD_3	Saves the time and the new mode when the LUI input mode is changed.	Date	N-R	8		0	Dimensionless number
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0	Dimensionless number
50	OPERATOR_ACTION_ RECORD_4	Saves the time and the new mode when the LUI input mode is changed.	Date	N-R	8		0	Dimensionless number
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0	Dimensionless number
51	OPERATOR_ACTION_ RECORD_5	Saves the time and the new mode when the LUI input mode is changed.	Date	N-R	8		0	Dimensionless number
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0	Dimensionless number
52	OPERATOR_ACTION_ RECORD_6	Saves the time and the new mode when the LUI input mode is changed.	Date	N-R	8		0	Dimensionless number
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0	Dimensionless number
53	OPERATOR_ACTION_ RECORD_7	Saves the time and the new mode when the LUI input mode is changed.	Date	N-R	8		0	Dimensionless number
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0	Dimensionless number
54	OPERATOR_ACTION_ RECORD_8	Saves the time and the new mode when the LUI input mode is changed.	Date	N-R	8		0	Dimensionless number
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0	Dimensionless number
55	OPERATOR_ACTION_ RECORD_9	Saves the time and the new mode when the LUI input mode is changed.	Date	N-R	8		0	Dimensionless number
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0	Dimensionless number
56	OPERATOR_ACTION_ RECORD_10	Saves the time and the new mode when the LUI input mode is changed.	Date	N-R	8		0	Dimensionless number
			Value	N-R	1	0x00: Local User I/F Inactive 0x80: Local User I/F Active	0	Dimensionless number

Appendix D. Specifications

LIST OF FEATURES

Item	Function
Forced fully open/closed	The control valve can be fully closed or opened securely when the desired percentage of input signal is reached.
Desired flow characteristics	The relationship between input signal and valve travel that is appropriate for the process can be defined by using a 21-point line graph.

FUNCTIONAL SPECIFICATIONS

Item		Function
Applicable actuator		Pneumatic single and double acting, linear and rotary motion actuator
Communication protocol		Foundation fieldbus
Lightning protection		Peak value of voltage surge: 12 kV Peak value of current surge: 1000 A
Flow characteristics		Linear, Equal percentage, Quick opening Custom user characteristics (21 points)
Manual operation		Auto/Manual external switch or LUI (Local User Interface) (Not available double acting actuator)
Supply air pressure		140 to 700 kPa
Air consumption		for single acting actuator 3.2 L/min [N] or less: with steady supply air pressure of 140 kPa {1.4 kgf/cm²} and output of 50 % 4.0 L/min [N] or less: with steady supply air pressure of 280 kPa {2.8 kgf/cm²} and output of 50 % 4.8 L/min [N] or less: with steady supply air pressure of 500 kPa {5.0 kgf/cm²} and output of 50 % for double acting actuator 8 L/min (N) or less: at air pressure of 400 kPa {4.0 kgf/cm²} and balanced output pressures at a steady 70 % of the supply air pressure
Maximum air deliver flowrate		110 L/min (N) at 140 kPa {1.4 kgf/cm²}
Air connections		Rc1/4, 1/4NPT
Electrical connections		G1/2, 1/2NPT, M20×1.5
Ambient temperature limits		−40 to +80 °C for general model TIIS Flameproof: −20 to +55 °C FM/FMC/IECEx/CCC/KCs Explosion protection: −30 to +75 °C ATEX/IECEx FM Intrinsically safe (ic) and Nonincendive: −24 to +75 °C Intrinsically safe: −40 to +60 °C LCD operating limit: 0 to +50 °C
Ambient humidity limits		5 to 100 %RH
Vibration characteristics		20 m/s², 5 to 400 Hz (with standard mounting kit on Azbil Corporation's HA actuator)
Color		Silver
Material		Cast aluminum
Weight		Without Pressure regulator with filter: 4.2 kg With Pressure regulator with filter model RA1B: 4.7 kg With Pressure regulator with filter model KZ03: 4.9 kg
Perfor-mance	Accuracy	±1.0 %F.S. But: ±3.0 % FS if the feedback lever angle is outside the ±4° to ±20° range (see Table 1)
	Stroke coverage	14.3 to 100 mm Stroke (Feedback Lever Angle ±4° to ±20°)
Structure		TIIS Flameproof Ex d IIC T6 X FM Explosionproof/Dust Ignition Protection Explosionproof (Division system): Class I, Division 1, Group B, C, D T6 • Factory sealed, conduit seal not required • Not including gasoline atmospheres Flameproof (Zone system): Class I, Zone 1, AEx d IIC T6 Gb Dust ignition protection (Division system): Class II, III, Division 1, Group E, F , G T6 Dust ignition protection (Zone system): Zone 21 AEx tb IIIC T85 °C Db Enclosure classification: IP66 FM Intrinsically safe (ic) and Nonincendive Intrinsically safe (ic) (Zone system) Class I, Zone 2, AEx ic IIC T4 FISCO & Entity Parameters: Ui=32 V, Ci=4 nF, Li=0 Nonincendive (Division system) Class I, Division 2, Group A, B, C and D, T4 Nonincendive Field Wiring & FNICO Parameters: Vmax=32 V, Ci=4 nF, Li=0 Suitable Class II and Class III, Division 2, Group E, F and G, T4 Indoor/Outdoor Enclosure: NEMA Type 4X, IP66

Item	Function
Structure	FMC Explosionproof/Dust Ignition Protection Explosionproof (Division system): Class I, Division 1, Group C, D T6 • Factory sealed, conduit seal not required • Not including gasoline atmospheres Flameproof (Zone system): Class I, Zone 1, Ex d IIB T6 • Seal all conduits within 450 mm (18 inches) Dust ignition protection (Division system): Class II,III, Division 1, Group E, F, G T6 Enclosure classification: IP66 • The wiring conduit cable gland and electrical wiring must be compliant with the National Electrical Code (NEC). ATEX Intrinsically safe/Dust Ignition Protection FISCO Field Device Intrinsically safe: II 1 G Ex ia IIC T4 Ga Dust ignition protection: II 1 D Ex ia IIIC T135°C Da Enclosure classification: IP66 The power supply should be ATEX certified FISCO power supply system and comply with the following conditions: User Terminals (+/-FB): Ui=17.5 V, Ii=380 mA, Pi=5.32 W, Ci=2 nF, Li=negligible IECEx Flameproof/Dust Ignition Protection Flameproof: Ex d IIC T6 Gb Enclosure classification: Ex tb IIIC T85 °C Db Enclosure classification: IP66 Please use IECEx Ex d IIC-approved products as the cable gland for connecting it to the electrical connection port. However, please use IP66-approved products when using it in an environment that requires IP66. IECEx Intrinsically safe/Dust Ignition Protection FISCO Field Device Intrinsically safe: Ex ia IIC T4 Ga Dust ignition protection: Ex ia IIIC T135°C Da Enclosure classification: IP66 The power supply should be IECEx certified FISCO power supply system and comply with the following conditions: User Terminals (+/-FB): Ui=17.5 V, Ii=380 mA, Pi=5.32 W, Ci=2 nF, Li=negligible CCC Flameproof / Dust Ignition Protection Flameproof: Ex db IIC T6 Gb -30°C≤T_{amb}≤+75°C IP66 Dust ignition protection: Ex tb IIIC T85°C Db Enclosure classification: IP66 For the cable gland connected to the electrical connection port, use products with CCC Ex d IIC or Ex tD A21 explosion-proof certification. Please use IP66-approved products in an environment that requires IP66. KCs Flameproof Ex d IIC T6 Please use KCs Ex d IIC-approved products as the cable gland to be connected to the electrical connection port.
CE conformity	Electromagnetic compatibility EN61326-1: 2013 (CE Marking) The device is intended for use in industrial locations defined in CE marking directive (EN 61326-1).

Note: Depending on the inner diameter and length of the air pipe, automatic setup might not be sufficient to realize the optimum operation. In such a case, please specify the relevant parameters.

Conditions of supply air (JIS C1805-1 (2001))

Item	Function
Particles	Maximum diameter 3 μmm
Oil mist	Less than 1 ppm at mass
Humidity of the air supply	The dew point should be at least 10 °C lower than the temperature of this device.

To meet the above specifications for instrument air, install the air purification devices listed below properly in the specified installation location.

Examples of air purification devices

Installation	Air purification device	SMC corporation	CKD corporation
Compressor outlet or main line	Line filter	AFF series	AF series
	Mist separator	AM series	
Terminal device	Mist separator	AM150 or AM250 series	M3000S type

Table 1. Standard travel range and accuracy

Actuator	Travel [mm]	Accuracy [%FS]
PSA1, 2	14.3, 20, 25	1.0
PSA3, 4	20, 38	1.0
HA1	6, 8, 10	3.0
	14.3, 25	1.0
HA2	10	3.0
	14.3, 25, 38	1.0
HA3	14.3	3.0
	25, 38, 50	1.0
HA4	14.3	3.0
	25, 38, 50, 75	1.0
VA5	25, 37.5, 50, 75, 100	1.0
VA6 PSA6, 7	14.3	3.0
	25, 37.5, 50, 75, 100	1.0
HK1 PSK1	10	3.0
	19	1.0
DAP560, 1000 1000X	14.3	3.0
	25~100	1.0
DAP1500, 1500X	14.3, 25	3.0
	38~100	1.0

FIELDBUS SPECIFICATIONS

Function Blocks

Block name	Number	Period of execution [ms]
AO (Analog Output)	1	30
DI (Discrete Input)	2	30
AR (Arithmetic)	1	30
PID	2	45
OS (Output Splitter)	1	30
IS (Input Selector)	1	30

RELATED SPECIFICATIONS

Item	Function
Supply voltage	9 to 32 V except for intrinsically safe / 9 to 17.5 V for intrinsically safe
Maximum current	20 mA
Registration	Interoperability test ITK 6.1 approved

VCR STRUCTURE

VCR No.	Configuration
1	QUB (Server) for NMIB/SNIB
2 to 32	Fully configurable

NETWORK PARAMETERS

The following table shows the key parameter values that affect interoperability of the Fieldbus devices. The LAS needs to be configured to satisfy these parameters. If other devices on the same Fieldbus network require a greater number for them, the greater number must be used. This will degrade network performance, though.

Symbol	Parameter	Factory setting	Range of value
V (ST)	Slot Time *1	5	5 to 100
V (MID)	Minimum Inter PDU Delay *1	10	10 to (V(MRD)-1)×V(ST), smaller than 120 inclusive.
V (MRD)	Maximum Response Delay *2	4	V(MRD)×V(ST) shall be greater than 20 and V(MRD) shall be smaller than 11, inclusive.
T1	SM Step Tuner	48000 (15 seconds)	-
T2	SM Set Address Sequence Timer	2880000 (90 seconds)	T2 > T3
T3	SM Set Address Wait Timer	1440000 (45 seconds)	T2 > T3
V (FUN)	First Unpolled Node	0x25	0x14 to 0xF7
V (NUN)	Number of consecutive Unpolled-Node	0xBA	0x00 to oxE4
V(MSO)	Maximum Scheduling Overhead *1	0x00	0x00 to 0x 3F
V(DMDT)	Default Minimum Token Delegation time *1	0x56	0x20 to 0x7FFF
V(DTHT)	Default Token Holding Time *1	0x0400	0x0114 to 0xFDE8 (65,000)
V(TTRT)	Target Token Rotation Time *1	4096	1 to 60000ms
V(LTHT)	Link Maintenance Token Holding Time *1	0x0124	0x0124 to 0xFDE8 (65,000)
V(TDP)	Time Distribution Period	5000	5 to 55000 ms
V(MICD)	Maximum Inactivity to Claim LAS Delay *1	2000	1 to 4095
V(LDDP)	LAS Database Distribution Period	3000	100 to 55000 ms

Note 1. A LAS requires parameters other than those listed here to operate. Please refer to the user's manual that comes with our LAS device.

2. The T3 needs to be set between 15 seconds and 60 seconds.

**1. The unit is octet time (256 s). Octet time is the time required to handle 8 bits of data on the Fieldbus Network.*

**2. The unit is slot-time.*

Appendix E. Model Configuration Table

MODEL SELECTION

Basic model number

AVP703	FOUNDATION fieldbus	-	(1)	(2)	(3)	-	(4)	(5)	(6)	(7)	-	(8)	(9)
(1) Structure	Water-proof		X										
	TIIS Flameproof (Electrical connection G1/2 only) with cable gland *1		E										
	FM Explosionproof/Dust ignition protection (Electrical connection G1/2 is not available.)		F										
	FM Intrinsically safe (ic) and Nonincendive		V										
	FMC Explosionproof/Dust ignition protection (Electrical connection G1/2 is not available.)		A										
	ATEX Intrinsically safe/Dust Ignition Protection		L										
	IECEx Flameproof/Dust ignition protection (Electrical connection G1/2 is not available.)		D										
	IECEx Intrinsically safe/Dust Ignition Protection		T										
	CCC Flameproof/Dust ignition protection (Electrical connection G1/2 is not available.)		N										
	KCs Flameproof (Electrical connection G1/2 is not available.)		K										

(2) Connection	Electrical connection	Air piping connection	Mounting thread	Pressure gauge thread									
	G1/2	Rc1/4	M8	Rc1/8	G								
	1/2NPT	1/4NPT	M8	Rc1/8	N								
	M20×1.5	1/4NPT	M8	Rc1/8	M								

(3) Finish	Standard (Baked acrylic)	S											
	Corrosion proof (Baked urethane)	B											

(4) (5) Display	Display with push button	D	X										
Diagnostic	Advanced Diag (with four pressure sensors)			A	X								

(8) (9) Option	None	X	X
	Explosion-proof universal elbow (SUS304 G1/2) (1)	A	A
	Explosion-proof universal elbow (SUS304 G1/2) (2)	A	C
	Model RA1B pressure regulator with filter (Mounted on Positioner)*2	M	7
	Model RA1B pressure regulator with filter (with bracket for separated mount)	M	8
	Model RA1B pressure regulator with filter (with bracket for separated mount onto horizontal-installed actuator)	M	9
	Model KZ03 pressure regulator with filter (Mounted on Positioner)*2	M	1
	Model KZ03 pressure regulator with filter (with bracket for separated mount)	M	2
	Model KZ03 pressure regulator with filter(with bracket for separated mount onto horizontal-installed actuator)	M	3
	Extension lever (In case of without mounting bracket)	M	L
	Seal tape prohibited	M	J
	Mounting bracket material SUS316*3	M	6
	Mounting bracket (PSA1,2, PSK1)	Y	S
	Mounting bracket (New model PSA3, 4 (produced after 2000), VA1 to 3 produced after May.'83))	Y	Q
	Mounting bracket (PSA6, VA4 to 6(procuced after May.'83))	Y	L
	Mounting bracket (PSA7)	Y	8
	Mounting bracket (HA1)	Y	A
	Mounting bracket (HA2, HL2)	Y	T
	Mounting bracket (HA3, HL3)	Y	C
	Mounting bracket (HA4, HL4)	Y	N
	Mounting Bracket (VR1)	Y	V
	Mounting Bracket (VR2, 3)	Y	R
	Mounting Bracket (VR3H)	Y	6
	Mounting Bracket (RSA1)	Y	F
	Mounting Bracket (RSA2)	Y	U
	Mounting Bracket (old model PSA3, 4 (those produced before 1999))	Y	Y
	Mounting Bracket (VA1 to 3(produced before Apr.'83, former model Motion Connector), 800-1, 2, 3)*4	Y	W
	Mounting Bracket (VA4,5(produced before Apr.'83, former model Motion Connector), 800-4, 5)*4	Y	J
	Mounting Bracket (VP5, 6)	Y	1
	Mounting Bracket (VP7)	Y	7
	Mounting bracket (DAP560, 1000, 1000X (stroke: 100 mm max.))	Y	4
	Mounting bracket (DAP1500, 1500X (stroke: 100 mm max.))	Y	5

*1. *One set of TIIS Flameproof cable gland shall be attached for model AVP703.*

*2. *Select model the code "M1" or "M7" only when the direction of drain of the pressure regulator with filter on the control valve is downward(ground).*

*3. *Material of mounting bracket when you don't select code "M6" is SUS304.*

*4. *Consult with sales representative in case of no mounting hole on the side of valve yoke.*

Individual specifications

Device TAG No. (8 characters)	Be sure to configure the data.
NODE_ADDRESS	0x_ _ (16hex number)
Input characterization*1	L: Linear EQ%: Equal percentage QO: Quick opening USER: User-defined
Positioner action*2	D: Direct for single acting actuator R: Reverse for single acting actuator W: For double acting actuator
Supply pressure classification	1: 140≤Ps≤150 kPa 2: 150<Ps≤300 kPa 3: 300<Ps≤400 kPa 4: 400<Ps≤450 kPa 5: 450<Ps≤700 kPa
Unit of pressure gauge	A (kPa) B (kgf/cm²) C (MPa) D (bar) E (psi)
Valve closed position	DOWN, UP
Actuator type	L: Linear R90: Rotary 90° R60: Rotary 60° RS90: Rotary sub 90° RS60: Rotary sub 60°
LCD facing upwards	X: No optional parts A: LCD cover and Pressure gages jointed to elbows B: LCD cover C: Pressure gages jointed to elbows

**1. Refer to following when selecting the input/output characteristics.*

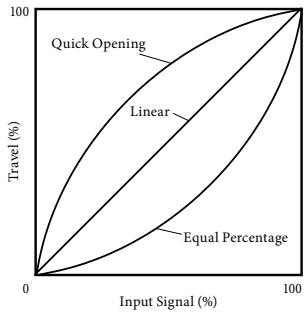


Figure 1. Input characterization

Selection of input characterization

The flow characteristic of a control valve is set by selecting the valve plug characteristic, and the input-output characteristics of the positioner must be specified as linear. However, if the valve plug flow characteristic, which depends on the control valve's shape and structure, does not meet requirements, you can correct the overall flow characteristic of the control valve by specifying "equal percentage" or "quick opening" for the input-output characteristics of the positioner, as shown in Table 2.

Table 2. Control valve flow characteristics correction by the positioner

Characteristic of valve plug	Input characterization of positioner	Overall flow characteristic of control valve
Linear	Quick opening	Quick opening
Linear	EQ%	EQ%
EQ%	Quick opening	Linear

Note: If the valve plug characteristic is "quick opening," the overall flow characteristic of the control valve cannot be linear even if "equal percentage" is set for the positioner's input-output characteristics. (This is because when the valve plug characteristic is "quick opening," the control valve works as an ON/OFF valve and it is difficult to correct its characteristics by changing the setting of the positioner.)

**2. When the power is shut off, select D (Direct for single acting actuator) to make the output air pressure of this device zero, and R (Reverse for single acting actuator) to make the output at the maximum air pressure (supply air pressure). Positioner action differs from actuator and control valve action, so be careful in selecting the positioner's action.*

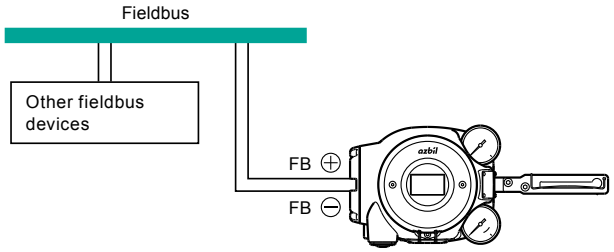


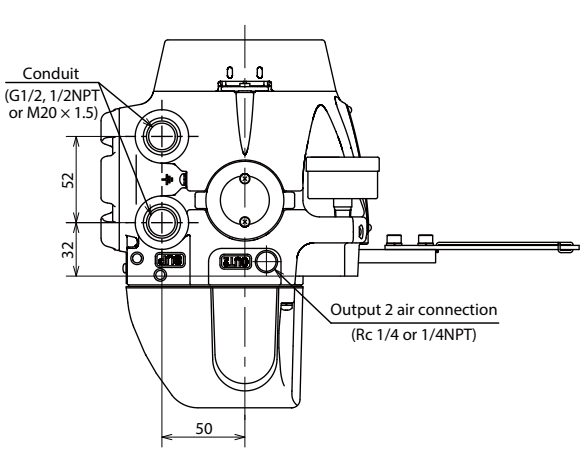
Figure 2. Wiring example of AVP703

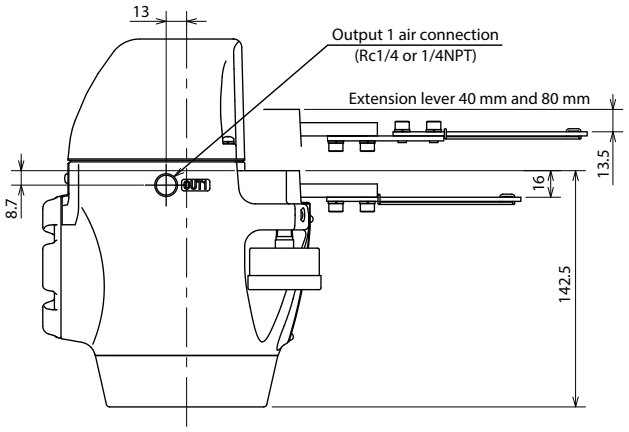
Appendix F. Outline Dimensional Drawing

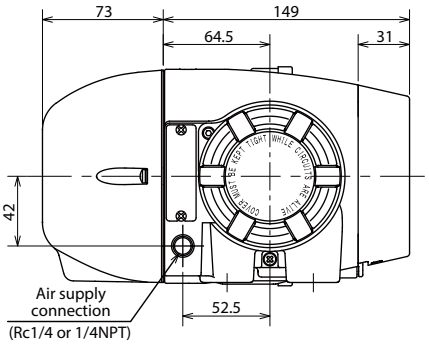
DIMENSIONS

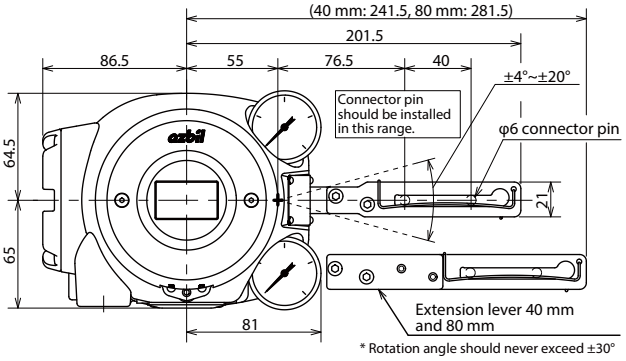
For single acting actuator without regulator

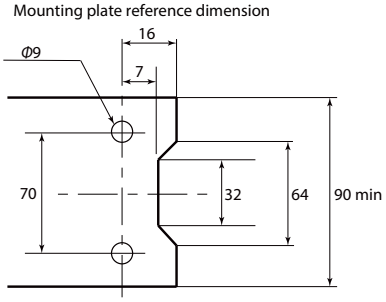
[Unit: mm]

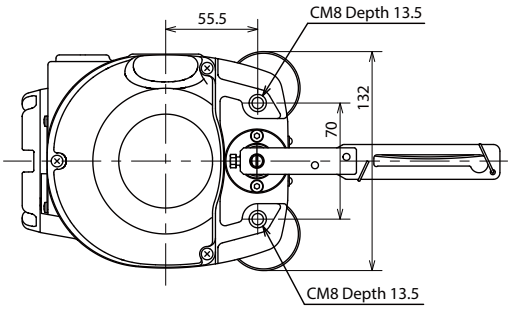




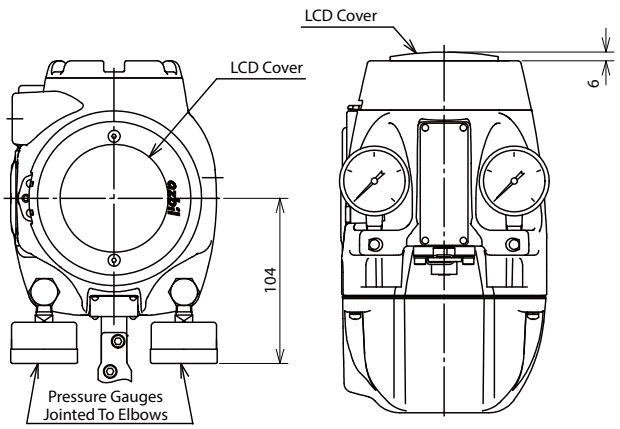






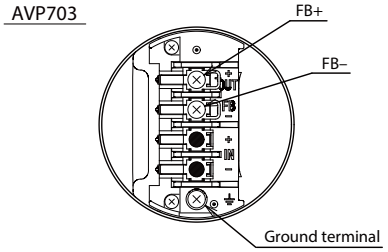


LCD Facing Upwards



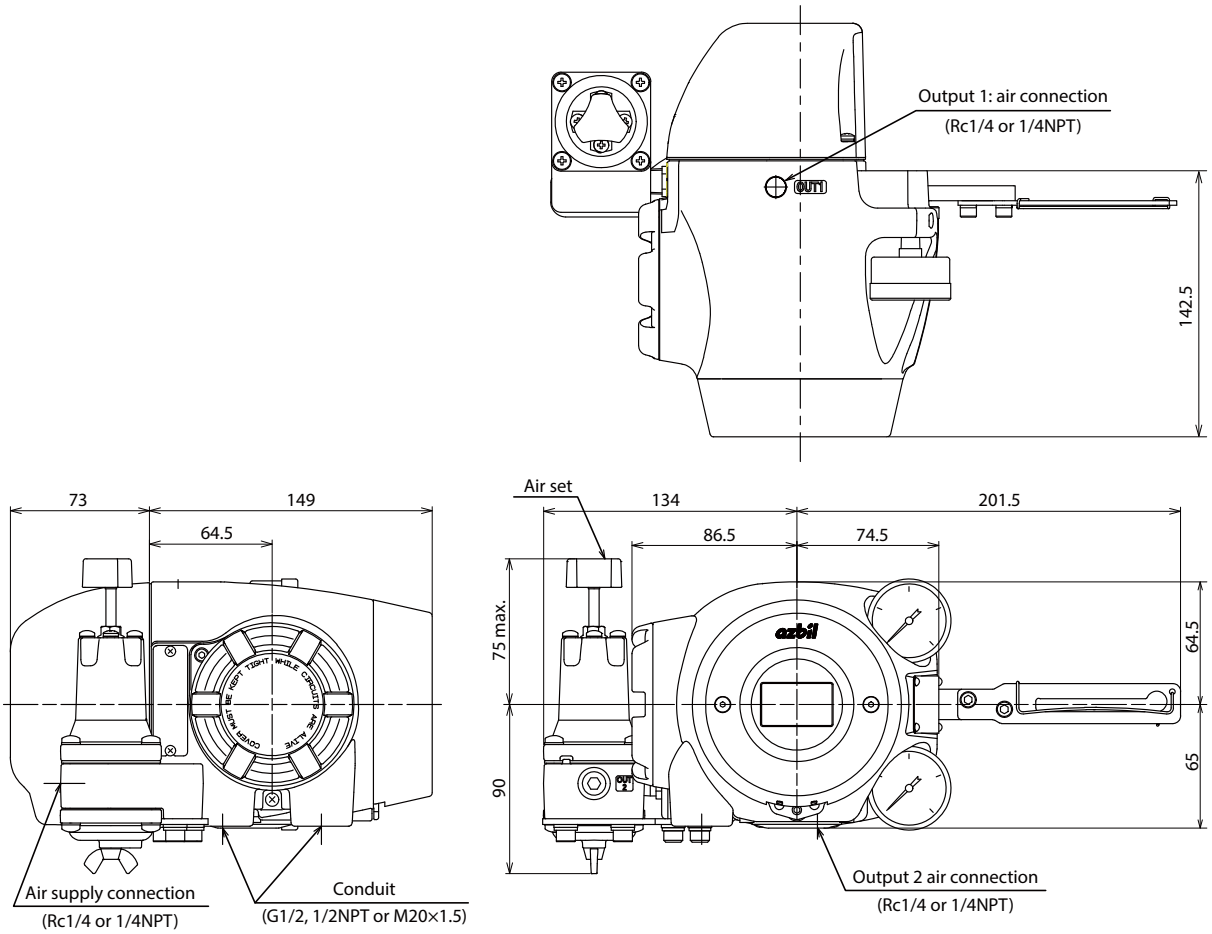
Terminal

Screw size: M4



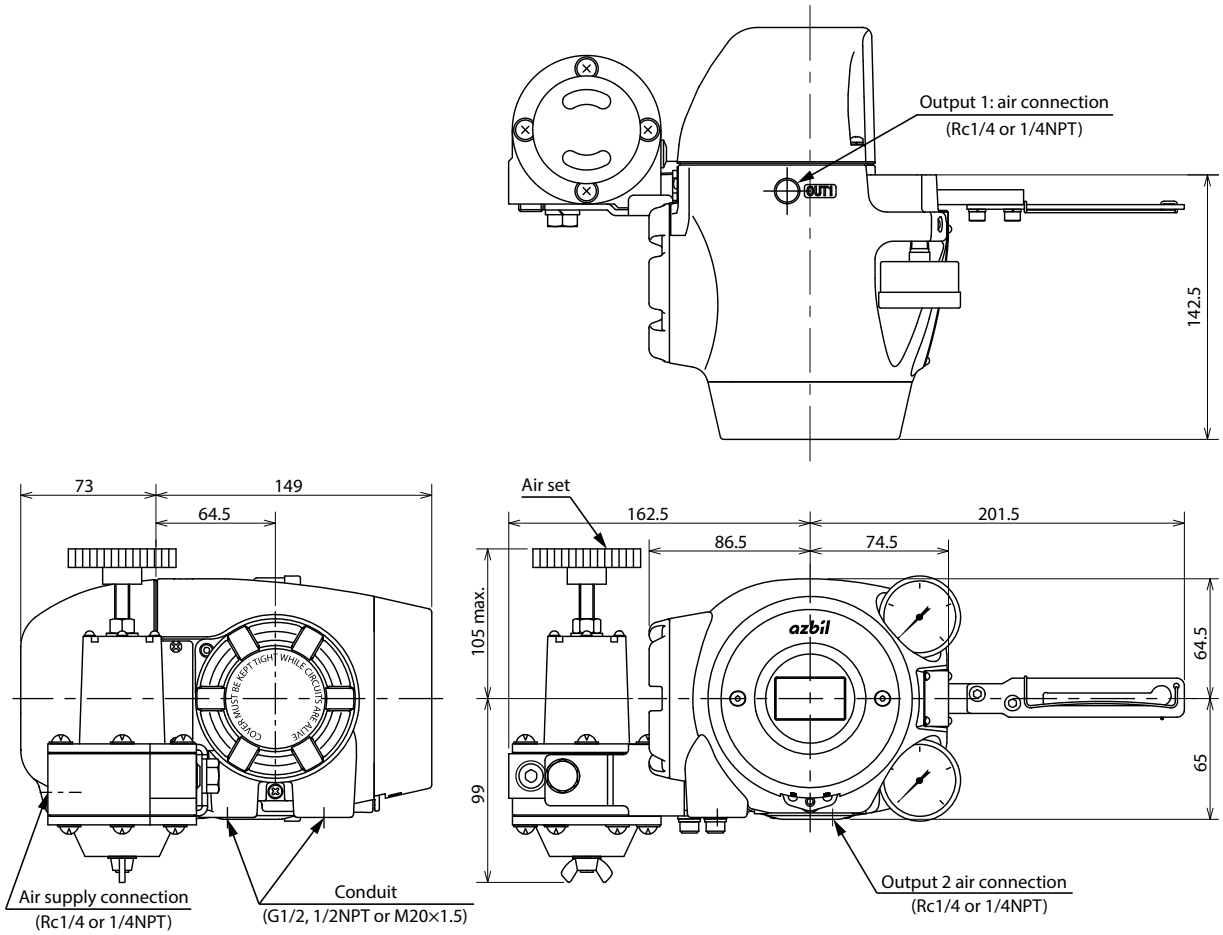
For single acting actuator with RA1B regulator

[Unit: mm]



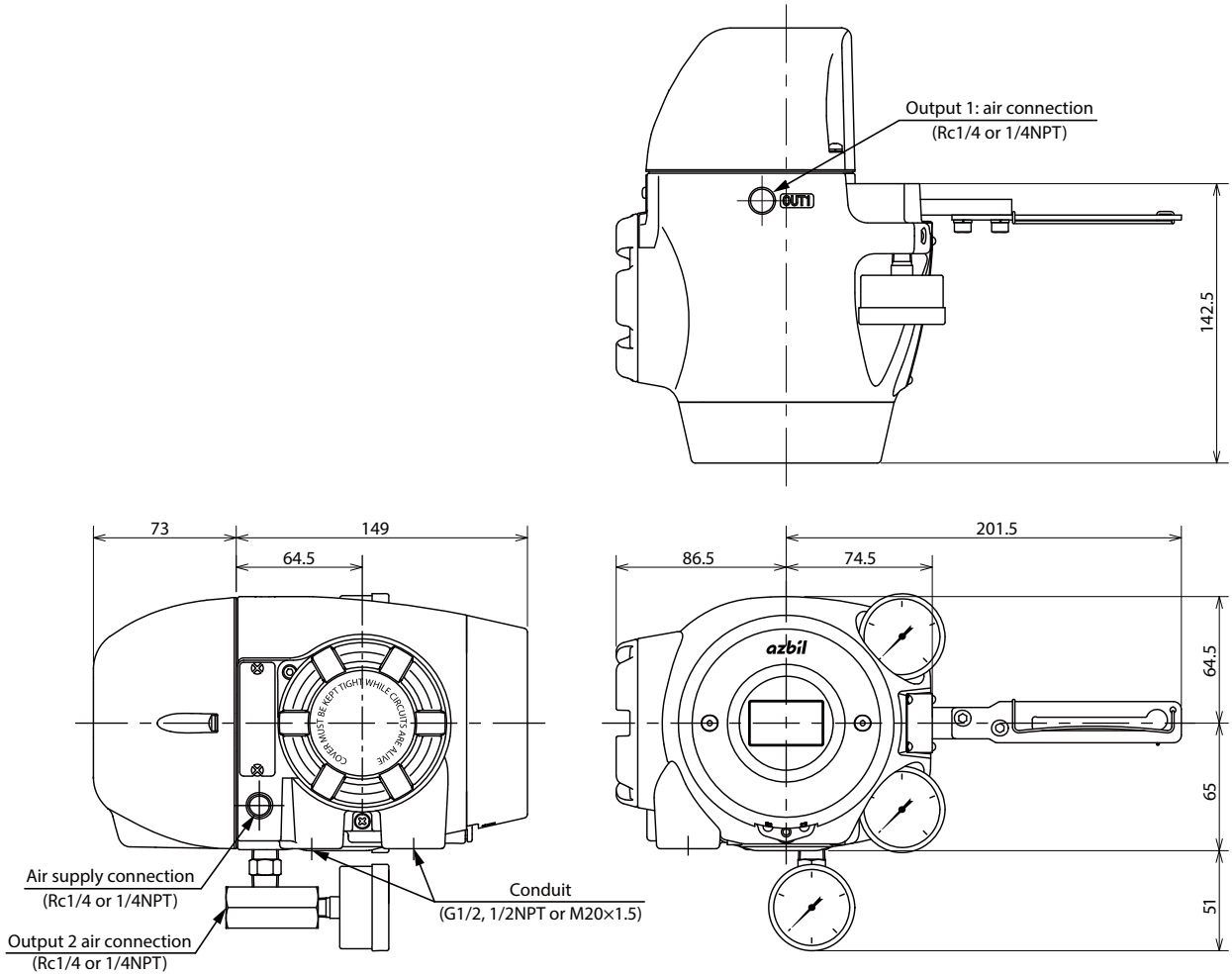
For single acting actuator with KZ03 regulator

[Unit: mm]

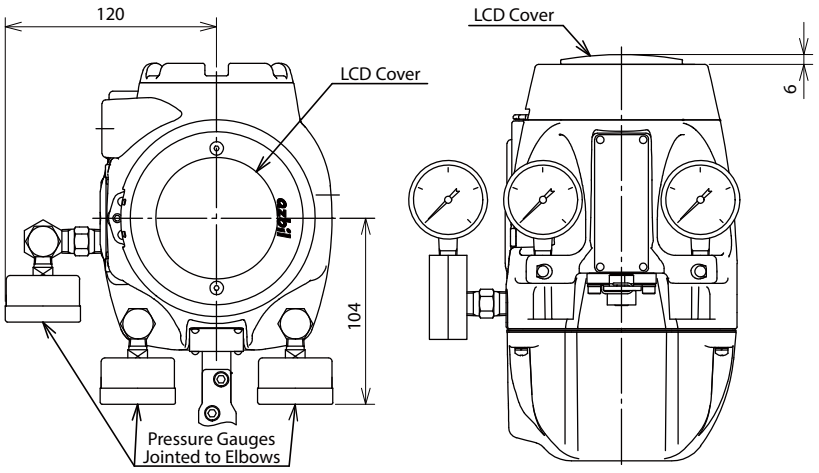


For double acting actuator without regulator

[Unit: mm]

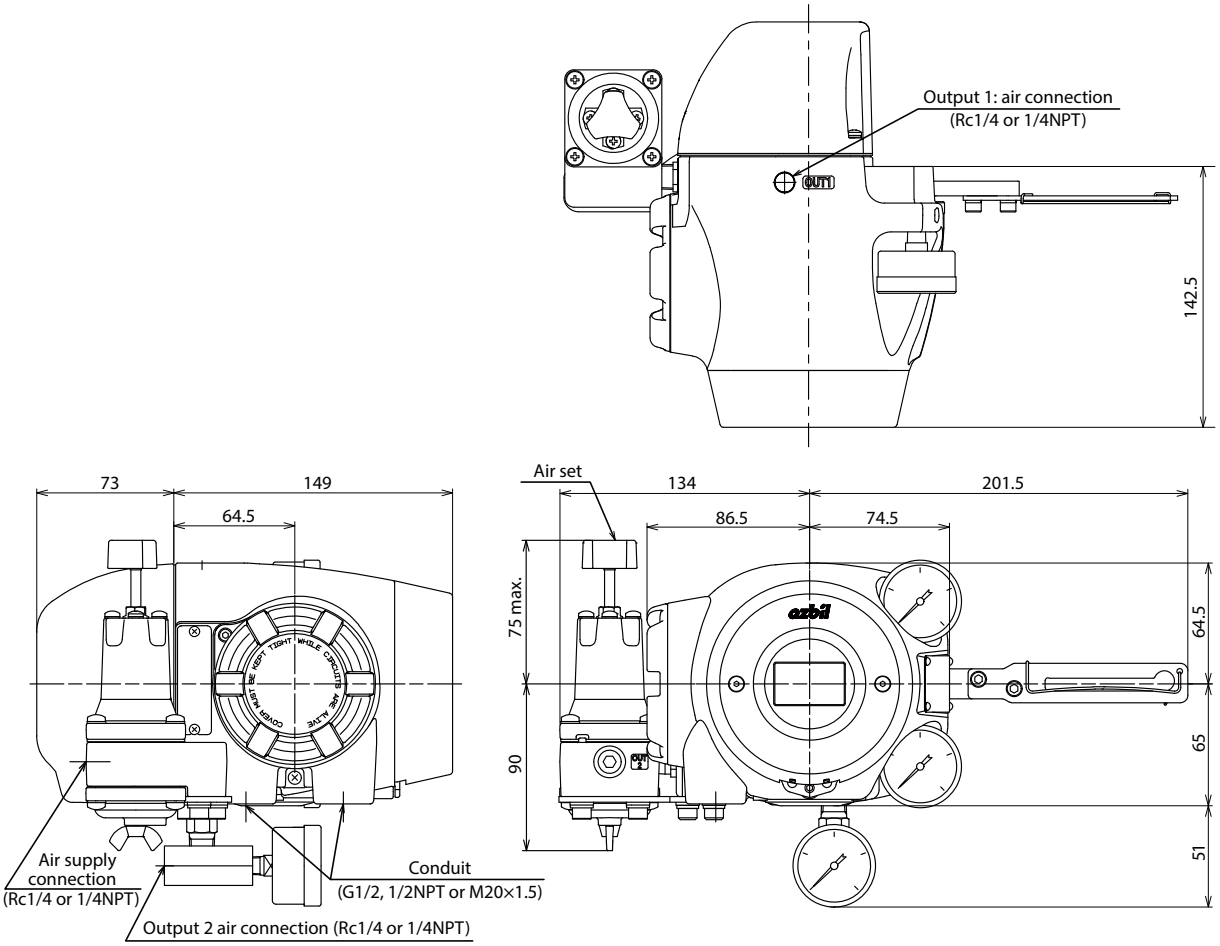


LCD Facing Upwards



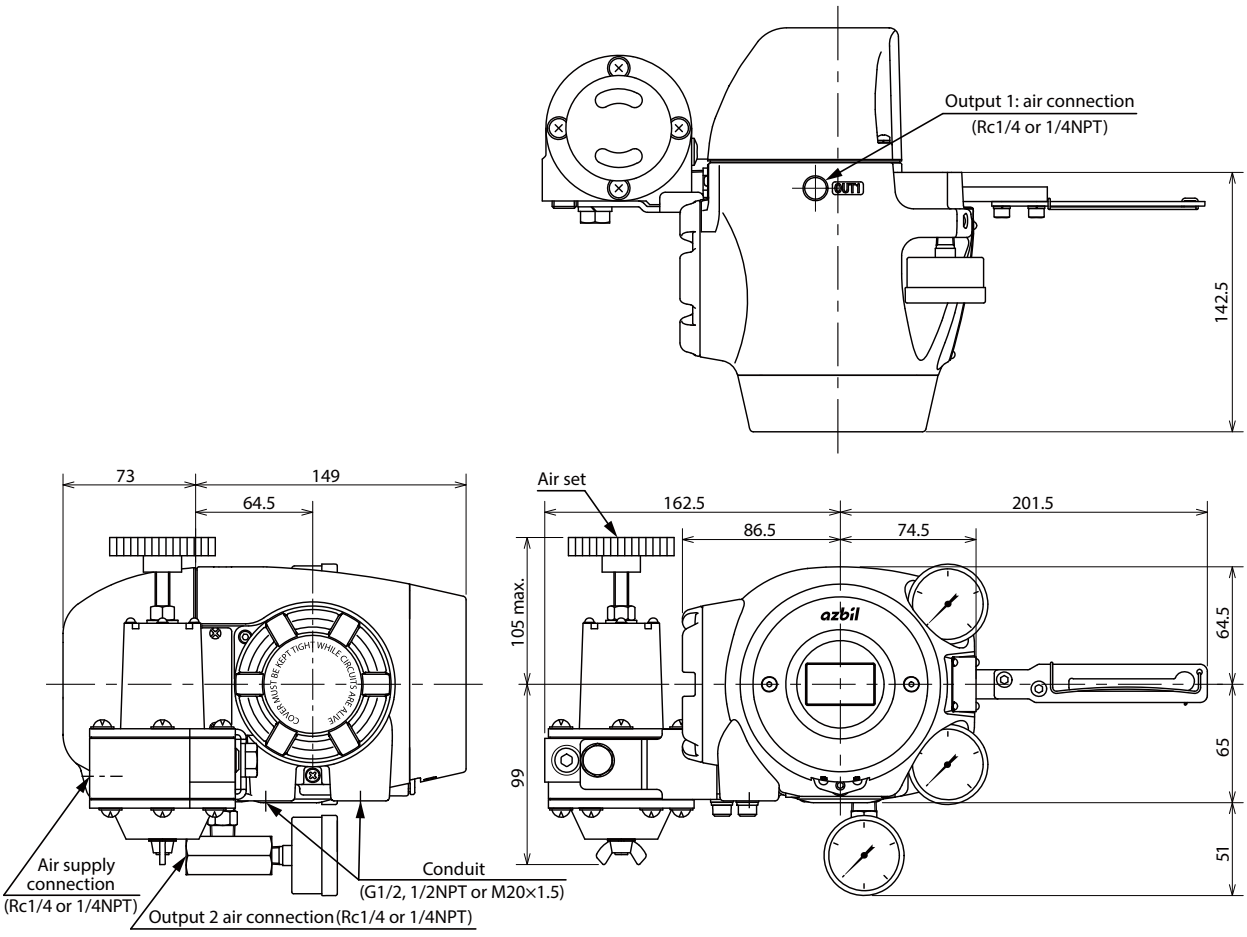
For double acting actuator with RA1B regulator

[Unit: mm]



For double acting actuator with KZ03 regulator

[Unit: mm]



Terms and Conditions

We would like to express our appreciation for your purchase and use of Azbil Corporation's products.
You are required to acknowledge and agree upon the following terms and conditions for your purchase of Azbil Corporation's products (system products, field instruments, control valves, and control products), unless otherwise stated in any separate document, including, without limitation, estimation sheets, written agreements, catalogs, specifications and instruction manuals.

1. Warranty period and warranty scope

1.1 Warranty period

Azbil Corporation's products shall be warranted for one (1) year from the date of your purchase of the said products or the delivery of the said products to a place designated by you.

1.2 Warranty scope

In the event that Azbil Corporation's product has any failure attributable to azbil during the aforementioned warranty period, Azbil Corporation shall, without charge, deliver a replacement for the said product to the place where you purchased, or repair the said product and deliver it to the aforementioned place.

Notwithstanding the foregoing, any failure falling under one of the following shall not be covered under this warranty:

(1) Failure caused by your improper use of azbil product
(noncompliance with conditions, environment of use, precautions, etc. set forth in catalogs, specifications, instruction manuals, etc.);
(2) Failure caused for other reasons than Azbil Corporation's product;
(3) Failure caused by any modification or repair made by any person other than Azbil Corporation or Azbil Corporation's subcontractors;
(4) Failure caused by your use of Azbil Corporation's product in a manner not conforming to the intended usage of that product;
(5) Failure that the state-of-the-art at the time of Azbil Corporation's shipment did not allow Azbil Corporation to predict; or
(6) Failure that arose from any reason not attributable to Azbil Corporation, including, without limitation, acts of God, disasters, and actions taken by a third party.

Please note that the term "warranty" as used herein refers to equipment-only-warranty, and Azbil Corporation shall not be liable for any damages, including direct, indirect, special, incidental or consequential damages in connection with or arising out of Azbil Corporation's products.

2. Ascertainment of suitability

You are required to ascertain the suitability of Azbil Corporation's product in case of your use of the same with your machinery, equipment, etc. (hereinafter referred to as "Equipment") on your own responsibility, taking the following matters into consideration:

(1) Regulations and standards or laws that your Equipment is to comply with.
(2) Examples of application described in any documents provided by Azbil Corporation are for your reference purpose only, and you are required to check the functions and safety of your Equipment prior to your use.
(3) Measures to be taken to secure the required level of the reliability and safety of your Equipment in your use
Although azbil is constantly making efforts to improve the quality and reliability of Azbil Corporation's products, there exists a possibility that parts and machinery may break down.
You are required to provide your Equipment with safety design such as fool-proof design, *1 and fail-safe design*2 (anti-flame propagation design, etc.), whereby preventing any occurrence of physical injuries, fires, significant damage, and so forth. Furthermore, fault avoidance, *3 fault tolerance,*4 or the like should be incorporated so that the said Equipment can satisfy the level of reliability and safety required for your use.

*1. A design that is safe even if the user makes an error.
*2. A design that is safe even if the device fails.
*3. Avoidance of device failure by using highly reliable components, etc.
*4. The use of redundancy.

3. Precautions and restrictions on application

3.1 Restrictions on application

Please follow the table below for use in nuclear power or radiation-related equipment.

	Nuclear power quality*5 required	Nuclear power quality*5 not required
Within a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Cannot be used (except for limit switches for nuclear power*7)
Outside a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Can be used

*5. Nuclear power quality: compliance with JEAG 4121 required
*6. Radiation controlled area: an area governed by the requirements of article 3 of "Rules on the Prevention of Harm from Ionizing Radiation," article 2 2 4 of "Regulations on Installation and Operation of Nuclear Reactors for Practical Power Generation," article 4 of "Determining the Quantity, etc., of Radiation-Emitting Isotopes,"etc.
*7. Limit switch for nuclear power: a limit switch designed, manufactured and sold according to IEEE 382 and JEAG 4121.

Any Azbil Corporation's products shall not be used for/with medical equipment.

The products are for industrial use. Do not allow general consumers to install or use any Azbil Corporation's product. However, azbil products can be incorporated into products used by general consumers. If you intend to use a product for that purpose, please contact one of our sales representatives.

3.2 Precautions on application

you are required to conduct a consultation with our sales representative and understand detail specifications, cautions for operation, and so forth by reference to catalogs, specifications, instruction manual, etc. in case that you intend to use azbil product for any purposes specified in (1) through (6) below. Moreover, you are required to provide your Equipment with fool-proof design, fail-safe design, anti-flame propagation design, fault avoidance, fault tolerance, and other kinds of protection/safety circuit design on your own responsibility to ensure reliability and safety, whereby preventing problems caused by failure or nonconformity.

(1) For use under such conditions or in such environments as not stated in technical documents, including catalogs, specification, and instruction manuals
(2) For use of specific purposes, such as:
    * Nuclear energy/radiation related facilities
      [When used outside a radiation controlled area and where nuclear power quality is not required]
      [When the limit switch for nuclear power is used]
    * Machinery or equipment for space/sea bottom
    * Transportation equipment
      [Railway, aircraft, vessels, vehicle equipment, etc.]
    * Antidisaster/crime-prevention equipment
    * Burning appliances
    * Electrothermal equipment
    * Amusement facilities
    * Facilities/applications associated directly with billing
(3) Supply systems such as electricity/gas/water supply systems, large-scale communication systems, and traffic/air traffic control systems requiring high reliability
(4) Facilities that are to comply with regulations of governmental/public agencies or specific industries
(5) Machinery or equipment that may affect human lives, human bodies or properties
(6) Other machinery or equipment equivalent to those set forth in items (1) to (5) above which require high reliability and safety

4. Precautions against long-term use

   Use of Azbil Corporation's products, including switches, which contain electronic components, over a prolonged period may degrade insulation or increase contact-resistance and may result in heat generation or any other similar problem causing such product or switch to develop safety hazards such as smoking, ignition, and electrification. Although acceleration of the above situation varies depending on the conditions or environment of use of the products, you are required not to use any Azbil Corporation's products for a period exceeding ten (10) years unless otherwise stated in specifications or instruction manuals.

5. Recommendation for renewal

   Mechanical components, such as relays and switches, used for Azbil Corporation's products will reach the end of their life due to wear by repetitious open/close operations.

   In addition, electronic components such as electrolytic capacitors will reach the end of their life due to aged deterioration based on the conditions or environment in which such electronic components are used. Although acceleration of the above situation varies depending on the conditions or environment of use, the number of open/close operations of relays, etc. as prescribed in specifications or instruction manuals, or depending on the design margin of your machine or equipment, you are required to renew any Azbil Corporation's products every 5 to 10 years unless otherwise specified in specifications or instruction manuals. System products, field instruments (sensors such as pressure/flow/level sensors, regulating valves, etc.) will reach the end of their life due to aged deterioration of parts. For those parts that will reach the end of their life due to aged deterioration, recommended replacement cycles are prescribed. You are required to replace parts based on such recommended replacement cycles.

6. Other precautions

   Prior to your use of Azbil Corporation's products, you are required to understand and comply with specifications (e.g., conditions and environment of use), precautions, warnings/cautions/notices as set forth in the technical documents prepared for individual Azbil Corporation's products, such as catalogs, specifications, and instruction manuals to ensure the quality, reliability, and safety of those products.

7. Changes to specifications

   Please note that the descriptions contained in any documents provided by azbil are subject to change without notice for improvement or for any other reason. For inquires or information on specifications as you may need to check, please contact our branch offices or sales offices, or your local sales agents.

8. Discontinuance of the supply of products/parts

   Please note that the production of any Azbil Corporation's product may be discontinued without notice. After manufacturing is discontinued, we may not be able to provide replacement products even within the warranty period.

   For repairable products, we will, in principle, undertake repairs for five (5) years after the discontinuance of those products. In some cases, however, we cannot undertake such repairs for reasons, such as the absence of repair parts. For system products, field instruments, we may not be able to undertake parts replacement for similar reasons.

9. Scope of services

   Prices of Azbil Corporation's products do not include any charges for services such as engineer dispatch service. Accordingly, a separate fee will be charged in any of the following cases:

   (1) Installation, adjustment, guidance, and attendance at a test run
   (2) Maintenance, inspection, adjustment, and repair
   (3) Technical guidance and technical education
   (4) Special test or special inspection of a product under the conditions specified by you

   Please note that we cannot provide any services as set forth above in a nuclear energy controlled area (radiation controlled area) or at a place where the level of exposure to radiation is equivalent to that in a nuclear energy controlled area.

Document Number:	CM2-AVP703-2001
Document Name:	Smart Valve Positioner 700 Series with FOUNDATION Fieldbus User's Manual
Date:	1st edition: July 2014 13th edition: Nov. 2022
Issued/Edited by:	Azbil Corporation

Azbil Corporation