FLOWSERVE

# USER INSTRUCTIONS

***Logix 800***
***Digital Positioner***

***Installation***
***Operation***
***Maintenance***


*Experience In Motion*

# Contents

# 1. Introduction

The Logix 800 is a digital positioner designed primarily for controlling adjustable valves.

The positioner can be used with single or double action actuators with either rotary or linear movement.

The Logix 800 can be equipped with modules for feedback, limit switches, and a pressure gauge block.

The modules can be factory assembled before delivery or fitted later.

The modules for feedback and limit switches can contain the following:

Feedback 4-20 mA and one of the following functions:

- Two mechanical contacts
- Two reed switches
- Two inductive sensors, DIN 19234

## Safety instruction

Read the safety instructions in this manual carefully before using the product. The installation, operation, and maintenance of the product must be done by staff with the necessary training and experience. If any questions arise during installation, contact the supplier/sales office before continuing work.

## Warning

- The valve package moves when in operation and can cause personal injury or damage if handled incorrectly.
- If the input signal fails or is switched off, the valve moves quickly to its end position.
- If the compressed air supply fails or is turned off, fast movements can occur.
- The valve is not controlled by the input signals when in the Out of service mode. It will open/close in the event of a leak.
- If a high value is set for Cut off, fast movements can occur.
- When the valve is controlled in the Manual mode, the valve can move quickly.
- Incorrect settings can cause self-oscillation, which can lead to damage.

## Important

- Always turn off the compressed air supply before removing or disconnecting the air supply connection or the integral filter. Remove or disconnect with care because C- is still under pressure even after the air supply is turned off.
- Always work in an ESD protected area when servicing the PCB´s. Make sure the input signal is switched off.
- The air supply must be free from moisture, water, oil and particles.

## Special Conditions for Safe Use

The enclosure of Logix 800I (Intrinsically safe) is made of aluminium and any impact or friction caused by external objects shall be avoided in the application.

# 2. Storage

## General

The Logix 800 positioner is a precision instrument. Therefore it is essential that it is handled and stored in the right way. Always follow the instructions below!

**N.B.** As soon as the positioner is connected and started, internal air leakage will provide protection against corrosion and prevent the ingress of moisture. For this reason, the air supply pressure should always be kept on.

## Storage indoors

Store the positioner in its original packaging. The storage environment must be clean, dry, and cool (15 to 26°C, 59 to 79°F.

## Storage outdoors or for a longer period

If the positioner must be stored outdoors, it is important that all the cover screws are tightened and that all connections are properly sealed. The unit should be packed with a desiccant (silica gel) in a plastic bag or similar, covered with plastic, and not exposed to sunlight, rain, or snow.

This is also applicable for long-term storage (more than 1 month) and for long transport by sea.

## Storage in a warm place

When the positioner is stored in a warm place with a high relative humidity and is subjected to daily temperature variations, the air inside the unit will expand and contract.

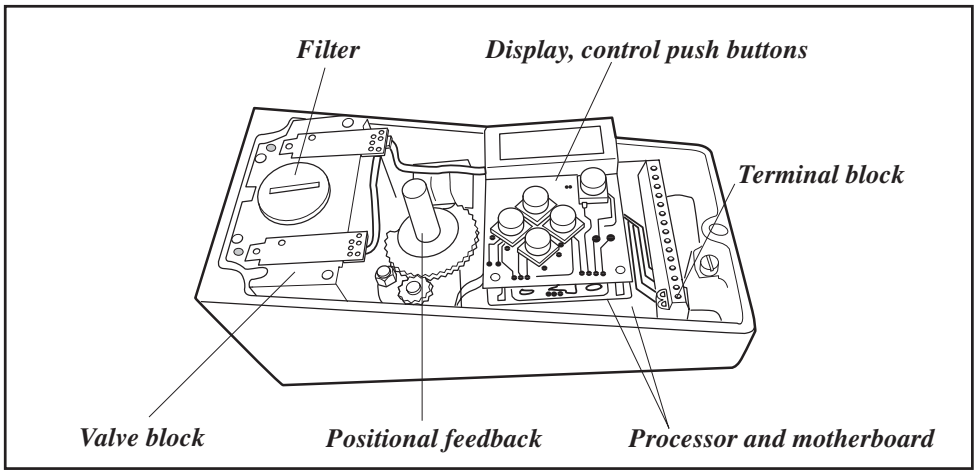
This means that air from outside the unit may be drawn into the positioner. Depending on the temperature variations, relative humidity, and other factors, condensation and corrosion can occur inside the unit, which in turn can give rise to functional disorders or a failure.

# 3. Design

The Logix 800 positioner contains:
- Electronic board with microprocessor, HART modem, Profibus, Foundation Fieldbus, display, etc.
- Valve block
- Positional feedback with potentiometer
- Sealed compartment for electrical connections

The push buttons and display are accessible underneath the aluminium cover, which is sealed with an O-ring.

The figure shows the Logix 800 with the cover removed.



# 4. Variants

## Logix 800 General purpose

The Logix 800 digital positioner has an easy to use user interface with 5 pushbuttons and local graphic LCD display. Communication options include 4-20ma HART, Foundation Fieldbus and Profibus PA. All Logix 800 positioners are available with Feedback, Fail Freeze (Fail in last position and hold when power is lost), 270-degree rotation (for extended travel) and Gauge block.

## Logix 800 Explosion proof

The Logix 800 digital positioner is available in explosion proof enclosure. The explosion proof Logix 800 features the same easy to use interface for local configuration as the **general purpose** version does. Communication with Hart, Foundation Fieldbus and Profibus is possible.

Further features are gauge ports and local graphic LCD display.
ATEX: EEx d IIB + $H_2$ T6 (Ta +65°C), T5 (Ta +80°C) ⟨Ex⟩ II 2GD

## Logix 800 Intrinsically safe

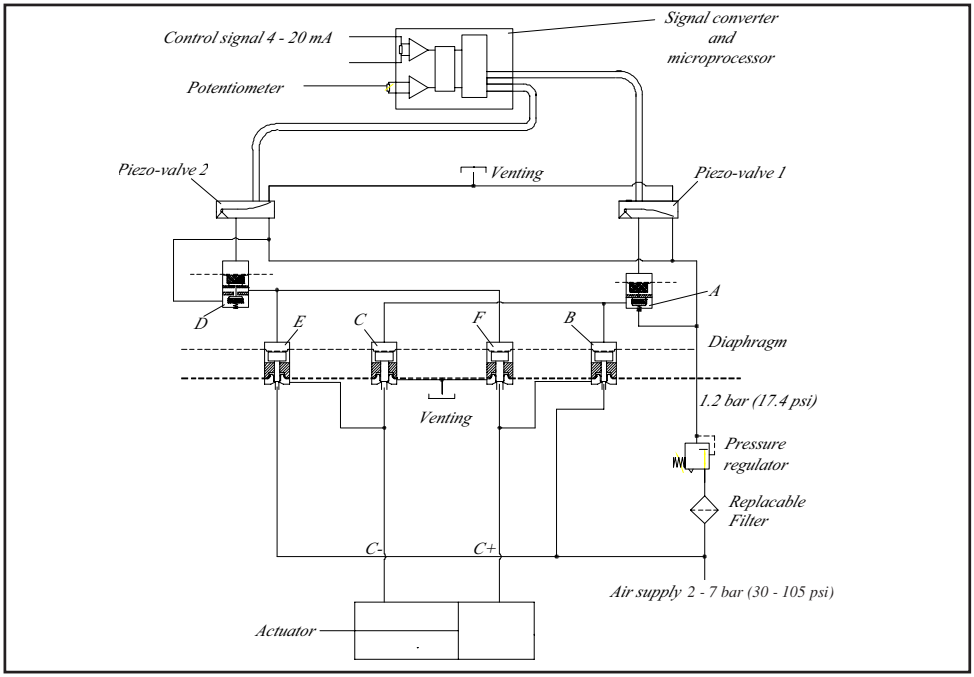
The Logix 800 digital positioner is available in intrinsically safe version for installation in hazardous areas. The intrinsically safe Logix 800 has all the same features and options as the general purpose version, gauge block, local graphic LCD display and feedback option etc. Communication with Hart, Foundation Fieldbus and Profibus is possible.

ATEX: EEx ia IIC T4 Ta=-30...80°C ⟨Ex⟩ II 1 GD
CSA, FM Class I Div.1 Grps B,C,D, Class II Div.1 Grps E,F,G, T6, T5.


## Logix 800 remote mounted

This version is suitable for installations in severe applications e.g. vibrations, high or low temperature corrosive environment, or difficult to access areas. A flat or dome style indicator can be fitted on the feedback box installed on the actuator. The maximum recommended distance between the remote unit and the Logix 800 is 5 m (16.4 ft).

# 5. Function




The control signal function and the feedback from the potentiometer position are converted to digital signals that are processed with a PID algorithm in the microprocessor. This provides control signals to the two piezo-valves.

Valves B and E deliver air to the actuator while valves C and F exhaust air from the actuator to atmosphere. Valves B and C are controlled by Piezo-valve 1 and valve A. Valves E and F are controlled by Piezo-Valve 2 and valve D.

Full supply pressure is directed to valves B and E. Air with filtered and reduced pressure is supplied to valves A, C, D and F.

For double acting actuators, connect C+ and C- to the actuator.

For single acting (spring return) actuators connect C+ to the actuator and plug port C-.

**Assume equilibrium**

Increasing input signal changes position in piezo-valve 1, causing valve A to close.

Supply pressure is then allowed to open valve B and flow to the actuator via the C+ port. When the actuator reaches its new steady state position piezo-valve 1 closes which causes valves B and C to close shutting off supply air to the actuator.

A decreasing input signal functions in the same manner, except uses piezo-valve 2 and valves D, E and F.

# 6. Installation

## Tubing

Use tubes with a minimum inner diameter 6 mm (1/4”).

## Air supply requirements

Max. air supply pressure, see the section Technical Data, Section 10.

The air supply must be free from moisture, water, oil, and particles.

The air must come from a refrigeration dried supply or be treated in such a way that its dew point is at least 10°C (18°F) below the lowest expected ambient temperature.

To ensure a stable and problem-free air supply, we recommend the installation of a filter/pressure regulator <40µ as close to the positioner as possible.

Before the air supply is connected to the positioner, we recommend the hose is opened freely for 2 to 3 minutes to allow any contamination to be blown out. Direct the air jet into a large paper bag to trap any water, oil, or other foreign materials. If this indicates that the air system is contaminated, it should be properly cleaned.

**WARNING**! Do not direct the open air jet towards people or objects because it may cause personal injury or damage.

**Poor quality air supplies are the main source of problems in pneumatic systems.**

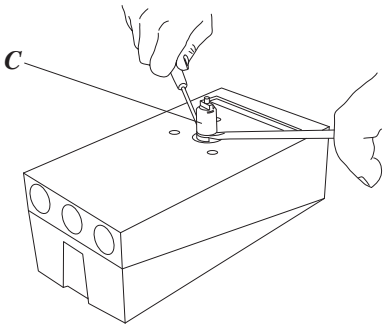
## Mounting

**N.B.** If the positioner is installed in a hazardous environment, it must be of a type approved for this purpose.

The Logix 800 positioner, all versions, has an ISO F05 footprint, A. The holes are used to attach the Logix 800 to the mounting bracket B. Please contact PMV or your local distributor representative with actuator specifics for the proper mounting bracket and hardware.

The spindle adapter C can be changed to suit the actuator in question.

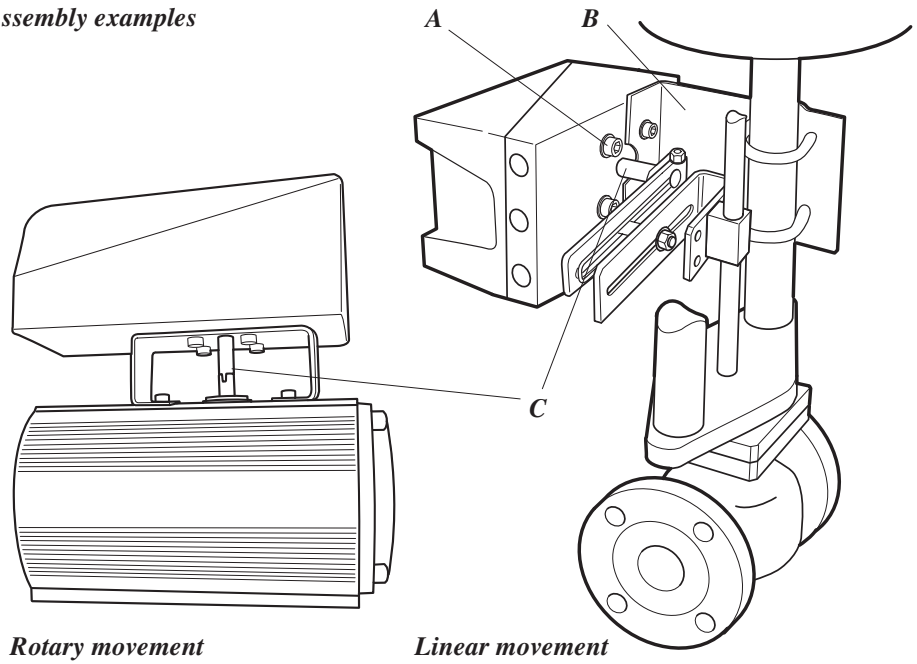
Remove the existing adapter using two screwdrivers. Check that the spring ring on




the positioner spindle is undamaged and fit the new adapter.

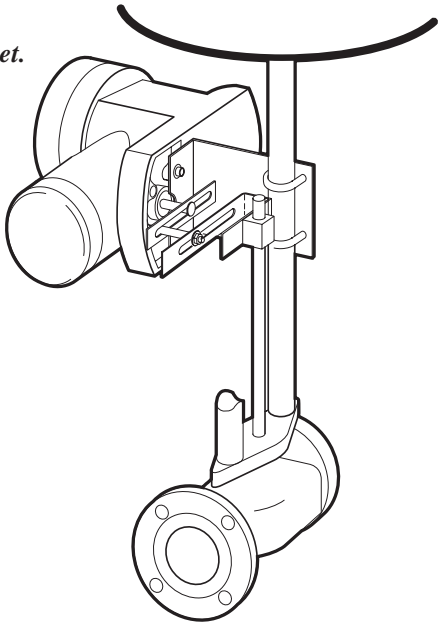
It is important that the positioner's spindle and the arms, that transfer the actuator movements, are correctly mounted. Any tension between these parts can cause incorrect operation and abnormal wear.

***Assembly examples***




***Rotary movement*** ***Linear movement***

*Logix 800 Ex positioner attached to mounting bracket.*

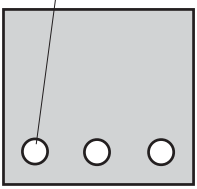


## Connections

**Air:**

| | |
|---|---|
| Port S | Supply air, 2-7 bar |
| Port C+ | Connection to actuator |
| Port C- | Connection to actuator (only for double action) |

***Must be plugged when converting to single action function.***




**Electrical connection**

See page 12, 13.

**Dimensions**

Air connections:
1/4" NPT alt. G 1/4"
Electrical connection:
M20 x 1.5 alt. NPT 1/2"

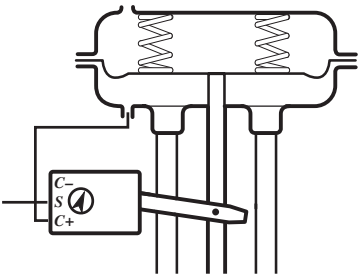
Loctite 577 or equivalent is recommended as a sealant.

***For data for air and electrical connections, see section Technical Data on page 48.***

## Single action positioner, Direct function

**Actuator with closing spring**

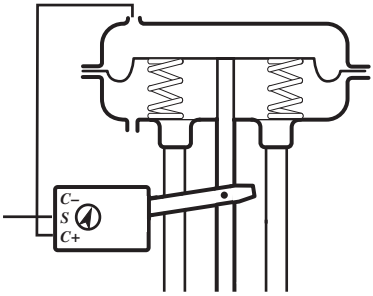
When the control signal increases, the pressure C+ to the actuator is **increased**. The valve stem moves upward and rotates the positioner spindle **counter-clockwise**. When the control signal drops to zero, C+ is vented and the valve closes.




## Reverse function

**Actuator with opening spring**

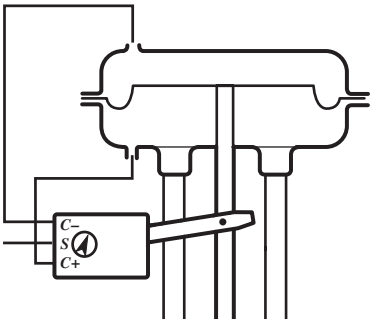
When the control signal increases the pressure C+ to the actuator is **increased**. The valve stem moves downward and the positioner spindle rotates **clockwise.** When the control signal drops to zero, C+ is vented and the valve opens.




## Double action positioner, Direct function

**Double action actuator**

When the control signal increases, the pressure C+ to the actuator is increased. The valve stem is pressed upward and rotates the positioner spindle counter-clockwise. When the control signal is reduced, the pressure C- to the actuator increases and the valve spindle is pressed downward. If the control signal disappears, the pressure goes to C-, C+ vents, and the valve closes.




**Fail in place (Fail Freeze)**

Signal hold at previous position when input signal drops below 3,75 mA.

Drift rate in midrange <0,1% after 30 s and < 2% after 30 min.

## Electrical connections

Terminal block diagram for the Logix 800 and Logix 800 Ex.

**See Section 10 cdwg D3-70**

**Warning!** In a hazardous environment where there is a risk of explosion, electrical connections must comply with the relevant regulations.

### Logix 800

The terminal block (below) for the positioner is accessible when the aluminium cover and inner cover are removed, see Section 8.

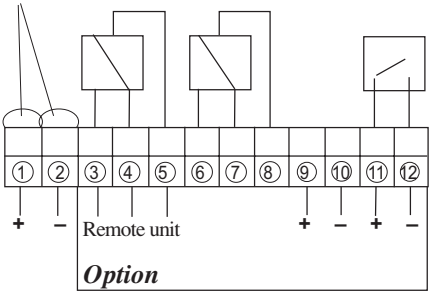
### Remote unit

The remote unit shall be connected between terminals 3, 4 and 5 in the Logix 800 and 3, 4 and 5 in the remote unit. Use a shielded cable and ground it in the Logix 800 only. Max recommended distance between Logix 800 and remote unit: 5 m (16,4 ft).

**Note!** When converting the Logix 800 or Logix 800 Ex to a remote unit, modifications have to be internally with a cable.

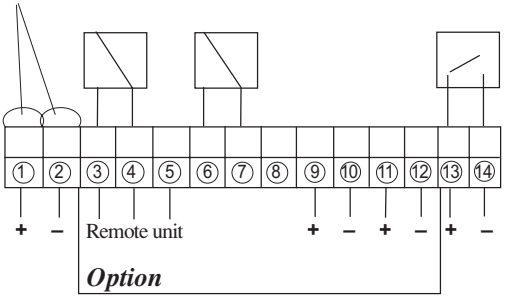
**When installing Logix 800 Intrinsically safe unit, always consider cdwg D3-70.**

### Logix 800, Single board




**1 Input signal + 4-20 mA , Hart, Profibus, Foundation Fieldbus**
**2 Input signal – 4-20 mA , Hart, Profibus, Foundation Fieldbus**
3 Switch 1 NO/Remote
4 Switch 1 NC/Remote
5 Switch 1 COM/Remote
Optional
6 Switch 2 NO
7 Switch 2 NC
8 Switch 2 COM
9 4-20 mA + Feedback, 13-28 V DC
10 4-20 mA – Feedback, 13-28 V DC
11 Alarm output +, 8-28 V DC
12 Alarm output –, 8-28 V DC

### Logix 800, Double board




**1 Input signal + 4-20 mA , Hart, Profibus, Foundation Fieldbus**
**2 Input signal – 4-20 mA , Hart, Profibus, Foundation Fieldbus**
3 Remote Unit
4 Remote Unit
5 Remote Unit
Optional
6 Switch 2 NO
7 Switch 2 NC
8 Switch 2 COM
9 AUX input 4-20 mA +
10 AUX input 4-20 mA –
11 4-20 mA + Feedback, 13-28 V DC
12 4-20 mA – Feedback, 13-28 V DC
13 Alarm output +, 8-28 V DC
14 Alarm output –, 8-28 V DC

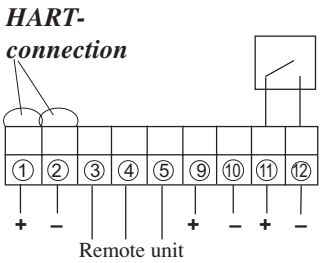
**Logix 800 Ex**

The terminal (below) for the positioner is accessible when the terminal cover is removed, see Section 8.

**See Section 10 cdwg D3-70**

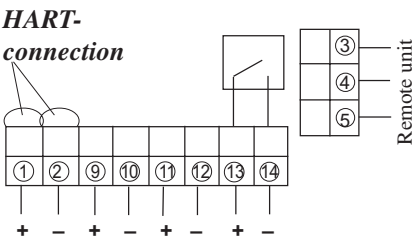
**Warning!** In a hazardous environment where there is a risk of explosion, electrical connections must comply with the relevant regulations.

## Logix 800 Ex, Single board



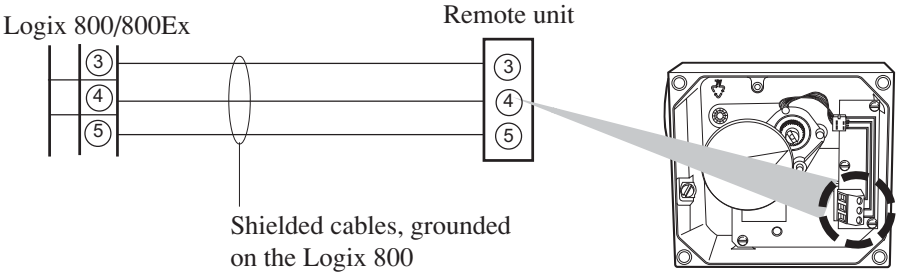

**1 Input signal + 4-20 mA , Hart, Profibus, Foundation Fieldbus**
**2 Input signal – 4-20 mA , Hart, Profibus, Foundation Fieldbus**
3 Remote unit
4 Remote unit
5 Remote unit
Optional
9 4-20 mA + Feedback, 13-28 V DC
10 4-20 mA – Feedback, 13-28 V DC
11 Alarm output +, 8-28 V DC
12 Alarm output –, 8-28 V DC

## Logix 800 Ex, Double board




**1 Input signal + 4-20 mA , Hart, Profibus, Foundation Fieldbus**
**2 Input signal – 4-20 mA , Hart, Profibus, Foundation Fieldbus**
3 Remote unit
4 Remote unit
5 Remote unit
Optional
9 AUX input 4-20 mA +
10 AUX input 4-20 mA –
11 4-20 mA + Feedback, 13-28 V DC
12 4-20 mA – Feedback, 13-28 V DC
13 Alarm output +, 8-28 V DC
14 Alarm output –, 8-28 V DC

## Connecting a remote unit



# 7. Control

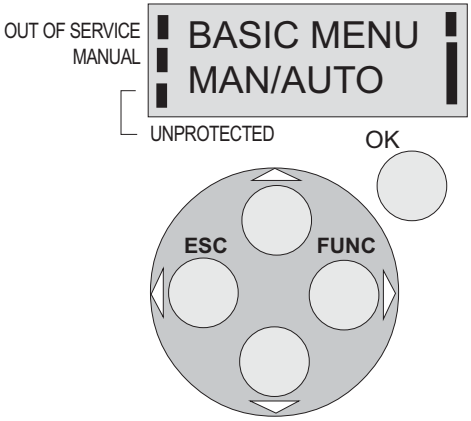
## Menus and pushbuttons

The positioner is controlled using the five pushbuttons and the display, which are accessible when the aluminium cover is removed.

For normal functioning, the display shows the current value. Press the ESC button for two seconds to display the main menu.

Use the  pushbuttons to browse through the main menu and the sub-menus.

The main menu is divided up into a basic menu and a full menu, see page 16.




## Other functions

**ESC**
Exit the menu without making any changes (as long as any changes have not been confirmed with OK).

**FUNC**
To select function and change parameters.

**OK**
To confirm selection or change of parameters.

**MENU INDICATOR**
Displays the position of the current menu row in the menu.

**IN SERVICE**
The positioner is following the input signal. This is the normal status when the positioner is working.

**OUT OF SERVICE**
The positioner is not following the input signal. Critical parameters can be changed.

**MANUAL**
The positioner can be adjusted manually using the pushbuttons. See section ”Man/Auto”, page 21”.

**UNPROTECTED**
Most of the parameters can be changed when the positioner is in the ”Unprotected” position. However, critical parameters are locked when the positioner is in the ”In service” position.

## Menu indicator

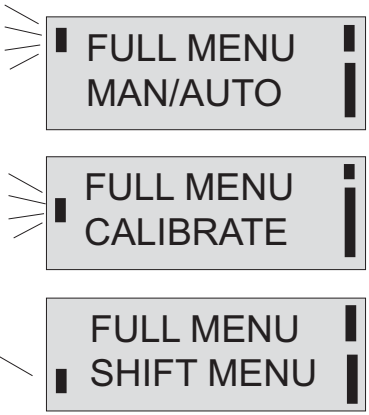
There are indicators at both sides of the display window and they indicate as follows:

Flashing in position **Out of service**

Flashing in position **Manual**

Displayed in position **Unprotected**

The indicators on the right-hand side show the position in the current menu.




## Menus

To display the menus you can select:

- **Basic menu**, which means you can browse through four different steps

- **Full menu**, which comprises ten steps. Use the Shift Menu to browse through the steps

Full Menu can be locked out using a passcode.

The main menus are shown on the next page and the sub-menus on the subsequent pages.

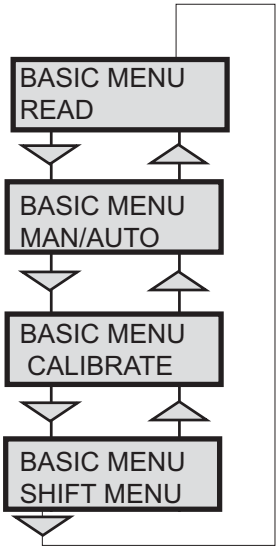
## Changing parameter values

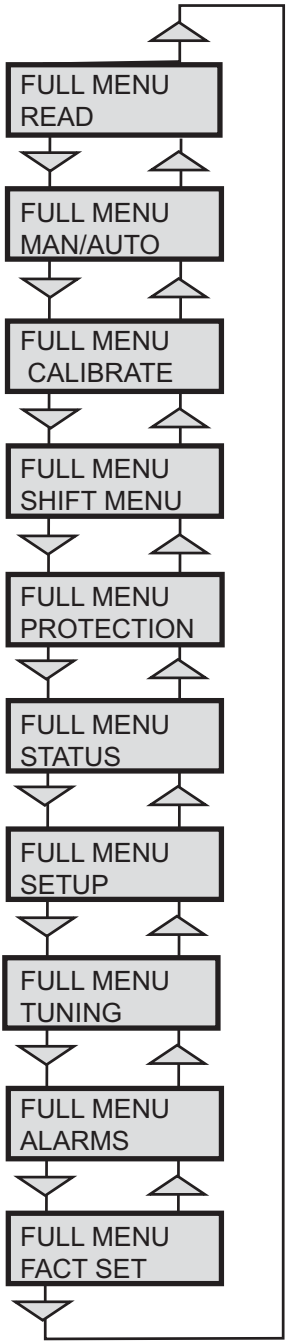
Change by pressing  until the desired figure is flashing.

Press  to step to the desired figure. Confirm by pressing OK.

A change can be undone by pressing the **ESC** button, which returns you to the previous menu.

## Menu system




The menus are described on the following pages.


## First start

Calibrate in the basic menu is displayed automatically the first time the power is applied, and can be selected from the basic/ main menu at any later time.

A complete auto-calibration takes about 3 minutes and includes end limit calibration, auto-tuning, leak test, and a check on the speed of movement. Start the automatic calibration by selecting **Auto-Cal** and then answer the questions on the display by pressing **OK** or the respective arrow. The menu is described on the next page.

**Calibration error messages**

If a fault occurs during calibration, one of the following error messages can be displayed:

**No movement/press ESC to abort**

Typically the result of an air delivery issue to the actuator, or incorrect mounting and/or linkage arrangement. Check for proper supply air to the positioner, pinched tubing, proper actuator sizing, proper linkage and mounting arrangement.

**Pot uncalibrated/press ESC to abort**

The potentiometer has been set to an illegal value. The potentiomenter is aligned using the Calibrate - Expert cal - pot Menu. The calibration sequence must be restarted after the fault is corrected.

**Air leak detected/ESC = abort**
**OK = go on**

An air leak has been detected. The calibration sequence should be restarted after the fault is corrected.

**First start, Profibus**

Connect the input signal at pos 1 and 2 on the terminal block. See Electrical connections in the manual.

In the SETUP/Devicedata/Profibus: change the address from 126 to any number between 1-125.

Never use the same number with more than one unit. Install values in failsafe mode, for communication when loss of signal.

Calibrate the unit.

GSD files are available at our web-page www.pmv.nu

**To install the D3_PROFIBUS.DDL file to Siemens SIMATIC PDM.**

1. Move the files to The directory with the DeviceInstall.exe. There should be one existing from Siemens that is included in PDM
2. Run the Program DeviceInstall.exe

| Parameter | Description | BYTE | |
|---|---|---|---|
| SP | Setpoint | The SP has 5 bytes, 4 bytes for the float value and one status byte that has to be 128 or over (80 in hex) for the D3 to accept it. Use 128 means GOOD and everything should work fine. | 4+1=5 |
| READBACK | Position | The READBACK has 5 bytes, 4 bytes for the float value and one status byte. | 4+1=5 |
| POS_D | Digital position | Gets a position in digital form<br>0 = Not initialized<br>1 = Opened<br>2 = Closed<br>3 = Intermediate | 2 |
| CHECKBACK | | Detailed information of the device, bit wise coded, more than one massage possible at ones. | 3 |
| RCAS_IN | Remote Cascade | The RCAS_IN has 5 bytes, 4 bytes for the float value and one status byte. | 4+1=5 |
| RCAS_OUT | Remote Cascade | The RCAS_OUT has 5 bytes, 4 bytes for the float value and one status byte. | 4+1=5 |

Status Byte

| MSB | | | | | | | | LSB meaning | D3 use |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 1 | 0 | x | x | not connected | |
| 0 | 0 | 0 | 0 | 1 | 1 | x | x | device failure | PROFIbus PA module failure |
| 0 | 0 | 0 | 1 | 0 | 0 | x | x | sensor failure | No sensor value |
| 0 | 0 | 0 | 1 | 1 | 1 | x | x | out of service | AI Function Block in O/S mode |
| 1 | 0 | 0 | 0 | 0 | 0 | x | x | Good - | Non cascade measured value OK<br>All Alarm values used |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | ok | |
| 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | below low limit Lo | Advisory alarm |
| 1 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | Above high limit Hi | Advisory alarm |
| 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | Lo-Lo | Critical alarm |
| 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | Hi-Hi | Critical alarm |

Example SP = 43.7% and 50%

| Float | Hex | Status |
|---|---|---|
| 43.7 | 42 2E CC CD | 80 |
| 50.0 | 42 48 00 00 | 80 |

## (FF) Fieldbus Foundation function blocks

Function blocks are sets of data sorted by function and use. They can be connected to each other to solve a control process, or to a controlling DCS. To get a good introduction and understanding of FF look at www.fieldbus.org and download the "Technical Overview" from the About FF pages.

## (TB) Transducer Block

The TB contains unit specific data. Most of the parameters are the same as parameters found on the display. The data and the order of data varies between different products.

The AO-block setpoint (SP) and process value (PV) parameters are transceived to the TB through a channel.

The TB has to be in AUTO for the AO-block to be in AUTO.

The positioner has to be in menu-auto mode and in service to be controlled from the fieldbus.

If the positioner is placed in menu-manual mode then the transducer block will be forced to (LO) local override. In this way a person in the field will be able to control the positioner from the keypad, without collision with a control loop.

## (RB) Resource Block

The RB is a set of parameters that looks the same for all units and products. The values of the RB define unit information that concerns the Fieldbus Protocol such as

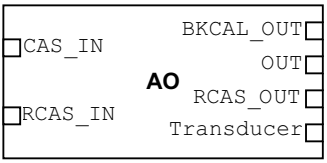
MANUFAC_ID which informs the unique manufacturer id. For Flowserve it is 0x464C53.

The RB has to be in AUTO for the AO-block to be in AUTO.

## (AO) Analogue Output Block

The AO follows Fieldbus Foundation's standard on content and action. It is used for transferring (SP) setpoints from the bus to the positioner.

AO-block overview




CAS_IN (cascade input) and RCAS_IN (remote cascade input) are selected as inputs to the AO block depending on the MODE_BLK parameter. The selected input will be relayed to the SP parameter of the AO block. BKCAL_OUT (back calculated output) is a calculated output that can be sent back to a controlling object so that control bumps can be avoided. Usually the BKCAL_OUT is set to be the (PV) process value of the AO-block, i.e. the actual measured position of the valve.

OUT is the primary calculated output of the AO block. During a limited action (ramping) of the AO block the RCAS_OUT parameter will supply the final setpoint and the OUT parameter will be the limited output.

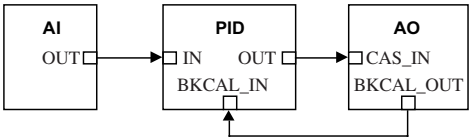
The transducer block is connected through a channel to the AO block. Through this channel the OUT value and SP are transceived.

In order to set the AO block to AUTO, the TB and the RB have to be in AUTO. Further the AO block has to be scheduled. Using National Instruments Configurator; scheduling can be done by adding the unit to a project and then click on the "upload to device"-icon.

To write a setpoint value by hand, add Man to MODE->Permitted parameter, and then choose MODE->Target to Man. Make sure that the unit is scheduled.

## Example

A typical FF block loop control might look like the following:




Where the positioner is represented by the AO-block.


The contents of the menu are shown on the next page. The various menu texts are described below.

| | |
|---|---|
| **Auto-Cal** | Auto-tuning and calibration of end positions |
| **Start tune** | Starts the tuning. Questions/commands are displayed during calibration. Select the type of movement, function, etc. with ▽ and confirm with **OK** as shown in the chart on the next page. |
| **Lose prev value? OK?** | A warning that the value set previously will be lost (not during the first auto-tuning). |
| **Actuator? rotating** | Select for rotating actuator. |
| **Actuator? linear** | Select for linear actuator. |
| **Actuator single act** | Select for single act. |
| **Actuator double act** | Select for double act. |
| **Direction? direct** | Select for direct function. |
| **Direction? reverse** | Select for reverse function. |
| **In service? Press OK** | Calibration finished. Press OK to start positioner functioning. (If ESC is pressed, the positioner assumes the ”Out of service” position but the calibration is retained). |
| **TravelCal** | Calibration of end positions |
| **Start cal** | Start end position calibration. |
| **Lose prev value? OK?** | A warning that the previously set value will be lost. Confirm with OK. The calibration sequence starts. |
| **In service? Press OK** | Calibration finished. Press OK to start positioner functioning. (If ESC is pressed, the positioner assumes the ”Out of service” position but the calibration is retained). |
| **Perform** | Setting gain |
| **Normal** | 100% gain |
| **Perform 50%, 25%, 12%, L, M, S** | Possibility to select a lower gain in steps. |
| **L, M, S** | Preset values for L, M, S actuators |
| **Factory set** | Resets all set values and enters Factory Mode. **Should only be used by authorized staff.** |

**Note.** Original P. I. D. will always be shown in display

## ExpertCal

***Set point LO:*** Use the calibrator set to 4 mA (or set another value on the display). Press OK.

***Set point HI:*** Use a calibrator of 20 mA (or set another value on the display). Press OK.

***Pressure LO:*** Use a supply of 2 bar (30 psi) (or set another value on the display). Press OK. Pressure read out only possible on Logix 800 with built in pressure sensor.

***Pressure HI:*** Use a supply of 7 bar (105 psi) (or set another value on the display). Press OK. Pressure read out only possible on Logix 800 with built in pressure sensor.

***Temp:*** Calibrate using a known temperature.

Only Double board

***Aux input LO:*** Use the calibrator and a power supply of 4 mA (or set another value on the display). Press OK.

***Aux input HI:*** Use a supply of 20 mA (or set another value on the display). Press OK.

**Pot:** Potentiometer setting, if its position relative to the gear segment has been changed. See Section 8.

**Full reset:** Resets all the set values.

The menu contents are shown in the figures on the right and the texts are described below:


**Current values can be read using the Read Menu and some values can be reset.**

**Pos** Shows current position

**Set&pos** Set point and position

**Set&dev** Set point and deviation

**Temp** Shows current temperature

**Aux** Shows auxinput signal valve. External pot or similar (Only Double board)

**Statistics**

**n cycles** Shows number of movements (turns)

**Acc travel** Shows accumulated movement

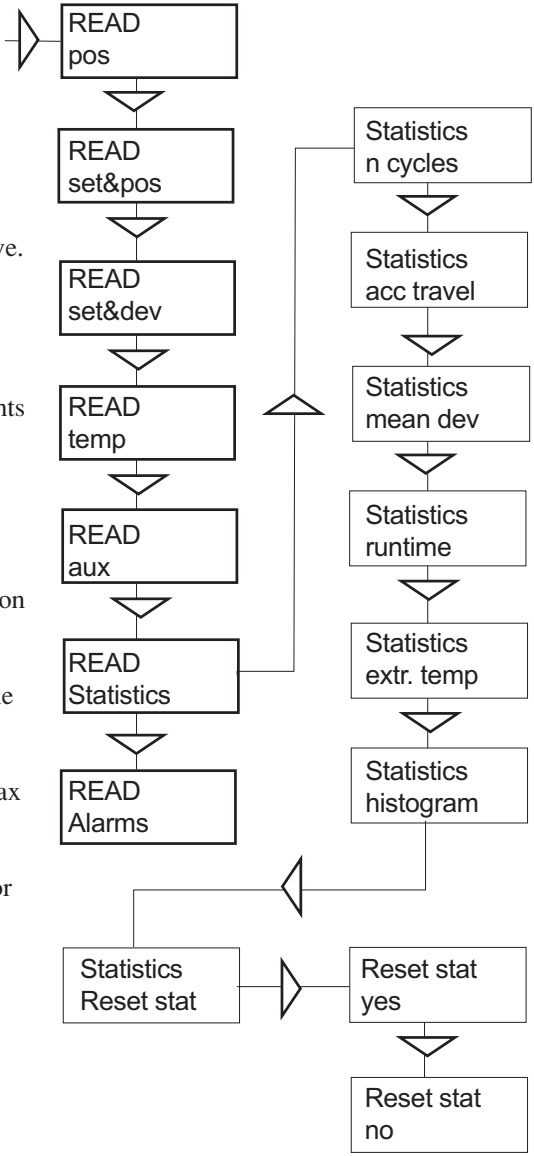
**mean dev** Shows accumulated deviation in %

**runtime** Shows accumulated runtime since last reset

**Extr temp** Shows extreme min and max temperature

**Histogram** Shows position and time for PV

**Alarms** Displays tripped alarms




**The Man/Auto menu is used to change between manual and automatic modes.**

The menu contents are shown in the figures on the right and the various texts are described below:


**AUT, OK = MAN**
Positioner in automatic mode

**MAN, OK = AUT**
Positioner in manual mode

In the **MAN** mode, the value of POS can be changed using ▲▼. The push-buttons increase/decrease the value in steps. The value can also be changed in the same way as for the other parameter values, as described on page 15.

When changing between **MAN** and **AUT** mode, the **OK** button must be pressed for 3 seconds.

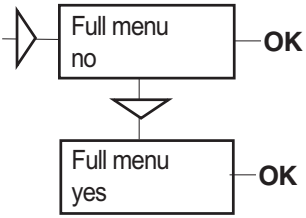
**Other functions**
C+ can be fully opened by pressing ▲ and then immediately OK simultaneously.

C- can be fully opened by pressing ▼ and OK simultaneously.

C+ and C- can be fully opened for blowing clean by pressing ▲▼ and OK simultaneously.


**The Shift Menu is used to choose between the basic menu and the full menu.**

The menu contents are shown in the figures on the right and the various texts are described below:



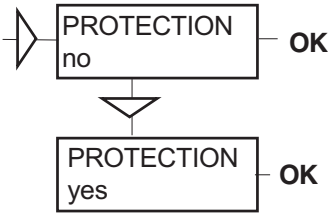

**No** Full menu selected.

**Yes** Basic menu selected.

Full Menu can be locked with a passcode, see Setup menu.


**The Write Protect menu is used to protect all essential settings.**

The menu contents are shown in the figures on the right and the various texts are described below:



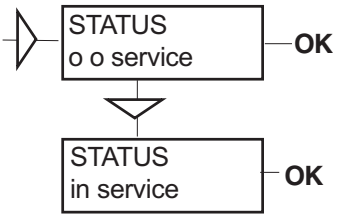

**No** Entered values are not write protected. ”Unprotected” is displayed in the lower left-hand corner.

**Yes** Entered values are write protected. Passcod needed for change to **No** (Applicable when a passcode has been set up in SETUP menu).
.

When changing between Yes and No mode, the OK button must be pressed for 3 seconds.


**The Status Menu is used to select whether or not the positioner is in service.**

The menu contents are shown in the figures on the right and the various texts are described below:




**o o service** Not in service. Flashing indicator in upper left-hand corner of display.

**in service** Positioner in service. Critical parameters cannot be changed.

When changing between **In service** and **Out of service**, the **OK** button must be pressed for 3 seconds.

FULL MENU
SETUP

**The Setup Menu is used for various settings**.

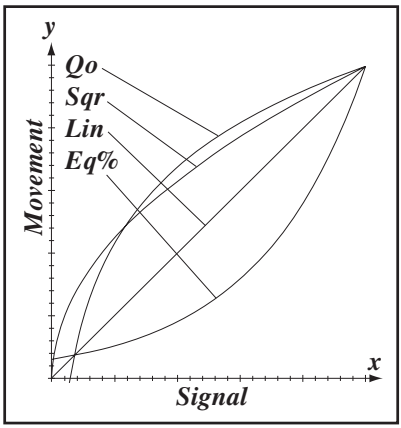
The menu contents are shown in the chart on the next page and the various texts are described below:

| | | | |
|---|---|---|---|
| **Actuator** | Type of actuator | Size of actuator | Time out |
| **Rotating** | Rotating actuator. | Small | 10 s |
| **Linear** | Linear actuator. | Medium | 25 s |
| | | Large | 60 s |
| | | Texas | 180 s |

**Lever** Only for linear actuator.
**Lever stroke** Stroke length to achieve correct display.
**Level cal** Calibration of positions to achieve correct display.

**Direction**
**Direct** Direct function (signal increase opens). Indicator/spindle rotates counter-clockwise.
**Reverse** Reverse function.

**Character** Curves that show position as a function of input signal.
**Linear**
**Equal %** — See diagram.
**Quick open**
**Sqr root**
**Custom** Create own curve.




**Cust chr**
**# of point** Specify number of points (3, 5, 9, 17, or 33)
**Cust curve** Enter values on X and Y axes.

**Curr range**
**0%=4.0 mA**
**100%=20.0 mA** Possibility of selecting which input signal values will correspond to 0% and 100% movement respectively. Examples of settings: 4 mA = 0%, 12 mA = 100%, 12 mA = 0%, 20 mA = 100%.

| | |
|---|---|
| **TRVL range** | Setting end positions |
| **0%=0.0%** | Select Out of Service. Set percentage value for desired end position (e.g. 3%). |
| **Set 0%** | Select In Service. Connect calibrator. Move forward to desired end position (0%) and press OK. |
| **100%=100.0%** | Select Out of Service. Set percentage value for desired end position (e.g. 97%). |
| **Set 100%** | Select In Service. Connect calibrator. Move forward to desired end position (100%) and press OK. |
| **Trvl ctrl** | Behaviour at set end position |
| **Set low** | Choose between Free (go to mechanical stop), Limit (stop at set end position), and Cut off (go directly to mechanical stop at set end position). |
| **Set high** | Similar to Set low. |
| **Values** | Select position for Cut off and Limit at the respective end positions. |
| **Passcodes** | Setting passcodes for various functions |
| **Full menu** | Passcode for access to full menu. |
| **Write prot** | Passcode for removing write protect. |
| **Expert** | Passcode for access to Expert menu (TUNING). |
| **Fact set** | Passcode to return to default values applicable when positioner was delivered. |

Numbers between 0000 and 9999 can be used as passcodes. 0 = no passcode required.

| | |
|---|---|
| **Appearance** | On display |
| **Language** | Select menu language. |
| **Units** | Select units. |
| **Def. Display** | Select value(s) to be displayed during service. |
| | The display reverts to this value 10 minutes after any change is made. |
| **Start menu** | Start in Basic menu or Full menu. |
| **Contrast** | Adjust display contrast (Only Double board). |
| **Orient** | Orientation of text on display. |
| **Par mode** | Display of control para meters such as P, I, D or K, Ti, Td. |
| **Devicedata** | |
| **HW rew** | General parameters. |
| **SW rew** | |
| **Capability** | |
| **HART** | Menu with HART parameters. Only amendable with HART communicator. It is possible to read from display. |
| **Profibus** | |
| **Status** | Indicates present status |
| **Device ID** | Serial number |
| **Address** | 1-126 |
| **Tag** | Allotted ID |
| **Descriptor** | ID description |
| **Date** | N/A |
| **Failsafe** | Value = preset pos<br>Time = Set time +10sec= time before movement<br>Valve act = failsafe (preset pos) or lastvalue (present pos)<br>Alarm out= On/Off |

**Foundation Fieldbus**

| | |
|---|---|
| **Device ID** | Serial number |
| **Nod address** | Address on the bus provided by the DCS system |
| **TAG–PD_TAG** | Name provided by the DCS system |
| **Descriptor** | Logix 800 positioner |
| **Date** | N/A (not applicable) |
| **Sim jumper** | Simulate jumper, FF simulation functionality activated = ON |


The menu contents are shown in the chart on the next page and the various texts are described below:

| | |
|---|---|
| **Close time** | Minimum time (Min 0.005) from fully open to closed. |
| **Open time** | Minimum time (Min 0.05) from closed to fully open. |
| **Deadband** | Setting deadband. Min. 0.2%. |
| **Expert Control** | Advanced settings. See explanations below. |
| **Togglestep** | Test tool for checking functions. Overlays a square wave on the set value. |
| **Self test** | Test of processor, potentiometer, etc. |
| **Leakage** | Air leakage detected can be either connections, positioner tubing or actuator. |
| **Undo** | You can read last 20 changes. |

**P,I,D and K,Ti,Td parameters**

If one of the gains is changed, the corresponding value in the other gain set is changed accordingly.

**Min Pulse**

The minimum pulse lengths (the“minpulses”) are displayed in the menu, and can be changed.

**Spring adjust**

The spring adjust function compensates the airflow linearly with the actuator C+ chamber volume (for a constant position error), so that low volumes get less flow. This is needed for linear single-acting actuators, where a low C+ volume means that the actuator spring is extended, its force is reduced, and less flow is needed for stable position changes.

FULL MENU
ALARMS

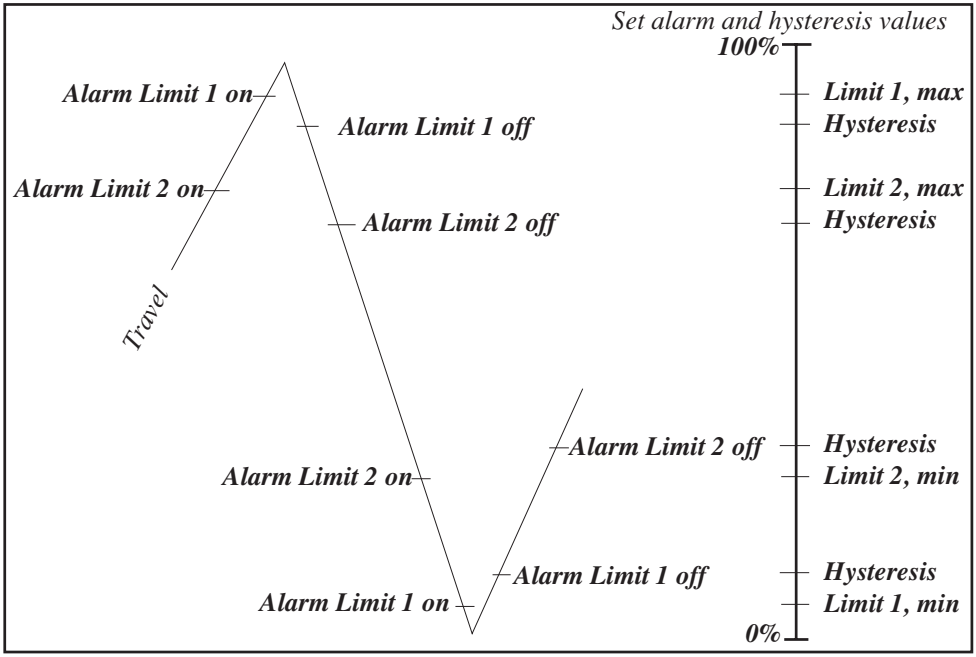
The menu contents are shown in the chart on the next page and the various texts are described below:

**Deviation** Alarm generated when deviation occurs
**On/Off** Alarm on/off.
**Distance** Allowed distance before alarm is generated.
**Time** Total deviation time before alarm is generated.
**Alarm out** Select ON/OFF offers output on terminals 13 and 14.

**Valve act** Behaviour of valve when alarm is generated.

**Limit 1** Alarm above/below a certain level.
**On/Off** Alarm on/off.
**Minipos** Setting of desired min. position.
**Maxpos** Setting of desired max. position. — See diagram below!
**Hysteresis** Desired hysteresis.
**Alarm on** Select ON/OFF offers output on terminals 11 and 12 (Single Board) or 13 and 14 (Double Board).
**Valve act** Behaviour of valve when alarm is generated.

**Limit 2** See Limit 1.



Only Double board

| | |
|---|---|
| **Pos=aux** | External potentiometer |
| **On/Off** | Function on/off. |
| **Max diff** | Max. allowed deviation between internal and external potentiometer. |
| **Alarm out** | Select ON/OFF offers output on terminals 13 and 14. |
| **Valve act** | Behaviour of valve when alarm is generated. |
| **Aux input** | External input signal 4-20 mA. |
| **On/Off** | Alarm on/off. |
| **Minipos** | Setting of desired min. position. |
| **Maxpos** | Setting of desired max. position. |
| **Hysteresis** | Desired hysteresis. |
| **Valve act** | Behaviour of valve when alarm is generated. |

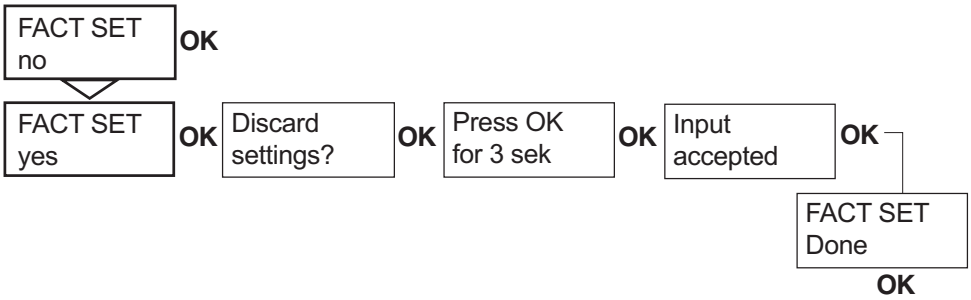
Function similar to Limit 1 and 2. See chart on previous page.

| | |
|---|---|
| **Temp** | **Alarm based on temperature** |
| **On/Off** | Temperature alarm on/off. |
| **Low temp** | Temperature setting. |
| **High temp** | Temperature setting. |
| **Hysteresis** | Allowed hysteresis. |
| **Alarm out** | Select ON/OFF offers output on terminals 13 and 14. |
| **Valve act** | Behaviour of valve when alarm is generated. |

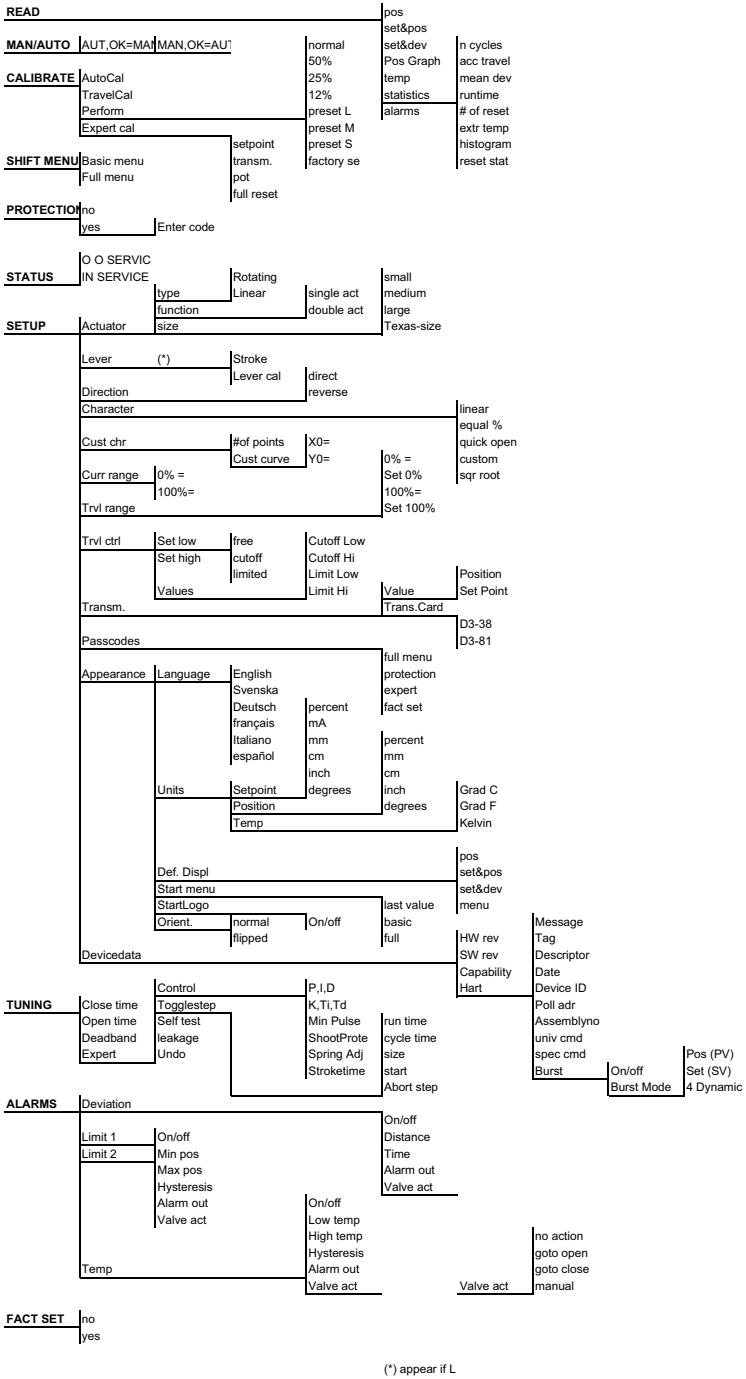
| Valve act | |
|---|---|
| **No action** | Alarm generated only. Operations not affected. |
| **Goto open** | C+ gives full pressure and valve moves to fully open position. Positioner changes to position Manual. |
| **Goto close** | C- gives full pressure and valve moves to fully closed position. Positioner changes to position Manual. |
| **Manual** | Valve stays in unchanged position. Positioner moves to position Manual. |


The menu contents are shown in the chart below.

The default values that were set on delivery can be reset using the Fact Set menu. Values from calibration and from other settings will then be lost.

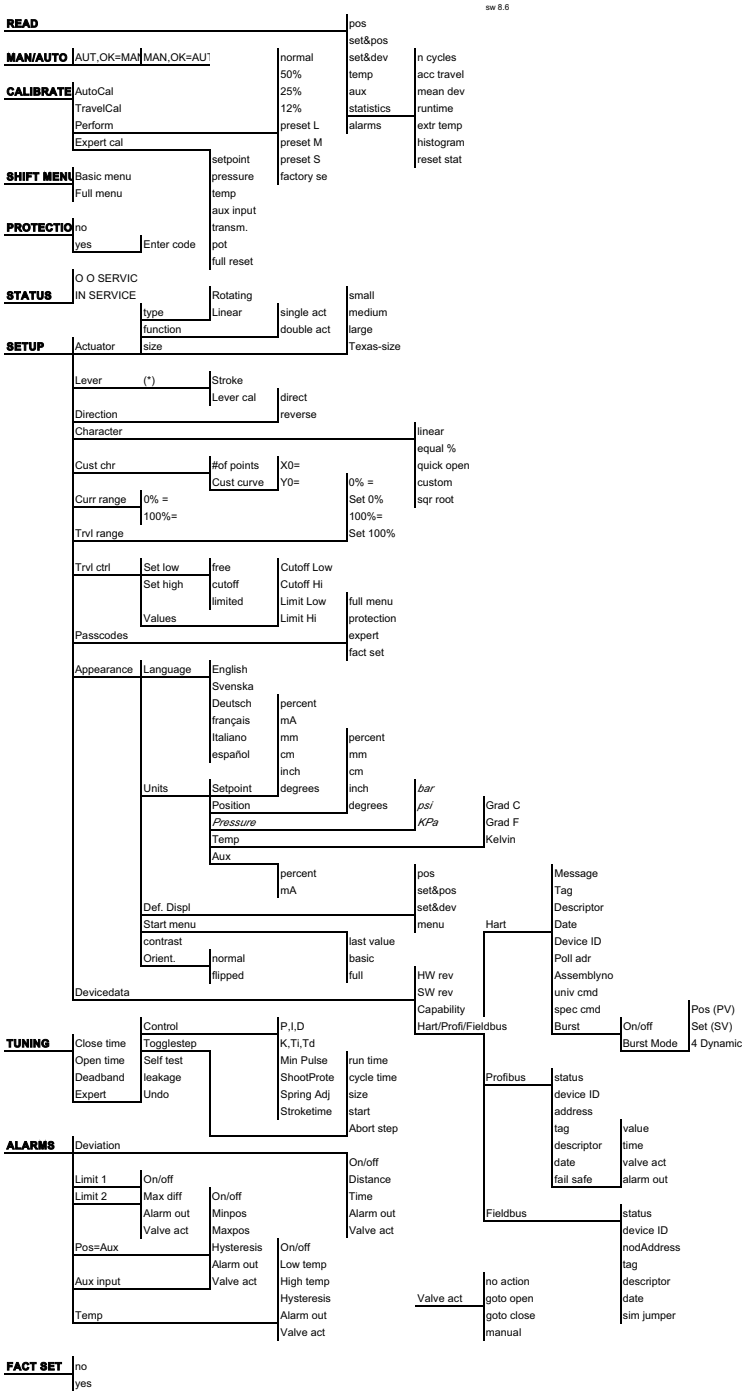


sw 9.0




(*) appear if L

# Double Board




(*) appear if L

# 8. Maintenance/service

When carrying out service, replacing a circuit board, etc., it may be necessary to remove and refit various parts of the positioner. This is described on the following pages.

**Read the Safety Instructions on page 3 before starting work on the positioner.**

**Cleanliness is essential when working with the positioner. Contamination in the air ducts will infallible lead to operational disturbances. Do not disassemble the unit more than that described here.**

**Do not take the valve block apart because its function will be impaired.**

**When working with the Logix 800 positioner, the work place must be equipped with ESD protection before the work is started.**

**Always turn off the air and electrical supplies before starting any work.**

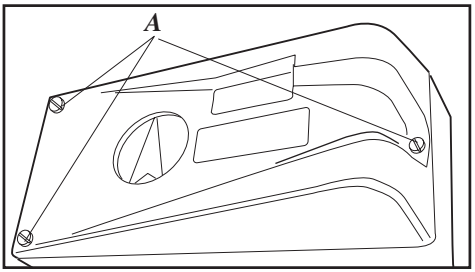
**When upgrading electronically parts inside a Logix positioner approved for installation in Hazardous locations special procedures apply, permission from PMV/Flowserve is required prior to the start of work.**

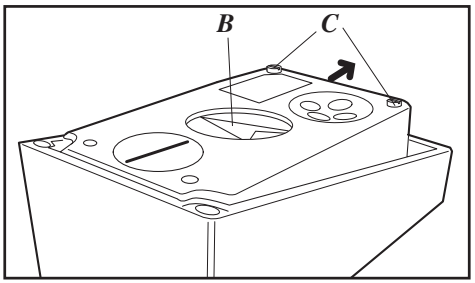
**Please contact a Flowserve office for information regarding proper procedures.**
www.pmv.nu or infopmv@flowserve.com

## Disassembling Logix 800

**Removing cover and inner cover**

• Unscrew the screws A and remove the cover.



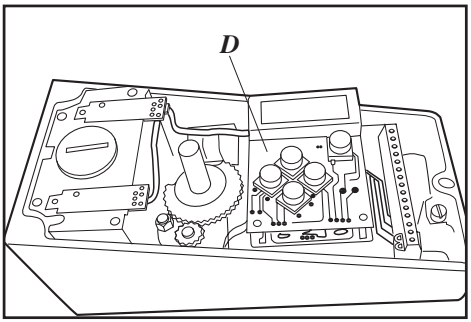

• Pull off the arrow pointer, B.

• Unscrew the screws C, pull the inner cover slightly in the direction of the arrow, and remove the cover.

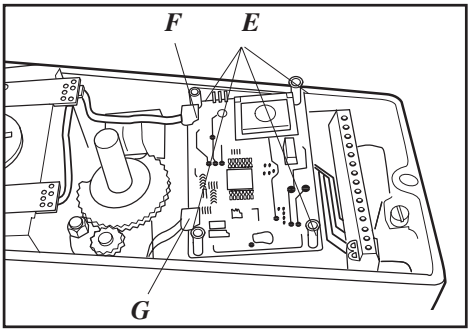
## Circuit boards (pcb)

**Disconnect or switch off the electric power supply before starting any work.**

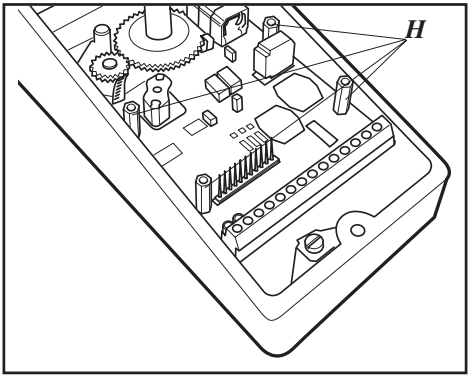
• Lift off the display pcb.




• Unscrew the spacers E, release the cable connections F and G, and lift up the processor pcb.

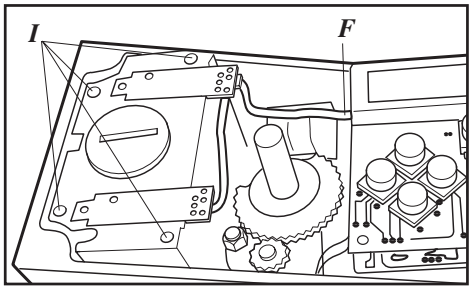



• Remove the terminal board by unscrewing the spacers H.



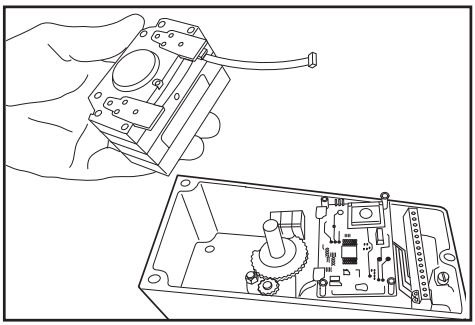
**Valve block**

**Turn off the air and electric power supply before starting any work.**




• Release the connector F from the processor pcb.

• Remove the four screws I.



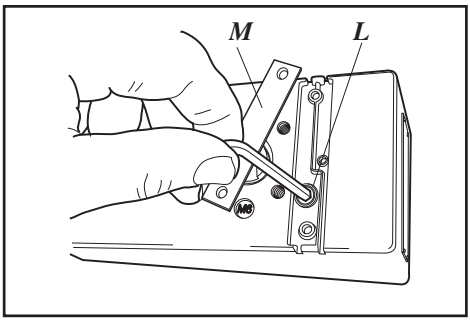
• Lift out the valve block

**N.B. Do not disassemble the valve block**

• When installing the valve block — torque the four screws to 1,4 Nm and sealwith Locktite 222.

## Silencer

A silencer, L (option) can be mounted under the plate M on the Logix 800. Contact PMV.




## Spindle adapter

The spindle adapter can be changed to suit the actuator in question, see page 9.

## Potentiometer

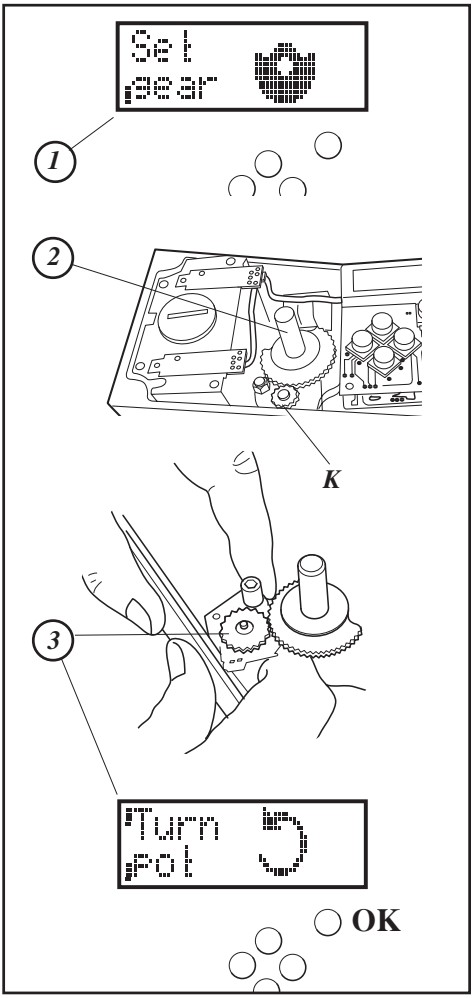
**90° and 270° spring loaded potentiometer**
The spring-loaded potentiometer **K** can be removed from the gearwheel for calibration or replacement.

If the potentiometer is replaced or the setting is changed, it must be calibrated.

• Select the menu Calibrate - Expert - Cal pot. The display shows Set gear (1).

• Turn the spindle shaft (2) cw to end position and press OK. Turn ccw to the end and press OK.

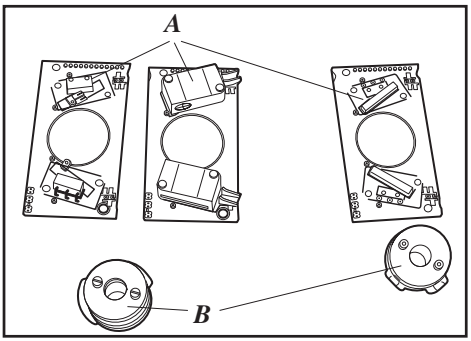
• Unmesh the potentiometer (3) and turn it according to display until OK is shown. Press OK.




## Transmitter boards

The equipment for transmitter feedback consists of a circuit board A, cam assembly B and screws.

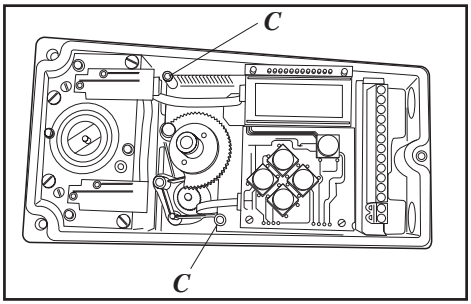
The circuit board exists in four:
- with mecanical switches, SPDT
- with namur sensors, DIN 19234
- with proximity switches
- with feedback transmitter only



## Transmitter board installation

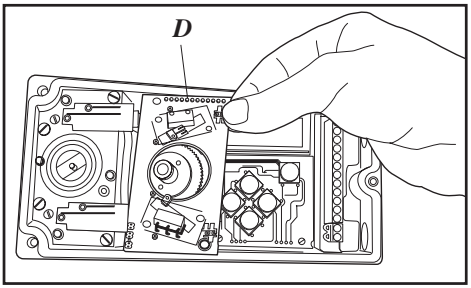
**Caution! Turn off the power and air supply before starting the installation.**

**Important for Logix 800 units with hazardous approvals:**
**Maintenance and repairs only to be made by authorized staff.**

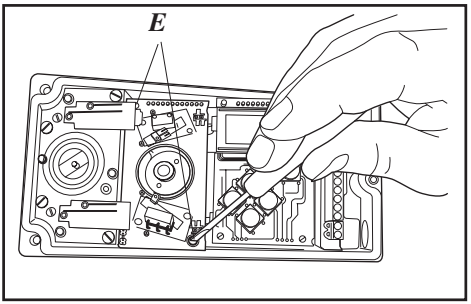



• Remove the cover, indicator and inner cover according to the description on page 37.

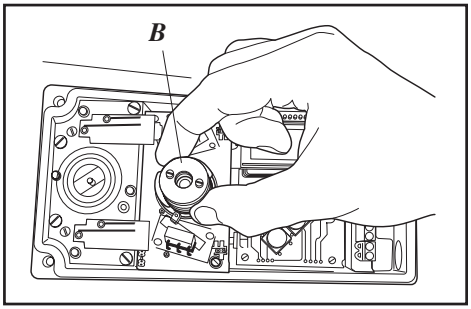
• Check that both spacers **C** are installed.




• Carefully mount the circuit board in its position. The pins **D** should fit in the connector and the positioners motherboard. Make sure that the feed back PC board is properly connected.

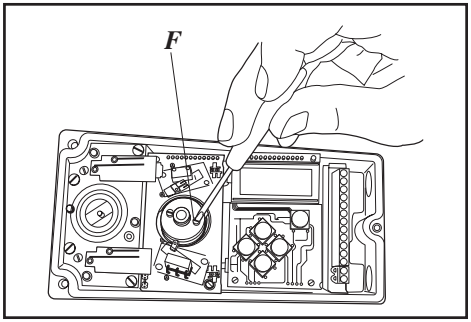



• Secure the circuit board with the enclosed screws **E**.

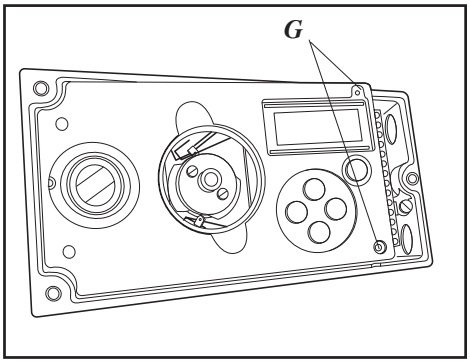



• Install the cam asssembly **B** on the shaft and push it down to its position. If the board has microswitches, be careful not to damage the levers.

• Tighten the screws **F**, on the cam assembly. Do not tighten the screws to hard. The cams should be able to move in relation to each other.

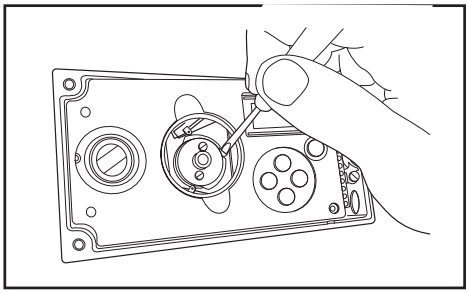



• Install the inner cover with the two screws, **G**.



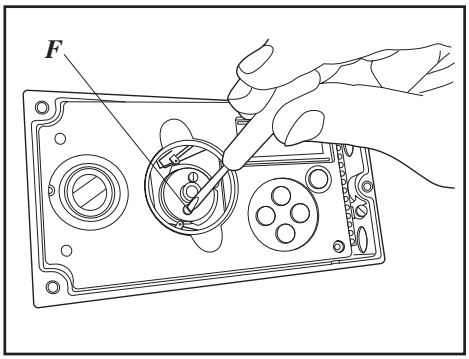

• Connect the wiring for the transmitter feedback on the terminal block, according to the drawing on next page.

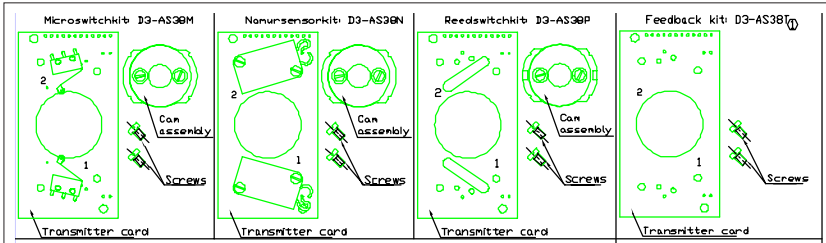
• Adjust the position where the switches/ sensors should be affected, by turning the cams with a screwdriver.

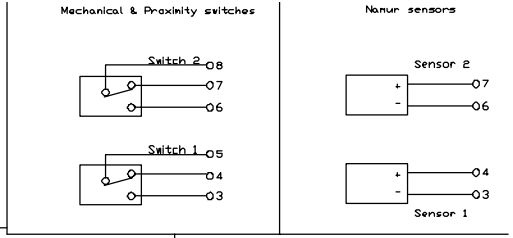


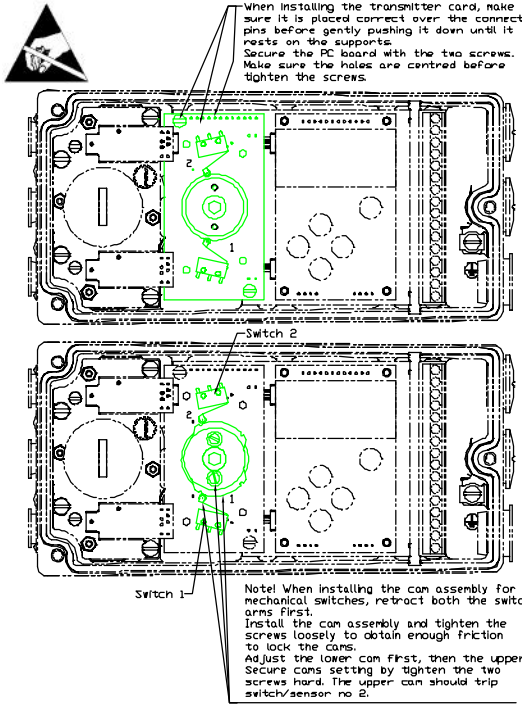
• Tighten the cam assembly screws **F** when the cams are correctly adjusted.

• Install the indicator and cover.
To calibrate the feedback transmitter, see drawing on next page.






For more information see manual chapter 8, Transmitter boards.

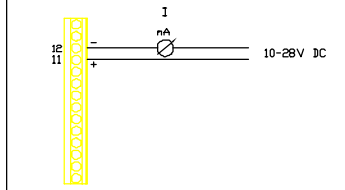
IMPORTANT!
When upgrading electronically parts inside a PMV positioner approved for installation in Hazardous locations special procedures apply, permission from PMV is required prior to the start of work.

Please contact your local PMV Sales office for information regarding proper procedures.

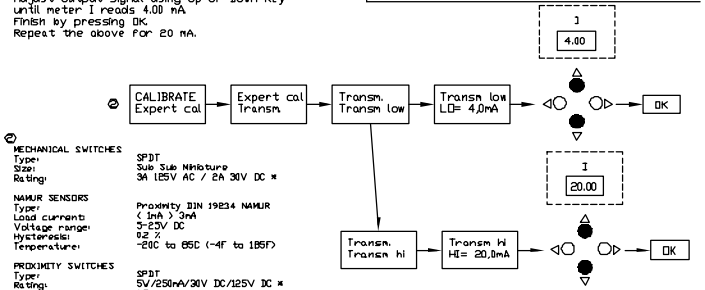
www.pmv.nu or info@pmv.nu

## Calibration of the 4-20 mA transmitter

Go to menu shown in diagram.
Connect mA meter I and check reading.
Adjust output signal using Up or Down key until meter I reads 4.00 mA
Finish by pressing OK.
Repeat the above for 20 mA.




Connect a mA meter I to terminal 11 & 12.




MECHANICAL SWITCHES
Type: SPDT
Size: Sub Sub Miniature
Rating: 3A 125V AC / 2A 30V DC *

NAMUR SENSORS
Type: Proximity DIN 19234 NAMUR
Load current: ( 1mA ) 3mA
Voltage range: 5-25V DC
Hysteresis: 0.2 %
Temperature: -20C to 85C (-4F to 185F)

PROXIMITY SWITCHES
Type: SPDT
Rating: 5V/250mA/30V DC/125V DC *
Operating time: 0.7 ms
Breakdown voltage: 200V DC
Contact resistance: 0.1 Ohm
Mechanical/Electrical life: 500000000 operations

4-20 mA TRANSMITTER
Supply: 9-28V DC
Output: 4-20 mA
Resolution: 0.1 %
Linearity full span: +/- 0.5 %
Output current limit: 30 mA DC
Load impedance: 600 Ohm @ 24V DC

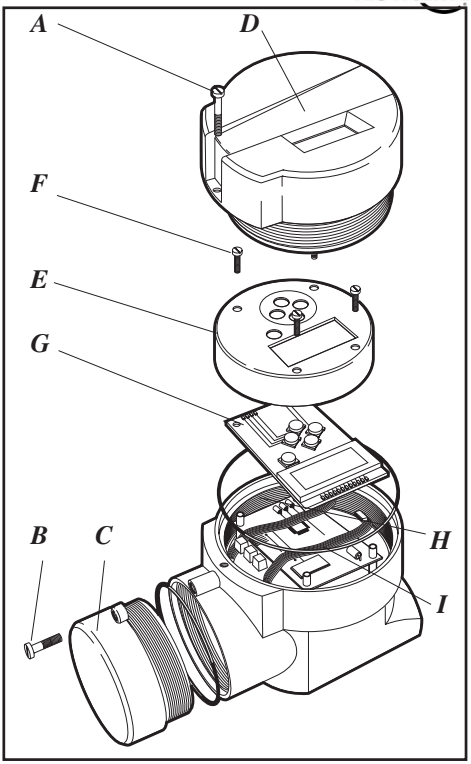
* Switch rating limited to 100 mA/30V DC/42V AC for D3 units with connection board D3-AS35 R1

## Disassembling Logix 800 Ex

• Loosen the screws **A** and **B** and remove the caps **C** och **D**.

• Remove the inner display cover **E** by loosening the four screws **F**.

• Carefully remove the display board and loosen the connections **H** and **I**.

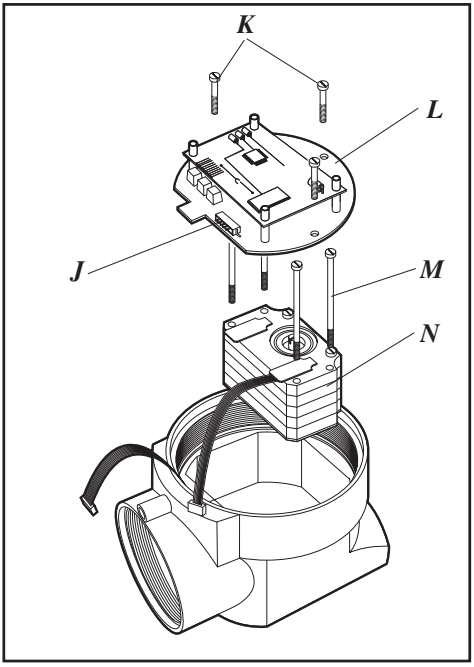



• Release the wide cable from the connector **J** on the terminal board.

• Loosen the three screws **K**.

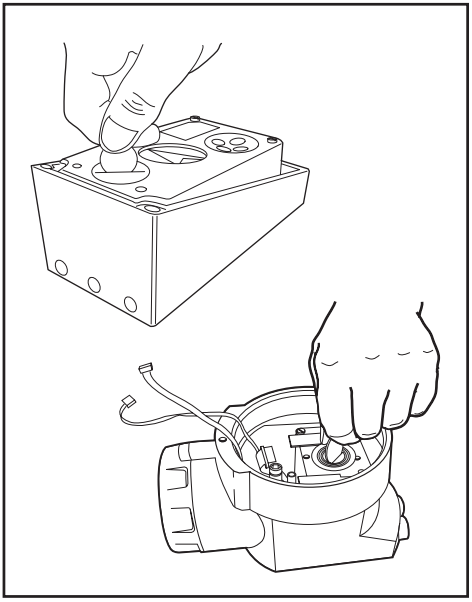
• Remove the circuit board package **L**, consisting of terminal and processor board.

• Remove he four screws **M** and lift the block **N**.



## Filter change, Logix 800 and Logix 800 Ex

**Turn off the compressed air supply before starting any work. Otherwise the filter can be uncontrollably blown out of the positioner by the air pressure, which can be dangerous.**



• Remove the filter cap using a coin of suitable size.

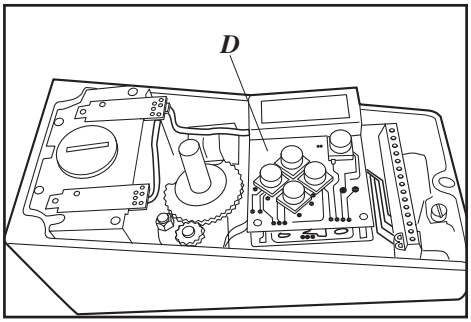
**Note!** Do not use a screwdriver. The filter cap might crack and cause air leakage.

## Converting for remote control

**Disconnect or switch off the electric power supply before starting any work.**

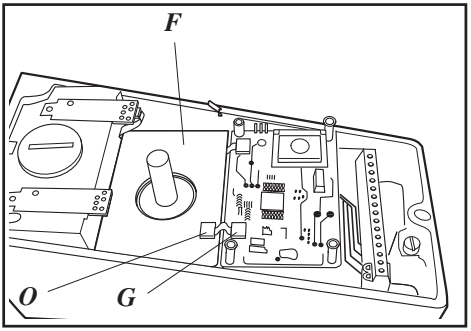
• Remove cover and inner cover, see page 37.

• Lift off the display pcb, **D**.




• Disconnect and secure the pot cable.

• Install transmitter board D3-AS38T , **F**.

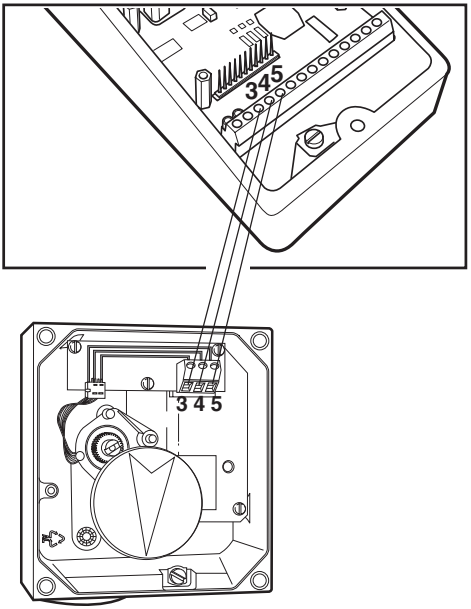



• Install the enclosured wire between **G** and **O** on the transmiter board.

• Connect the wiring between terminals 3, 4, 5 in the Logix 800 unit and 3, 4, 5 in the remote unit.

Use a shielded wire and ground it in the Logix 800 unit only.

Avoid longer distance than 5 m between Logix 800 unit and remote unit.



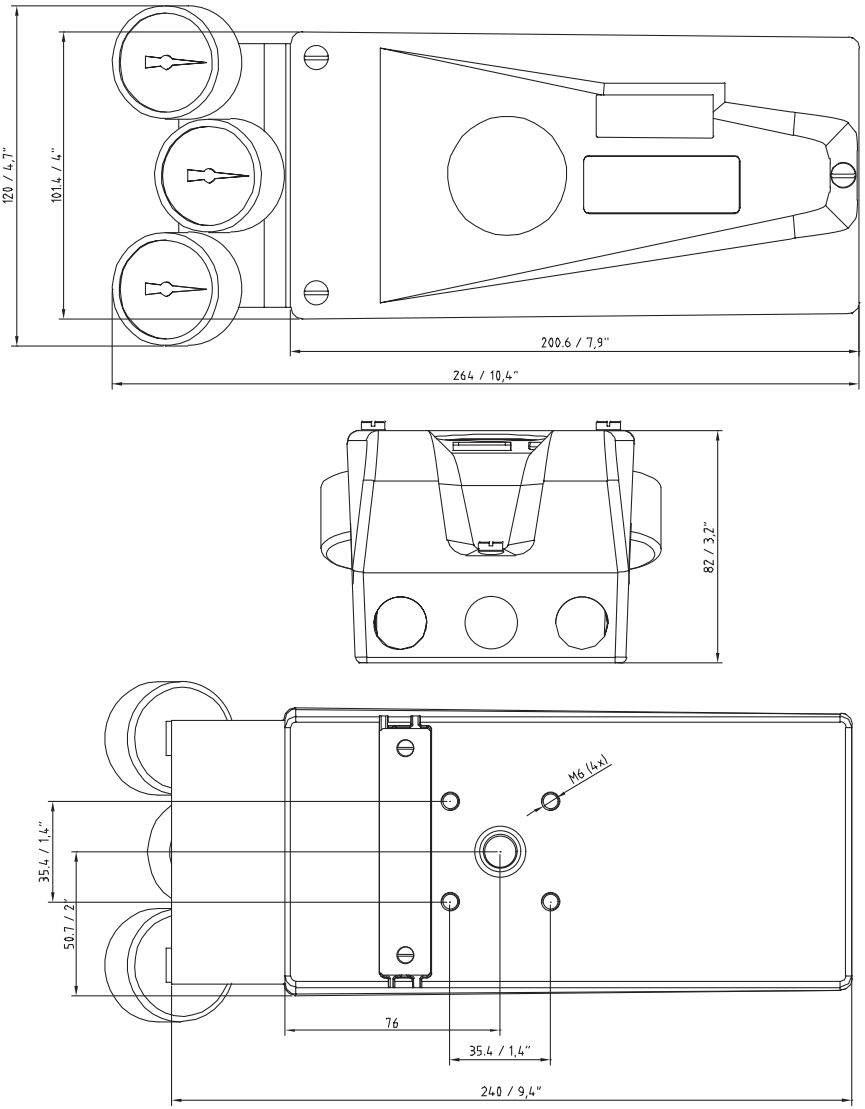
# 9. Trouble shooting

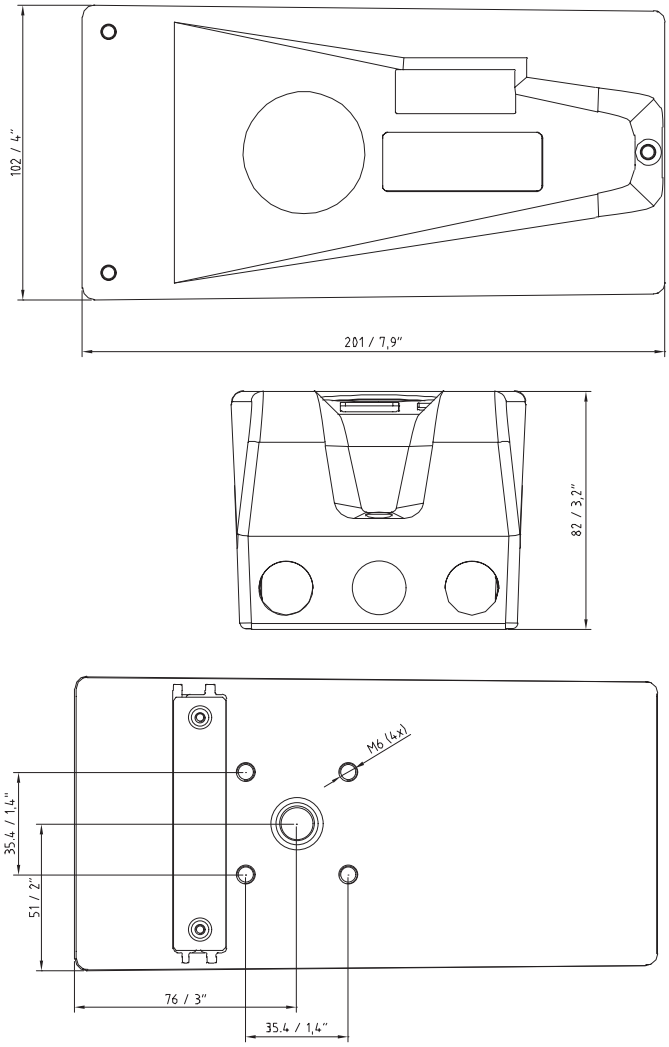
| Fault symptom | Action |
|---|---|
| Change in input signal to positioner does not affect actuator position. | • Check air supply pressure, air cleanliness, and connection between positioner and actuator.<br>• Out of service.<br>• Check input signal to positioner.<br>• Check mounting and connections of positioner and actuator. |
| Change in input signal to positioner makes actuator move to its end position. | • Check input signal.<br>• Check mounting and connections of positioner and actuator. |
| Inaccurate regulation. | • Implement auto-tuning. Check for any leaks.<br>• Uneven air supply pressure.<br>• Uneven input signal.<br>• Wrong size of actuator being used.<br>• High friction in actuator/valve package.<br>• Excess play in actuator/valve package.<br>• Excess play in mounting of positioner on actuator.<br>• Dirty/humid supply air. |
| Slow movements, unstable regulation. | • Implement auto-tuning.<br>• Increase the deadband (Tuning menu).<br>• Adjust Performance (Calibrate menu). |

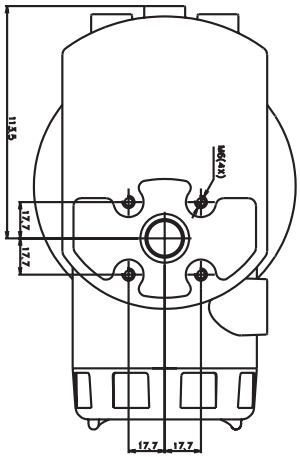
# 10. Technical data

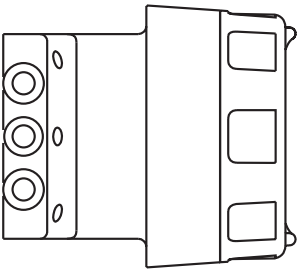
| | |
|---|---|
| Rotation angle | min. 30° max 100°, option 270° |
| Stroke | 5—130 mm (0.2” to 5.1”) |
| Input signal | 4—20 mA |
| Air supply | 2—7 bar (30—105 psi) Free from oil, waterand moisture. Filtered to min. 30 micron |
| Air delivery | 350 nl/min (13.8 scfm) |
| Air consumption | <0.3 nl/min (0.01 scfm) |
| Air connections | 1/4” G or NPT |
| Cable entry | 3 x M20 or 1/ 2” NPT |
| Electrical connections | Screw terminals 2.5 $mm^2$ /AWG14 |
| Linearity | <1% |
| Repeatability | <0.5% |
| Hysteresis | <0.4% |
| Dead band | 0.2—10% adjustable |
| Display | Graphic, view area 15 x 41mm (0.6 x 1.6”) |
| UI | 5 push buttons |
| Processor | 16 bit, M 16C |
| CE directives | 93/68EEC, 89/336/EEC, 92 /31/EEC |
| EMC | EN 50 081-2, EN 50 082-2 |
| Voltage drop, Double board | <10.1 V => resistance 505 Ω |
| Voltage drop, Single board without HART | < 8.0 V => resistance 400 Ω |
| Voltage drop, Single board with HART | < 9.4 V => resistance 470 Ω |
| Vibrations | <1% up to 10 g at frequency 10 — 500 Hz |
| Enclosure | IP66/NEMA 4X |
| Material | Die-cast aluminium, A2/A4 fasteners |
| Surface treatment | Powder epoxy |
| Temperatur range | –30 to +80°C (–22 to 176° F) |
| Weight | Logix 800X, 1.4 kg (3 lbs). Logix 800E, 3 kg (6.6 lbs) |
| Alarm output | Transistor Ri 1 KΩ |
| Alarm Supply Voltage | 8—28 V DC |
| Mounting position | Any |

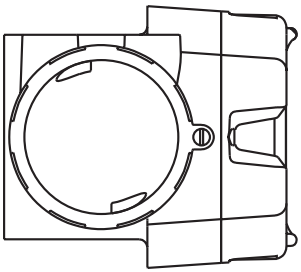
| | |
|---|---|
| **Mechanical switches** | |
| Type | SPDT |
| Size | Sub Sub miniature |
| Rating | 3 A/125 V AC<br>2 A/30 V DC |
| **Namur sensors (N32-V3-N)** | |
| Type | Proximity DIN 19234 NAMUR |
| Load current | 1 mA ≤ I ≤ 3 mA |
| Voltage range | 5 - 25 V DC |
| Hysteresis | 0.2 % |
| Temp | –20°C to 85°C (–4°F to 185°F) |
| **Proximity switches** | |
| Type | SPDT |
| Rating | 5 W/250 mA/30 V DC/125 V AC |
| Operating time | 0.7 ms |
| Breakdown voltage | 200 V DC |
| Contact resistance | 0.1 Ω |
| Mechanical/electrical life | >50 x $10^6$ operations |
| **Slot Namur switches (S32-S1N, S32-SN, S32-N)** | |
| Type | Proximity DIN EN 60947-5-6 |
| Load current | 1 mA ≤ I ≤ 3 mA |
| Voltage | 8 V DC |
| Hysteresis | 0.2 % |
| Temp | –25°C to 85°C (–13°F to 185°F) |
| **4 - 20 mA transmitter** | |
| Supply | 9 - 28 V DC |
| Output | 4 - 20 mA |
| Resolution | 0.1 % |
| Linearity full span | +/–0.5 % |
| Output current limit | 30 mA DC |
| Load impedance | 800 Ω @ 24 V DC |

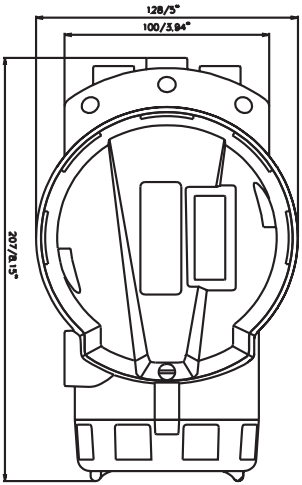

120 / 4,7"
101.4 / 4"
200.6 / 7,9"
264 / 10,4"
82 / 3,2"
M6 (4x)
35.4 / 1,4"
50.7 / 2"
76
35.4 / 1,4"
240 / 9,4"

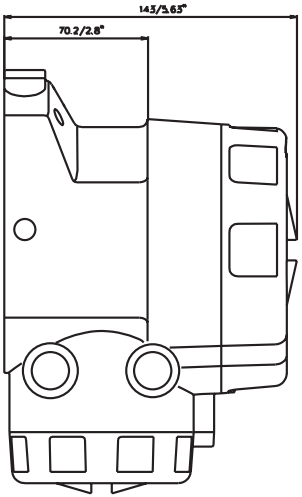

102 / 4"
201 / 7,9"
82 / 3,2"
M6 (4x)
35.4 / 1,4"
51 / 2"
76 / 3"
35.4 / 1,4"


113.5
M6(4X)
17.7
17.7
17.7
17.7






128/5"
100/3.94"
207/8.15"


143/5.65"
70.2/2.8"

## Signs and certificates

**D3E:**
D3E EXPLOSION PROOF DIGITAL VALVE POSITIONER
Class I Div.1 Grps B,C&D, Class II Div.1
Grps E,F&GT6(Ta +149 F) T5(Ta +176 F)
NEMA Type 4X/ IP66
EEx d IIB + H T6 (Ta +65 C) T5 (Ta +80 C) NEMKO 03 ATEX 111
II 2 GD
0470
Electrical Rating: max 28V DC, max 24mA, max 0,67 W
Do not open while energized! Seal within 50 mm of the enclosure.
Serial number, production year, software revision
FLOWSERVE, SWEDEN; PALMSTIERNA INTERNATIONAL, SOLNA

FM APPROVALS
PROJECT ID: 3015333

**D3E DIGITAL VALVE POSITIONER**

**From**

**Palmstiernas Instrument AB**
**Korta Gatan 9**
**S-17154 Solna, Sweden**

## I INTRODUCTION

1.1 Palmstiernas Instrument AB (manufacturer) requested continued FM Approval of their modified Digital Valve Positioner, Series D3E as explosionproof for Class I, Division 1, Groups B, C & D, T6 Ta = 65ºC / T5 Ta = 80ºC; dust-ignitionproof for Class II, Division 1, Groups E, F & G, T6 Ta = 65ºC / T5 Ta = 80ºC; indoor and outdoor (Type 4X) hazardous (classified) locations. The D3E Digital Valve Positioner is designed to control modulating valves.

1.2 This Report may be freely reproduced only in its entirety and without modification.

1.3 **Standards:** Approval of the D3E Digital Valve Positioner is based on the applicable requirements of the following standards:

| Title | Class Number | Date |
|---|---|---|
| Electrical Equipment for Use in Hazardous (Classified) Locations General Requirements. | FM 3600 | 1998 |
| Explosionproof Electrical Equipment for Hazardous (Classified) Locations | FM 3615 | 1989 |
| Electrical and Electronic Test, Measuring and Process Control Equipment | 3810<br>Including Supplement #1 | March 1989<br>July 1995 |
| Enclosures for Electrical Equipment | ANSI/NEMA 250 | 1991 |

1.4 As described in this report, the design and construction of the D3E Digital Valve Positioner provides for the required degree of protection against electrical shock, fire, and injury for hazardous (classified) locations.

1.5 **Listing:** The revised product listing will appear in the FM Approval Electrical Equipment Approval Guide, Chapter 2 as follows: (Additions are indicated by underline.)

***D3EaUc23fghZjXX. Digital Valve Positioner.***
XP/I/1/BCD/T6 Ta = 65°C/T5 Ta = 80°C; DIP/II/1/EFG/T6 Ta = 65°C/T5 Ta = 80°C; Type 4X

a = G or N. Air pipe connection thread type.
c = S, D, C or R. Function.
fgh = PVA, PVB or WCA. Cover and Indicator.
j = 4, 5, P or F. Input signal/protocol.

1.6 This report supplements FM Approvals Report ID: 3012363 which describe the original version of this product.



CSA INTERNATIONAL

# Certificate of Compliance

**Certificate:** 1278854 **Master Contract:** 176847

**Project:** 1278854 **Date Issued:** February 7, 2002

**Issued to:** **Palmstiernas Instrument AB**
**Korta Gatan 9**
**Solna, 171 54**
**SWEDEN**
**Attention:** **Mr. Mats Ragnarsson**

***The products listed below are eligible to bear the CSA Mark shown***

**Issued by:** R. Wildish

**Authorized by:** Nick Allano
Operation Manager

**PRODUCTS**

CLASS 2258 02 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations

Class I, Div. 1, Groups C and D; Class II, Div. 1, Groups E, F and G; Class III, Div. 1; Encl. Type 4X:

Model D3E xUx23PVBZxX Electronic-Pneumatic Valve Positioner; input rated 28 Vdc, 24 mA max; Temp. Code T6 @ Max Ambient 65 Deg C; Temp. Code T5 @ Max Ambient 81 Deg C.

Note: the x's in the D3E model code denote minor mechanical and electrical variations.

Nemko

Page 1 of 2

# [1] EC-TYPE EXAMINATION CERTIFICATE

**[2] Equipment or Protected System Intended for use in Potentially explosive atmospheres Directive 94/9/EC**

**[3] EC-Type Examination Certificate Number:** Nemko 03ATEX111

**[4] Equipment or Protective System:** Digital Valve Positioner
**[5] Applicant/ Manufacturer:** PMV Palmstiernas Instrument AB
**[6] Address:** Korta gatan 9
S-17154 Solna
Sweden

**[7]** This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

**[8]** Nemko AS, notified body number 0470 in accordance with Article 9 of Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no. 200309114

**[9]** Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

CENELEC EN 50014: 1997 + A1: 1999 + A2: 1999
CENELEC EN 50018: 2000

**[10]** If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

**[11]** This EC-TYPE EXAMINATION CERTIFICATE relates only to the design, examination and tests of the specified equipment or protective system in accordance to the directive 94/9/EC.
Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

**[12]** The marking of the equipment or protective system shall include the following:

Ex II 2 G EEx d IIB + H2 T6(Ta:65°C) T5(Ta:80°C)

Oslo, 2003-04-23

Rolf Hoel
Certification Department



*Postal address:* P.O.Box 73 Blindern, N-0314 OSLO, NORWAY
*Office address:* Gaustadalléen 30, 0373 OSLO
*Telephone:* +47 22 96 03 30
*Fax:* +47 22 96 05 50
*Enterprise number:* NO 974404532



## [13] Schedule

**[14] EC-TYPE EXAMINATION CERTIFICATE No Nemko 03ATEX111**

**[15] Description of Equipment or Protective System**

The PMV D3E is digital positioner designed primarily to control modulating valves. The positioner can be used with single or double action actuators with either rotary or linear movement. The D3E positioner comprises an electronic board with microprocessor, hart modem, display etc, a valve block, a positional feedback with potentiometer and a compartment for electrical connections.
The pushbuttons and display are accessible from underneath the threaded lid cover.
The whole assembly is contained in a flameproof aluminium enclosure with two threaded lids and two threaded openings for cable glands/conduits. Flame arresters are integrated in the enclosure in each air inlet and outlet.

**Type Designation**

**D3E abcdefghijkl**

The additional letters and digits in the type reference concern different accessories and functions of the instrument.
a: Air pipe connection thread type, b: Surface treatment, c: Function, de: Spindle, fgh: Cover and indicator, i: Temperature/Seals, j: Input signal/protocol, k: Feedback option, l: Accessories

**Temperature Class and Range of Ambient Temperatures**

Temperature class T6 –20°C <Ta<65°C
Temperature class T5 –20°C <Ta<80°C

**Electrical Data**

28V, 24mA

**Ingress Protection Code**

IP 66 according to IEC 60529
Type 4X according to Nema 250

**[16]** **Report No. 200309114** and the listed Schedule Documents D3E Technical File Contents Rev. C Dated 2003-04-23.

**[17] Special Conditions for Safe Use**

None

**[18] Essential Health and Safety Requirements**

See item 9



*Postal address:* P.O.Box 73 Blindern, N-0314 OSLO, NORWAY
*Office address:* Gaustadalléen 30, 0373 OSLO
*Telephone:* +47 22 96 03 30
*Fax:* +47 22 96 05 50
*Enterprise number:* NO 974404532

**D3I:**

D3I - Digital positioner - Intr. safe
EEx ia IIC T4, Ta= -30...+80 C, NEMKO 03ATEX110X
II I GD
0470
INTRINSICALLY SAFE/SECURITE INTRINSIQUE-Exia
When installed in accordance with installation drawing: D3-70

**WARNING!** Substitution of components may impair intrinsic safety.

**AVERTISSEMENT!** La substitution de composants peutcompromettre a securite intrinseque.
Serial number, production year, software revision
IP66/Nema 4x
Flowserve, Sweden; Palmstierna International;
S-171 54 Solna; www.flowserve.com

## [13] Schedule

## [14] EC-TYPE EXAMINATION CERTIFICATE No Nemko 03ATEX110X

**[15] Description of Equipment or Protective System**

The PMV D3I is a digital positioner designed primarily to control modulating valves. The positioner can be used with single or double action actuators with either rotary or linear movement.
The D3I positioner comprises:
-electronic board with microprocessor, Hart modem, display etc,
-pneumatic valve block,
-positional feedback with potentiometer
-compartment for electrical connections.
-the positioner D3I can also be equipped with modules for feedback, limit switches, and a pressure gauge block. The modules can be factory assembled before delivery or fitted later. The modules for feedback and limit switches can contain the following. Feedback 4-20mA and one of the following functions:
Two mechanical switches: Two reed switches: Two inductive sensors.
- Remote unit, an external unit containing the position potentiometer and indicator.

**Type Designation.**

**D3I abcdefghijkl**

The additional letters and digits in the type reference concern different accessories and functions of the instrument.
a: Air pipe connection thread type,
b: Surface treatment,
c: Function,
de: Spindle,
fgh: Cover and indicator,
i: Temperature/Seals,
j: Input signal/protocol: 4, 5, P. The letter "P" denotes the Profibus version
- S: Limit switches MEC + 4-20mA
- N: Limit sensors NAM + 4-20mA
- P: Limit switches PXY + 4-20mA
- T: 4-20mA

k: Feedback option
- X: no option
- S: Limit switch MEC + 4-20mA
- N: Limit sensors NAM + 4-20mA
- P: Limit switches PXY + 4-20mA
- T: 4-20mA transmitter only

l: Accessories:
- X: No accessories
- M: Gauge block

**D3I Remote Unit**

A separate unit for connection to the D3I

The Remote Unit is connected to terminals 3,4 and 5 on models with type indicator c= C or R and k=T



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*Enterprise number:* **NO 974404532**



**Safety Data**

The transmitter must be connected to safety barriers or isolators according to the drawing D3-70 and corresponding to the stated input values of the positioner.

**Profibus PA input signal. Terminals no. 1, 2**

| | | |
|---|---|---|
| Maximum input voltage. | $U_i$: | 15V |
| Maximum input current. | $I_i$: | 208mA |
| Maximum input power. | $P_i$: | 1,9W |
| Maximum internal capacitance. | $C_i$: | 4nF |
| Maximum internal inductance. | $L_i$: | 5µH |

**4-20mA input signal. Terminals no. 1, 2**

| | | |
|---|---|---|
| Maximum input voltage. | $U_i$: | 28V |
| Maximum input current. | $I_i$: | 93mA |
| Maximum input power. | $P_i$: | 653mW |
| Maximum internal capacitance. | $C_i$: | 4nF |
| Maximum internal inductance. | $L_i$: | 5µH |

**Switches, Mechanical or Proximity. Terminals 3-5, 6-8 or 4-5, 7-8**

| | | |
|---|---|---|
| Maximum input voltage. | $U_i$: | 28V |
| Maximum input current. | $I_i$: | 45mA |
| Maximum input power. | $P_i$: | 315mW |
| Maximum internal capacitance. | $C_i$: | 4nF |
| Maximum internal inductance. | $L_i$: | 5µH |

**Switches, Mechanical or Proximity with isolator barriers. Terminals 3-5, 6-8**

| | | |
|---|---|---|
| Maximum input voltage. | $U_i$: | 10,6V |
| Maximum input current. | $I_i$: | 29,7mA |
| Maximum input power. | $P_i$: | 79mW |
| Maximum internal capacitance. | $C_i$: | 1nF |
| Maximum internal inductance. | $L_i$: | 1µH |

**Namur switch and isolator barrier. Terminals 3-4, 6-7**

| | | |
|---|---|---|
| Maximum input voltage. | $U_i$: | 10,6V |
| Maximum input current. | $I_i$: | 29,7mA |
| Maximum input power. | $P_i$: | 79mW |
| Maximum internal capacitance. | $C_i$: | 35nF |
| Maximum internal inductance. | $L_i$: | 50µH |



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**Aux input 4-20mA- Terminals 9-10**

| | | |
|---|---|---|
| Maximum input voltage. | $U_i$: | 28V |
| Maximum input current. | $I_i$: | 45mA |
| Maximum input power. | $P_i$: | 315mW |
| Maximum internal capacitance. | $C_i$: | 5,7nF |
| Maximum internal inductance. | $L_i$: | 5µH |

**4-20mA Output. Terminals 11-12**

| | | |
|---|---|---|
| Maximum input voltage. | $U_i$: | 28V |
| Maximum input current. | $I_i$: | 75mA |
| Maximum input power. | $P_i$: | 525mW |
| Maximum internal capacitance. | $C_i$: | 5,7nF |
| Maximum internal inductance. | $L_i$: | 5µH |

**Alarm. Terminals 13-14**

| | | |
|---|---|---|
| Maximum input voltage. | $U_i$: | 28V |
| Maximum input current. | $I_i$: | 45mA |
| Maximum input power. | $P_i$: | 315mW |
| Maximum internal capacitance. | $C_i$: | 5,7nF |
| Maximum internal inductance. | $L_i$: | 5µH |

**Ambient Temperature Range**

-30°C <Ta<80°C

**D3I Remote Unit**
-30°C <Ta<120°C

**Ingress Protection Code**
IP 66 according to IEC 60529
Type 4X according to NEMA 250

**[16] Report No. 200309115** and the list of Schedule Documents D3I Technical File Contents Rev. B Dated 2003-05-06.



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**[17] Special Conditions for Safe Use**

1. The enclosure is made of aluminium and impact or friction caused by external objects shall be avoided in the application.
2. The surface area of the plastic parts on the cover exceeds the limits specified in EN 50284 for gas group IIC and intensive rubbing or brush charging should be avoided when used in an IIC explosive atmosphere.

**[18] Essential Health and Safety Requirements**
See item 9

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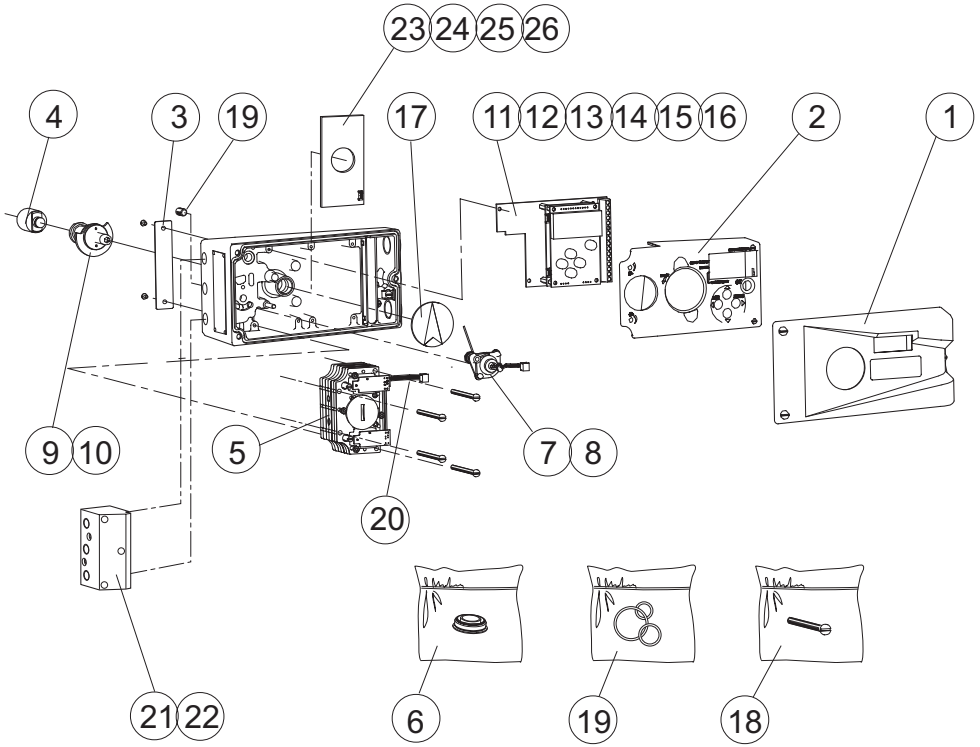
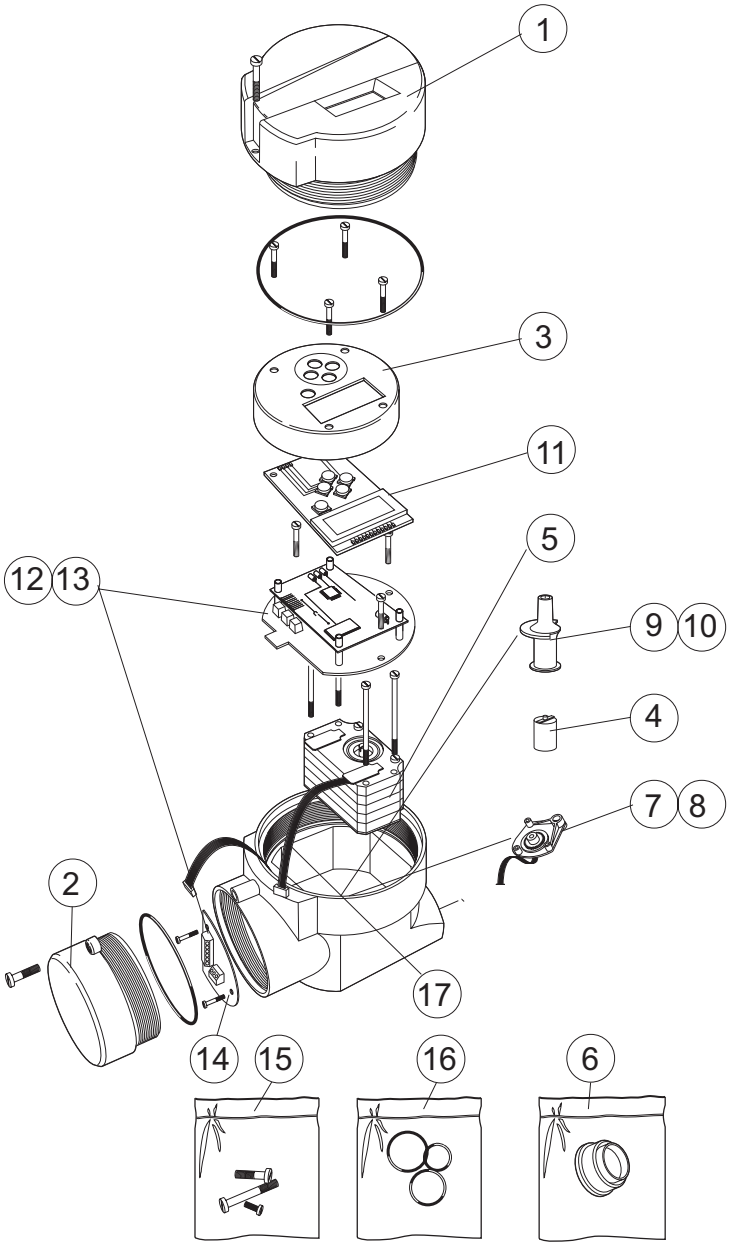
# 11. Spare parts



| Pos | Part no. | Description |
|---|---|---|
| 1 | D3-SP6 | Cover incl.screws |
| 2 | D3-SP11 | Internal cover incl.screws |
| 3 | P3-SP13 | Cover plate incl. screws |
| 4 | P5-Sxx | Spindle adapter |
| 5 | D3-SP1 | Block compl incl. cable, rubber seal, filter-plug |
| 6 | D3-SP9 | Filter-plug incl. O-ring, filter |
| 7 | D3-SP8 | Potentiometer compl incl. spring, holder, cable |
| 8 | D3-SP8-270 | Potentiometer compl incl. spring, holder, cable, 270deg |
| 9 | D3-SP20 | Shaft compl incl. gearwheel, friction clutch |
| 10 | D3-SP20-270 | Shaft compl.incl. gearwheel, friction clutch, 270deg |
| 11 | D3-SP37 | Pcb display assy |
| 12 | D3-SP80X | PCBs (terminal and processor) |
| 13 | D3-SP80H | PCBs (terminal and processor) HART |
| 14 | D3-SP35I | PCBs (terminal and processor) intrinsically safe |
| 15 | D3-SP35IH | PCBs (terminal and processor)intrinsically safe, HART |
| 16 | D3-SP35PF | PCBs (terminal and processor) Profibus/Fieldbus |
| 17 | P4A8 | Arrow pointer |
| 18 | D3-SP/SCREW | Kit, bag with screws |
| 19 | D3-SP/SEAL | Kit, bag with O-rings, seals |
| 20 | D3-SP42 | Cables and PC boards to pneumatic block |
| 21 | D3-SP34G | Gaugeblock G, complete |
| 22 | D3-SP34N | Gaugeblock N, complete |
| 23 | D3-AS38M | Transmitter board, Mechanical switches, assy +420 |
| 24 | D3-AS38N | Transmitter board, Namur sensors, assy +420 |
| 25 | D3-AS38P | Transmitter board, Proximity switches, assy +420 |
| 26 | D3-AS38T | Transmitter board 4-20, assy |
| 30 | D3-SP6WC | Cover incl. screws, Worcester |
| 31 | D3-67 | Silencer |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| Pos | Part no. | Description |
|---|---|---|
| 1 | D3E-SP2 | Front cover incl. screw |
| 2 | D3E-SP3 | Terminal cover incl. screw |
| 3 | D3E-SP4 | Internal cover incl. screws |
| 4 | P5-Sxx | Spindle adapter |
| 5 | D3-SP1 | Block compl. incl. cable, rubber seal, filter-plug |
| 6 | D3-SP9 | Filter plug incl.O-ring, filter |
| 7 | D3E-SP8 | Potentiometer compl. incl. spring, holder, cable |
| 8 | D3E-SP8-270 | Potentiometer compl. incl. spring, holder, cable |
| 9 | D3E-SP20 | Shaft compl. incl. gearwheel, friction clutch |
| 10 | D3E-SP20-270 | Shaft compl. incl. gearwheel, friction clutch |
| 11 | D3-SP37 | Display pcb |
| 12 | D3E-SP35X | All PCB´s, (processor, mother, terminal) |
| 13 | D3E-SP35H | All PCB´s, HART, (processor, mother, terminal) |
| 14 | D3E-SP40 | Terminal PCB |
| 15 | D3E-SP/Screw | Kit with screws D3E |
| 16 | D3E-SP/Seal | Kit with O-rings |
| 17 | D3E-SP42 | Cable for pneumatic block, incl. 2 x PCB |

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