Series 3730
Electropneumatic Positioner
Type 3730-5

with FOUNDATION™ fieldbus communication
FF Device Rev 1

Mounting and Operating Instructions

EB 8384-5 EN (1300-1614)
Firmware version K 1.26/ R 1.46
Edition July 2012
Definitions of the signal words used in these instructions

⚠️ **DANGER!**
indicates a hazardous situation which, if not avoided, will result in death or serious injury.

---

**NOTICE**
indicates a property damage message.

---

**WARNING!**
indicates a hazardous situation which, if not avoided, could result in death or serious injury.

---

**Note:** Supplementary explanations, information and tips
## Contents

<table>
<thead>
<tr>
<th>Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> Important safety instructions</td>
<td>9</td>
</tr>
<tr>
<td><strong>2</strong> Article code</td>
<td>11</td>
</tr>
<tr>
<td><strong>3</strong> Design and principle of operation</td>
<td>12</td>
</tr>
<tr>
<td><strong>3.1</strong> Additional equipment</td>
<td>13</td>
</tr>
<tr>
<td><strong>3.2</strong> Communication</td>
<td>13</td>
</tr>
<tr>
<td><strong>3.3</strong> Technical data</td>
<td>15</td>
</tr>
<tr>
<td><strong>4</strong> Attachment to the control valve – Mounting parts and accessories</td>
<td>18</td>
</tr>
<tr>
<td><strong>4.1</strong> Direct attachment</td>
<td>20</td>
</tr>
<tr>
<td><strong>4.1.1</strong> Type 3277-5 Actuator</td>
<td>20</td>
</tr>
<tr>
<td><strong>4.1.2</strong> Type 3277 Actuator</td>
<td>22</td>
</tr>
<tr>
<td><strong>4.2</strong> Attachment according to IEC 60534-6</td>
<td>24</td>
</tr>
<tr>
<td><strong>4.3</strong> Attachment to Type 3510 Micro-flow Valve</td>
<td>26</td>
</tr>
<tr>
<td><strong>4.4</strong> Attachment to rotary actuators</td>
<td>28</td>
</tr>
<tr>
<td><strong>4.4.1</strong> Heavy-duty version</td>
<td>30</td>
</tr>
<tr>
<td><strong>4.5</strong> Reversing amplifier for double-acting actuators</td>
<td>32</td>
</tr>
<tr>
<td><strong>4.5.1</strong> Reversing amplifier (1079-1118 or 1079-1119)</td>
<td>32</td>
</tr>
<tr>
<td><strong>4.6</strong> Attaching an external position sensor</td>
<td>34</td>
</tr>
<tr>
<td><strong>4.6.1</strong> Mounting the position sensor with direct attachment</td>
<td>34</td>
</tr>
<tr>
<td><strong>4.6.2</strong> Mounting the position sensor with attachment according to IEC 60534-6</td>
<td>36</td>
</tr>
<tr>
<td><strong>4.6.3</strong> Mounting the position sensor to Type 3510 Micro-flow Valve</td>
<td>37</td>
</tr>
<tr>
<td><strong>4.6.4</strong> Mounting the position sensor to rotary actuators</td>
<td>38</td>
</tr>
<tr>
<td><strong>4.7</strong> Attaching positioners with stainless steel housings</td>
<td>39</td>
</tr>
<tr>
<td><strong>4.8</strong> Air purging function for single-acting actuators</td>
<td>39</td>
</tr>
<tr>
<td><strong>4.9</strong> Mounting parts and accessories</td>
<td>40</td>
</tr>
<tr>
<td><strong>5</strong> Connections</td>
<td>44</td>
</tr>
<tr>
<td><strong>5.1</strong> Pneumatic connections</td>
<td>44</td>
</tr>
<tr>
<td><strong>5.1.1</strong> Signal pressure gauges</td>
<td>44</td>
</tr>
<tr>
<td><strong>5.1.2</strong> Supply pressure</td>
<td>44</td>
</tr>
<tr>
<td><strong>5.1.3</strong> Signal pressure (output)</td>
<td>45</td>
</tr>
<tr>
<td><strong>5.2</strong> Electrical connections</td>
<td>45</td>
</tr>
<tr>
<td><strong>5.2.1</strong> Establishing communication</td>
<td>48</td>
</tr>
<tr>
<td><strong>6</strong> Operator controls and readings</td>
<td>50</td>
</tr>
<tr>
<td><strong>7</strong> Start-up – Settings</td>
<td>52</td>
</tr>
<tr>
<td><strong>7.1</strong> Defining the valve closed position</td>
<td>52</td>
</tr>
<tr>
<td><strong>7.2</strong> Setting the volume restriction Q</td>
<td>53</td>
</tr>
<tr>
<td><strong>7.3</strong> Adapting the display</td>
<td>53</td>
</tr>
</tbody>
</table>
7.4 Limiting the signal pressure ........................................ 54
7.5 Checking the operating range of the positioner ............... 54
7.6 Initialization .......................................................... 55
7.6.1 MAX – Initialization based on maximum range ............... 57
7.6.2 NOM – Initialization based on nominal range ............... 58
7.6.3 MAN – Initialization based on a manually selected range . 59
7.6.4 Sub substitute calibration ......................................... 60
7.7 Zero calibration ........................................................ 63
7.8 Reset to default values .............................................. 64
7.9 Start-up via local interface (SSP) .................................. 64
8 Operation ...................................................................... 65
8.1 Enabling and selecting parameters .................................. 65
8.2 Operating modes ....................................................... 65
8.2.1 Automatic and manual modes .................................... 65
8.2.2 SAFE – Fail-safe position ......................................... 66
8.3 Malfunction/maintenance alarm .................................... 67
8.3.1 Confirming error messages ....................................... 68
9 Status and diagnostic alarms ........................................... 68
9.1 Standard EXPERT diagnostics ...................................... 68
9.2 Extended EXPERT+ diagnostics ................................... 69
10 Adjusting the limit switch ............................................. 70
11 Retrofitting an inductive limit switch .............................. 72
12 Maintenance ............................................................... 73
13 Servicing explosion-protected devices .............................. 73
14 Firmware update (serial interface) .................................. 73
15 Maintenance, calibration and work on equipment .............. 74
16 Fieldbus specification ................................................... 75
16.1 Device description (DD) ............................................. 75
16.2 FOUNDATION™ fieldbus block model ......................... 75
16.3 Resetting the device .................................................. 76
16.4 Status classification and condensed state ...................... 76
17 Appendix ................................................................. 78
17.1 Code list .................................................................... 78
17.2 Parameters ............................................................... 97
17.2.1 Resource Block .................................................... 97
17.2.2 Analog Output Transducer Block .............................. 97
## Modifications of positioner firmware in comparison to previous versions

<table>
<thead>
<tr>
<th>Previous</th>
<th>New</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication</td>
<td>K 1.21</td>
</tr>
</tbody>
</table>
| Leakage sensor at binary input 2 | The connection of a leakage sensor at binary input 2 (by selecting LEAKAGE SENSOR in CONFIG_BINARY_INPUT2 parameter of the AO Transducer Block) causes:  
  - Information specified in XD_ERROR_EXT parameter in the AO Transducer Block and the generation of a diagnostic alarm which is logged  
  - The state of the binary input is reported in BINARY_INPUT2 parameter in the AO Transducer Block |
| Diagnostic alarm “Device not initialized” | The diagnostic alarm “Device not initialized” is generated when the positioner is not initialized and the condensed status is set to “Maintenance alarm”. |
| Display of the operating range FINAL_VALUE_RANGE | The correction of the operating range FINAL_VALUE_RANGE over on-site operation of the positioner (Code 8/9) is also transferred over fieldbus in firmware version K 1.21 and higher. |
| Inactivated internal solenoid valve | A masking allows to be set whether an inactivated internal solenoid valve generates an AO block error and a resulting block alarm. |
| SOLENOID_SELECT parameter | The SOLENOID_SELECT parameter in firmware K 1.21 and higher allows to be set whether a “Maintenance now” block error of the AO Transducer Block results in an output error in the AO Block. |
| TOT_VALVE_TRAV_LIM parameter | New range: 1000 ... 990 000 000 |
| Operating range FINAL_VALUE_RANGE | The operating range FINAL_VALUE_RANGE of the AO Transducer Block is compared on entering it with TRANSM_PIN_POS. If the TRANSM_PIN_POS parameter is changed, the positioner checks whether the setting and unit match the current operating range FINAL_VALUE_RANGE. If this is not the case, the FINAL_VALUE_RANGE parameter is set to 0 to 100 %. |
| VALVE_TYPE parameter | The parameter of the AO Transducer Block is set depending on the selected PIN_POS. The last setting is kept when VALVE_TYPE parameter is set to OFF. |
| FINAL_VALUE parameter | The manipulated variable is scaled with FINAL_VALUE_RANGE in firmware K 1.22 and higher, and not with XD_SCALE. |
| Display of O/S mode in AO Transducer Block | If the AO Transducer Block is set to O/S mode, this is indicated in the positioner display by MAN/AUTO. |
### Modifications of positioner firmware in comparison to previous versions

<table>
<thead>
<tr>
<th>Previous</th>
<th>New</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>K 1.23</strong></td>
<td></td>
</tr>
<tr>
<td>Internal modifications</td>
<td></td>
</tr>
<tr>
<td><strong>K 1.24</strong></td>
<td></td>
</tr>
<tr>
<td>BUS_ADDRESS parameter</td>
<td>The bus address has the default setting of 248.</td>
</tr>
<tr>
<td>Device type</td>
<td>In the delivery state, the device is configured as a basic device.</td>
</tr>
<tr>
<td><strong>K 1.25</strong></td>
<td></td>
</tr>
<tr>
<td>Internal modifications</td>
<td></td>
</tr>
<tr>
<td><strong>K 1.26</strong></td>
<td></td>
</tr>
<tr>
<td>Corrections in PID Function Block allow a bumpless transfer from manual to automatic mode. The revisions affect the 'Direct action' option in the PID Function Block. Refer to CONTROL_OPTS parameter.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control R 1.43</th>
<th>R 1.44</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal modifications</td>
<td></td>
</tr>
<tr>
<td><strong>R 1.45</strong></td>
<td></td>
</tr>
<tr>
<td>Internal modifications</td>
<td></td>
</tr>
<tr>
<td><strong>R 1.46</strong></td>
<td></td>
</tr>
<tr>
<td>Internal modifications</td>
<td></td>
</tr>
</tbody>
</table>
1 Important safety instructions

For your own safety, follow these instructions concerning the mounting, start-up and operation of the positioner:

- The positioner is to be mounted, started up or operated only by trained and experienced personnel familiar with the product. According to these Mounting and Operating Instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible dangers due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.

- Explosion-protected versions of this positioner may only be operated by personnel who have undergone special training or instructions or who are authorized to work on explosion-protected devices in hazardous areas. Refer to section 13.

- Any hazards that could be caused by the process medium, the operating pressure, the signal pressure or by moving parts of the control valve are to be prevented by means of the appropriate measures.

- If inadmissible motions or forces are produced in the actuator as a result of the supply pressure, the supply pressure must be restricted by means of a suitable supply pressure reducing station.

To avoid damage to any equipment, the following also applies:

- Do not operate the positioner with the back of the positioner/vent opening facing upwards.
  The vent opening must not be sealed when the positioner is installed on site.

- Proper shipping and appropriate storage are assumed.
- Do not ground electric welding equipment near to the positioner.
**Note:** The device with a CE marking fulfills the requirements of the Directives 94/9/EC (ATEX) and 89/336/EEC (EMC).
The Declaration of Conformity is available on request.
2 Article code

<table>
<thead>
<tr>
<th>Positioner</th>
<th>Type 3730-5</th>
<th>x x x 0 x 0 x 0 0 0</th>
<th>x x</th>
</tr>
</thead>
<tbody>
<tr>
<td>With LCD and autotune, FOUNDATION™ fieldbus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explosion protection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATEX: II 2G Ex ia IIC T6; II 2D Ex t6b IIC T 80 °C IP 66</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FM/CSA:</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class I, Zone 0 AEx ia IIC; Class I, II, III, Div. 1, Groups A–G; Class I, Div. 2, Groups A–D; Class II, Div. 2, Groups F, G/ Ex ia IIC T6; Class I, II, Div. 1, Groups A–G; Ex nA II T6; Ex nL IIC T6; Class I, II, Div. 2, Groups A–G; Class II, Div. 1, Groups E–D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATEX: II 3G Ex nA II T6; II 3G Ex ic IIC T6; II 3D Ex tc IIC T 80 °C IP 66</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional equipment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inductive limit switch</td>
<td>Without</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>SJ2-SN</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SJ2-S1N</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solenoid valve</td>
<td>Without</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>mit, 24 V DC</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External position sensor</td>
<td>Without</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>With</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Binary input</td>
<td>Without</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Floating contact</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnostics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXPERT (standard)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXPERT+ (extended diagnostics)</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing material</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aluminum (standard)</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stainless steel 1.4581</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Special applications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positioner compatible with paint</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vent connection with ¼-18 NPT thread, back of housing sealed</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Special version</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NEPSI: Ex ia IIC T6</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NEPSI: Ex nA II T6; Ex nL IIC T6</td>
<td>8</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>IECEx: Ex ia IIC T6</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>GOST: 1Ex ia IIC T6</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
3 Design and principle of operation

The electropneumatic positioner is attached to pneumatic control valves. It is used to assign the valve stem position (controlled variable x) to the control signal (reference variable w). The input signal received from a control system is compared to the travel or rotational angle of the control valve, and a pneumatic signal pressure (output variable y) is produced.

The positioner consists of a travel sensor system proportional to resistance, an analog i/p converter with a downstream booster and the electronics unit with microcontroller.

When a deviation occurs, the actuator is pressurized or vented. If required, the changes in the signal pressure can be slowed down by a connectable Q restriction. The signal pressure supplied to the actuator can be limited by software or on site to 1.4, 2.4 or 3.7 bar.

A constant air stream to the atmosphere is created by the flow regulator (9) with a fixed set point. The air stream is used to purge the inside of the case as well as to optimize the air capacity booster. The i/p module (6) is supplied with a constant upstream pressure by the pressure regulator (8) to make it independent of the supply air pressure.

---

Fig. 2 · Functional diagram

1 Control valve
2 Travel sensor
3 PD controller
4 A/D converter
5 Microcontroller
6 i/p converter
7 Air capacity booster
8 Pressure regulator
9 Flow regulator
10 Volume restriction
11* Inductive limit switch
12* Solenoid valve
13 IEC 61158-2 interface module
14 Binary input, passive
15* Binary input, active
16 Display
17* Solenoid valve control
18* Galvanic isolation
19 D/A converter
20 Communication interface

* Optional
The positioner communicates and is powered using IEC 61158-2 transmission technology conforming to FOUNDATION™ fieldbus specification.

As a standard feature, the positioner comes with a binary input for DC voltage signals to signalize process information over the FOUNDATION™ fieldbus.

### 3.1 Additional equipment

**Version with solenoid valve**

If the operating voltage for the solenoid valve (12) fails, the supply pressure for the i/p module is vented to the atmosphere. The positioner can no longer operate and the control valve moves to the fail-safe position determined by the actuator, independent of the reference variable.

**NOTICE**

In manual mode (MAN), the manual set point is also reset to 0 %. A different manual set point must be entered again (Code 1).

**Version with inductive limit switch**

The rotary shaft of the positioner carries an adjustable tag which actuates the installed proximity switch.

**Version with binary contact**

All positioners are fitted with a binary input for DC voltage signals over which process information can be issued over the FOUNDATION™ fieldbus network. Another optional binary input is an active input powered by the positioner to connect a floating contact. Its switching condition can also be issued over the FOUNDATION™ fieldbus network.

**Version with external position sensor**

In this version, only the sensor is mounted to the control valve. The positioner is located separately from the valve. The connection of x and y signals to the valve is established by cable and piping for air (only without inductive limit switch).

**EXPERT+ extended valve diagnostics**

See Table 5 on page 42 for order numbers.

EXPERT+ upgrades the standard EXPERT diagnostics firmware incorporated in the positioner. The upgraded version provides extended functions to pinpoint valve parameters that have worsened, allowing the user to plan predictive maintenance and service work before malfunctions can affect the process and may cause unscheduled plant shutdowns.

The extended EXPERT+ diagnostics can be activated later at the positioner when EXPERT+ is not already activated on delivery of the positioner. The required activation code or an EXPERT+ USB dongle can be purchased to activate EXPERT+.

### 3.2 Communication

The positioner is completely controlled over the digital signal transmission implemented according to FOUNDATION™ fieldbus specification.

Data are transmitted as bit-synchronous current modulation at a rate of 31.25 kbit/s.
over twisted-pair cables conforming to IEC 61158-2.

**Note:** In the case, complex functions are started in the positioner, which require a long calculation time or lead to a large quantity of data being stored in the volatile memory of the positioner, the alert “busy” is issued over DD. This alert is **not a fault alarm** and can simply be confirmed.

**Configuration using TROVIS-VIEW software**

The positioner can be configured using TROVIS-VIEW Configuration and Operator Interface software. The positioner is equipped with an additional digital **SERIAL INTERFACE** to connect the RS-232 or USB port of the computer to the positioner over an adapter cable. The TROVIS-VIEW software enables the user to easily set parameters in the positioner and view process parameters online.

**Note:** The TROVIS-VIEW software is a common operator interface for various smart SAMSON devices. The software together with a device-specific module allow the configuration and parameterization of the device. The device-specific module for Type 3730-5 can be downloaded free of charge from the SAMSON website (Services > Software > TROVIS-VIEW). Additional information on TROVIS-VIEW (e.g. system requirements) can be found on the SAMSON website and in the Data Sheet T 6661 EN.

**Configuration using the NI-FBUS™ Configurator**

The NI-FBUS™ Configurator from National Instruments can also be used to configure the positioner. For this purpose, an interface card must be installed in a computer to connect it to the FOUNDATION™ fieldbus. The integrated function blocks are linked using the NI-FBUS™ Configurator.
### 3.3 Technical data

**Type 3730-5 Positioner** (technical data in test certificates additionally apply for explosion-protected devices)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rated travel, adjustable</strong></td>
<td>Direct attachment to Type 3277: 3.6 to 30 mm</td>
</tr>
<tr>
<td></td>
<td>Attachment acc. to IEC 60534-6: 3.6 to 200 mm</td>
</tr>
<tr>
<td></td>
<td>Attachment to rotary actuators (VDI/VDE 3845): 24° to 100°</td>
</tr>
<tr>
<td><strong>Travel range, adjustable</strong></td>
<td>Adjustable within the initialized travel/angle of rotation; travel can be restricted to ( \frac{1}{2} ) at the maximum</td>
</tr>
<tr>
<td><strong>Bus connection</strong></td>
<td>Fieldbus interface acc. to IEC 61158-2 bus-powered</td>
</tr>
<tr>
<td></td>
<td>Physical Layer Class: 113 (without explosion protection) und 111 (with ex. protection)</td>
</tr>
<tr>
<td></td>
<td>Field device acc. to FM 3610 Entity, FISCO and FNICO</td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td>Over SAMSON SSP interface and serial interface adapter</td>
</tr>
<tr>
<td><strong>Software requirements (SSP)</strong></td>
<td>SAMSON TROVIS-VIEW with database module 3730-5</td>
</tr>
<tr>
<td><strong>Permissible operating voltage</strong></td>
<td>9 to 32 V DC, power supply over bus line</td>
</tr>
<tr>
<td></td>
<td>The limits in test certificate additionally apply for explosion-protected devices.</td>
</tr>
<tr>
<td><strong>Max. operating current</strong></td>
<td>15 mA</td>
</tr>
<tr>
<td><strong>Add. current in case of fault</strong></td>
<td>0 mA</td>
</tr>
<tr>
<td><strong>Supply air</strong></td>
<td>Supply pressure from 1.4 to 7 bar (20 to 105 psi), Air quality acc. to ISO 8573-1 Edition 2001: Max. particle size and density: Class 4 Oil content: Class 3; Moisture and water: Class 3; Pressure dew point: At least 10 K beneath the lowest ambient temperature to be expected</td>
</tr>
<tr>
<td><strong>Signal pressure (output)</strong></td>
<td>0 bar up to supply pressure, limitable to 1.4/2.4/3.7 bar ±0.2 bar via software</td>
</tr>
<tr>
<td><strong>Characteristic</strong></td>
<td>Linear/equal percentage/reverse equal percentage · User-defined (over operating software and communication) · Butterfly valve linear/equal percentage · Rotary plug valve linear/equal percentage · Segmented ball valve linear/equal percentage Deviation from terminal-based conformity ≤ 1 %</td>
</tr>
<tr>
<td><strong>Hysteresis</strong></td>
<td>≤ 0.3 %</td>
</tr>
<tr>
<td><strong>Sensitivity</strong></td>
<td>≤ 0.1 %</td>
</tr>
<tr>
<td><strong>Direction of action</strong></td>
<td>Reversible</td>
</tr>
<tr>
<td><strong>Air consumption</strong></td>
<td>Independent from supply pressure approx. 110 l/h</td>
</tr>
<tr>
<td><strong>Air output capacity</strong></td>
<td></td>
</tr>
<tr>
<td>Actuator pressurized</td>
<td>At ( \Delta p = 6 ) bar: 8.5 m(^3)/h, at ( \Delta p = 1.4 ) bar: 3.0 m(^3)/h ( K_{\text{max}} (20 , ^\circ\text{C}) = 0.09 )</td>
</tr>
<tr>
<td>Actuator vented</td>
<td>at ( \Delta p = 6 ) bar: 14.0 m(^3)/h, at ( \Delta p = 1.4 ) bar: 4.5 m(^3)/h ( K_{\text{max}} (20 , ^\circ\text{C}) = 0.15 )</td>
</tr>
</tbody>
</table>
## Design and principle of operation

### Type 3730-5 Positioner (technical data in test certificates additionally apply for explosion-protected devices)

| Permissible ambient temperature | \(-20\) to \(+80\) °C for all versions  
\(-45\) to \(+80\) °C with metal cable gland  
\(-25\) to \(+80\) °C with inductive limit switch (SJ2-S1N) and metal cable gland  
The limits in test certificate additionally apply for explosion-protected devices. |
| Influences | Temperature ≤ 0.15 %/10 K  
Supply air None  
Vibration ≤ 0.25 % up to 2000 Hz and 4 g acc. to IEC 770 |
| Electromagnetic compatibility | Complying with EN 61000-6-2, EN 61000-6-3, EN 61326-1 and NAMUR Recommendation NE 21 |
| Explosion protection | ATEX Type 3730-51: II 2G Ex ia IIC T6; II 2D Ex tb IIIC T 80 °C IP 66  
Type 3730-58: II 3G Ex na IIC T6; II 3G Ex ic IIC T6; II 3D Ex tc IIIC T 80 °C IP 66  
FM Type 3730-53: Class I, Zone 0 AEx ia IIC; Class I, II, III, Div.1, Groups A–G;  
Class I, Div.2, Groups A–D; Class II, Div.2, Groups F, G  
CSA Type 3730-53: Ex ia IIC T6; Class I, II, Div.1, Groups A–G;  
Ex nA II T6; Ex nL IIC T6; Class I, II, Div.2, Groups A–G; Class II, Div.1, Groups E–D  
NEPS I Type 3730-51xx0x0xx0x00x00x009: Ex ia IIC T6  
Type 3730-58xx0x0xx0x00x00x00x010: Ex na II T6; Ex nL IIC T6  
IECEx Type 3730-51xx0x0xx0x00x00x012: Ex ia IIC T6  
GOST Type 3730-51xx0x0xx0x00x00x014: 1Ex ia IIC T6 |
| Electrical connection | One M20 x 1.5 cable gland, for 6 to 12 mm clamping range · Second additional threaded M20 x 1.5 hole · Screw terminals for 0.2 to 2.5 mm² wire cross-section |
| Degree of protection | IP 66/NEMA 4X |
| Implementation in safety-related systems in compliance with IEC 61508/SIL | Probability of failure on demand of safety functions PFD < 2.8 x 10\(^{-7}\) for a confidence level of 95 %.  
The safe failure fraction (SFF) according to Table A1 in IEC 61508-2 is greater or equal to 0.99.  
The valves are therefore suitable for implementation in safety-related systems with a hardware fault tolerance of 1 or 2 up to and including SIL 4. |
| Binary contact 1 | Input 0 to 30 V DC reverse polarity protection, static destruction limit 40 V, current consumption 3.5 mA at 24 V, galvanically isolated  
Signal Signal “1” at Ue > 5 V · Signal “0” at Ue < 3 V |
| Materials | Housing Die-cast aluminum EN AC-ALSi12(Fe) (EN AC-44300) acc. to DIN EN 1706; chromated and powder paint coated · Special version: stainless steel 1.4581 |
| External parts | Stainless steel 1.4571 and 1.4301 |
| Cable gland | Nickel-plated brass, M20x1.5 |
| Weight | Approx. 1 kg |
# Options for Type 3730-5

## Binary contact 2 for floating contact

<table>
<thead>
<tr>
<th>Switching input</th>
<th>R &lt; 100 Ω, contact loadability 100 mA, static destruction limit 20 V/5.8 mA, galvanically isolated</th>
</tr>
</thead>
</table>

## Solenoid valve

<table>
<thead>
<tr>
<th>Approval acc. to IEC 61508/SIL</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Input</th>
<th>24 V DC, reverse polarity protection, static destruction limit 40 V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current consumption I = ( \frac{U - 5.7 V}{3840 \Omega} ) (corresponding to 4.8 mA at 24 V/114 mW)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signal &quot;0&quot; no pick-up</th>
<th>≤ 15 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal &quot;1&quot; safe pick-up</td>
<td>&gt;19 V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Service life</th>
<th>&gt;5 ( \times ) 10⁴ switching cycles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kₜ coefficient</td>
<td>0.15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Implementation in safety-related systems in compliance with IEC 61508/SIL</th>
<th>Same as positioner pneumatics</th>
</tr>
</thead>
</table>

## Inductive limit switch

<table>
<thead>
<tr>
<th>For connection to switching amplifier acc. to EN 60947-5-6</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>SJ2-SN proximity switch</th>
<th>NAMUR NC contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>SJ2-S1N proximity switch</td>
<td>NAMUR NO contact</td>
</tr>
</tbody>
</table>

## External position sensor

<table>
<thead>
<tr>
<th>Same as positioner</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Travel</th>
<th>Same as positioner</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Cable</th>
<th>10 m with M12x1 connector, designed for continuous flexing, flame retardant acc. to VDE 0472, resistant to oils, lubricants, coolants as well as other corrosive media</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perm. ambient temperature</td>
<td>-60 to +105 °C</td>
</tr>
<tr>
<td>Vibration immunity</td>
<td>Up to 10 g in the range between 10 and 2000 Hz</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP 67</td>
</tr>
</tbody>
</table>
4 Attachment to the control valve – Mounting parts and accessories

WARNING!
Mount the positioner, keeping the following sequence:
1. Remove protective film from pneumatic connections.
2. Mount the positioner on the control valve
3. Connect the supply air
4. Connect the electrical power
5. Perform the start-up settings

The positioner is suitable for the following types of attachment:
- Direct attachment to SAMSON Type 3277 Actuator
- Attachment to actuators according to IEC 60534-6 (NAMUR)
- Attachment to Type 3510 Micro-flow Valve
- Attachment to rotary actuators

NOTICE
Attach the positioner to the control valve, observing the following instructions to avoid damaging the positioner.
- Use only the mounting parts/accessories listed in the Tables 1 to 5 (pages 40 to 42) to mount the positioner. Observe the type of attachment!
- Observe the assignment between lever and pin position (see travel tables on page 19)!

Lever and pin position
The positioner is adapted to the actuator and to the rated travel by the lever on the back of the positioner and the pin inserted into the lever.

The travel tables on page 19 show the maximum adjustment range at the positioner. The travel that can be implemented at the valve is additionally restricted by the selected fail-safe position and the required compression of the actuator springs.

The positioner is standard equipped with the lever M (pin position 35).

Note: If the standard mounted lever M (pin position 35) is replaced, the newly mounted lever must be moved once all the way as far as it will go in both directions to adapt it to the internal measuring lever.
## Travel tables

**Note:** The lever $M$ is included in the scope of delivery. Levers $S$, $L$, $XL$ for attachment according to IEC 60534-6 (NAMUR) are available as accessories (see Table 3 on page 41).

### Direct attachment to Type 3277-5 and Type 3277 Actuators

<table>
<thead>
<tr>
<th>Actuator size $[\text{cm}^2]$</th>
<th>Rated travel $[\text{mm}]$</th>
<th>Adjustment range at positioner</th>
<th>Required lever</th>
<th>Assigned pin position</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>7.5</td>
<td>5.0 to 25.0</td>
<td>$M$</td>
<td>25</td>
</tr>
<tr>
<td>120/240/350</td>
<td>15</td>
<td>7.0 to 35.0</td>
<td>$M$</td>
<td>35</td>
</tr>
<tr>
<td>355/700</td>
<td>30</td>
<td>10.0 to 50.0</td>
<td>$M$</td>
<td>50</td>
</tr>
</tbody>
</table>

### Attachment according to IEC 60534-6 (NAMUR)

<table>
<thead>
<tr>
<th>SAMSON valves/Type 3271 Actuator</th>
<th>Actuator size $[\text{cm}^2]$</th>
<th>Rated travel $[\text{mm}]$</th>
<th>Other valves/actuators</th>
<th>Required lever</th>
<th>Assigned pin position</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 and 120 with Type 3510 Valve</td>
<td>7.5</td>
<td>3.6 to 18.0</td>
<td>$S$</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>7.5</td>
<td>5.0 to 25.0</td>
<td>$M$</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>120/240/350</td>
<td>15</td>
<td>7.0 to 35.0</td>
<td>$M$</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>7.5</td>
<td>10.0 to 50.0</td>
<td>$M$</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>1000/1400/2800</td>
<td>30</td>
<td>14.0 to 70.0</td>
<td>$L$</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td>1000/1400/2800</td>
<td>60</td>
<td>20.0 to 100.0</td>
<td>$L$</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>1400/2800</td>
<td>120</td>
<td>40.0 to 200.0</td>
<td>$XL$</td>
<td>200</td>
<td></td>
</tr>
</tbody>
</table>

### Attachment to rotary actuators according to VDI/VDE 3845

<table>
<thead>
<tr>
<th>Rotary actuators</th>
<th>Min. Opening angle</th>
<th>Max. Opening angle</th>
<th>Required lever</th>
<th>Assigned pin position</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24</td>
<td>100°</td>
<td>$M$</td>
<td>90°</td>
</tr>
</tbody>
</table>
4.1 Direct attachment

4.1.1 Type 3277-5 Actuator

Refer to Table 1 on page 40 for the required mounting parts as well as the accessories with their order numbers. Note the travel table on page 19!

Actuator with 120 cm²

Depending on the type of positioner attachment, the signal pressure is routed either left or right of the yoke through a bore to the actuator diaphragm. Depending on the fail-safe action of the actuator "Actuator stem extends" or "Actuator stem retracts" (valve closes or opens if the supply air fails), the switchover plate (9) must first be attached to the actuator yoke. Align the switchover plate with the corresponding symbol for left or right attachment according to the marking (view looking onto the switchover plate).

1. Mount connecting plate (6) or pressure gauge bracket (7) with pressure gauges onto the positioner, making sure both seal rings (6.1) are seated properly.
2. Remove vent plug (4) on the back of the positioner and close the signal pressure output "Output 38" on the connecting plate (6) or on the pressure gauge bracket (7) with the stopper (5) included in the accessories.
3. Place follower clamp (3) on the actuator stem, align and screw tight so that the mounting screw is located in the groove of the actuator stem.
4. Mount cover plate (10) with narrow side of the cut-out opening (Fig. 4, left) pointing towards the signal pressure connection. Make sure that the bonded gasket (14) points towards the actuator yoke.
5. 15 mm travel: Keep the follower pin (2) at lever M (1) on the back of the positioner in the pin position 35 (delivered state).
6. 7.5 mm travel: Remove the follower pin (2) from the pin position 35, reposition it in the bore for pin position 25 and screw tight.
7. Place positioner on the cover plate (10) in such a manner that the follower pin (2) rests on the top of the follower clamp (3). Adjust the lever (1) correspondingly and open the positioner cover to hold the positioner shaft in position at the cap or the switch (Fig. 20).
8. Mount cover (11) on the other side. Make sure that the vent plug points downwards when the control valve is installed to allow any condensed water that collects to drain off.
Supply 9  Output 38

Fig. 4 · Direct attachment · Signal pressure connection for Type 3277-5 Actuator with 120 cm²

Note:
Always use the connecting plate (6) included in the accessories to connect supply and output.
Never screw threaded parts directly into the housing.
4.1.2 Type 3277 Actuator

Refer to Table 2 on page 41 or the required mounting parts as well as the accessories with their order numbers. Note the travel table on page 19!

Actuators with 240 to 700 cm²

Mount the positioner on the yoke as shown in Fig. 5. The signal pressure is routed to the actuator over the connection block (12), for actuators with fail-safe action "Actuator stem extends" internally through a bore in the valve yoke and for "Actuator stem retracts" through external piping.

1. Place follower clamp (3) on the actuator stem, align and screw tight so that the mounting screw is located in the groove of the actuator stem.

2. Mount cover plate (10) with narrow side of the cut-out opening (Fig. 5, on the left) pointing towards the signal pressure connection. Make sure that the bonded gasket (14) points towards the actuator yoke.

3. For actuators with 355/700 cm², remove the follower pin (2) at lever M (1) on the back of the positioner from pin position 35, reposition it in the bore for pin position 50 and screw tight. For actuators 240 and 350 cm² with 15 mm travel, the follower pin (2) remains in pin position 35.

4. Insert formed seal (15) in the groove of the positioner casing.

5. Place positioner on the cover plate in such a manner that the follower pin (2) rests on the top of the follower clamp (3). Adjust the lever (1) correspondingly and open the positioner cover to hold the positioner shaft in position at the cap or the switch (Fig. 20). The lever (1) must rest on the follower clamp with spring force. Mount the positioner on the cover plate (10) using the two fixing screws.

6. Make sure that the tip of the gasket (16) projecting from the side of the connection block (12) is positioned above the actuator symbol that corresponds with the actuator with fail-safe action "Actuator stem extends" or "Actuator stem retracts." If necessary, remove the three fixing screws and the cover. Then reposition the gasket (16) turned by 180°. The previous version of the connection block (Fig. 5, bottom) requires the switch plate (13) to be turned such that the corresponding actuator symbol points to the marking.

7. Place the connection block (12) with the associated seal rings against the positioner and the actuator yoke. Screw it tight using the fixing screw (12.1). For actuators with fail-safe action "Actuator stem retracts", additionally remove the stopper (12.2) and fit on the external signal pressure piping.

8. Mount cover (11) on the other side. Make sure that the vent plug points downwards when the control valve is installed to allow any condensed water that collects to drain off.
## Attachment to the control valve – Mounting parts and accessories

**Fig. 5** · Direct attachment – Signal pressure connection for Type 3277 Actuator with 240, 350, 355 and 700 cm²

<table>
<thead>
<tr>
<th>No.</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lever</td>
</tr>
<tr>
<td>1.1</td>
<td>Nut</td>
</tr>
<tr>
<td>1.2</td>
<td>Disk spring</td>
</tr>
<tr>
<td>2</td>
<td>Follower pin</td>
</tr>
<tr>
<td>3</td>
<td>Follower clamp</td>
</tr>
<tr>
<td>10</td>
<td>Cover plate</td>
</tr>
<tr>
<td>11</td>
<td>Cover</td>
</tr>
<tr>
<td>11.1</td>
<td>Vent plug</td>
</tr>
<tr>
<td>12</td>
<td>Connection block</td>
</tr>
<tr>
<td>12.1</td>
<td>Screw</td>
</tr>
<tr>
<td>12.2</td>
<td>Stopper or connection for external piping</td>
</tr>
<tr>
<td>13</td>
<td>Switch plate</td>
</tr>
<tr>
<td>14</td>
<td>Gasket</td>
</tr>
<tr>
<td>15</td>
<td>Formed seal</td>
</tr>
<tr>
<td>16</td>
<td>Gasket</td>
</tr>
</tbody>
</table>

- **View A**: View of the mounted components and the actuator stem retraction/extension.
- **View B**: View showing the connection block (old) with switch plate (13) and actuator stem retraction/extension.
- **View C**: View of the cut-out of the cover plate (10).
Attachment according to IEC 60534-6

Refer to Table 3 on page 41 for the required mounting parts as well as the accessories with their order numbers. Note the travel table on page 19!

The positioner is attached to the control valve with a NAMUR bracket (10).

1. Screw the two bolts (14) to the bracket (9.1) of the stem connector (9), place the follower plate (3) on top and use the screws (14.1) to tighten.

<table>
<thead>
<tr>
<th>Actuator size 2800 cm² and 1400 cm² (120 mm travel):</th>
</tr>
</thead>
<tbody>
<tr>
<td>- For a travel of 60 mm or smaller, screw the longer follower plate (3.1) directly to the stem connector (9).</td>
</tr>
<tr>
<td>- For a travel exceeding 60 mm, mount the bracket (16) first and then the follower plate (3) to the bracket together with the bolts (14) and screws (14.1).</td>
</tr>
</tbody>
</table>

2. Mount NAMUR bracket (10) to the control valve as follows:

<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- For attachment to the NAMUR rib, use an M8 screw (11), washer, and toothed lock washer directly in the yoke bore.</td>
</tr>
<tr>
<td>- For attachment to valves with rod-type yokes, use two U-bolts (15) around the yoke. Align the NAMUR bracket (10) in such a way that the slot of the follower plate (3) is centrally aligned with the NAMUR bracket at mid valve travel.</td>
</tr>
</tbody>
</table>

3. Mount connecting plate (6) or pressure gauge bracket (7) with pressure gauges (8) on the positioner, making sure both seal rings (6.1) are seated properly.

4. Select required lever size (1) M, L or XL and pin position according to the actuator size and valve travels listed in the table on page 19. Should you require a pin position other than position 35 with the standard installed lever M, or require a lever size L or XL, proceed as follows:

5. Screw the follower pin (2) in the assigned lever bore (pin position) as listed in the table. Only use the longer follower pin (2) included in the mounting kit.

6. Place lever (1) on the positioner shaft and screw tight using the disk spring (1.2) and nut (1.1).

**Note:** If you have mounted a new lever (1), you must move it once all the way as far as it will go in both directions.

7. Place positioner on the NAMUR bracket in such a manner that the follower pin (2) rests in the slot of the follower plate (3, 3.1). Adjust the lever (1) correspondingly. Screw the positioner to the NAMUR bracket using both its fixing screws.
Note: Always use the connecting plate (6) included in the accessories to connect supply and output. Never screw threaded parts directly into the housing.

Fig. 6 · Attachment according to IEC 60534-6 (NAMUR)
4.3  Attachment to Type 3510
Micro-flow Valve

Refer to Table 3 on page 41 for the required
mounting parts as well as the accessories
with their order numbers.
Note the travel table on page 19!

The positioner is attached to the valve yoke
using a bracket.

1. Place clamp (3) on the valve stem con-
nector, align at a right angle and screw
tight.

2. Screw bracket (10) to the valve yoke us-
using two screws (11).

3. Mount connecting plate (6) or pressure
gauge bracket (7) with pressure gauges
to the positioner, making sure both seal
rings (6.1) are seated properly.

4. Unscrew the standard installed lever M
(1) including follower pin (2) from the
positioner shaft.

5. Take lever S (1) and screw follower pin
(2) in the bore for pin position 17.

6. Place lever S on the positioner shaft and
screw tight using the disk spring (1.2)
and nut (1.1).
Move lever once all the way as far as it
will go in both directions.

7. Place positioner on the bracket (10) in
such a manner that the follower pin
slides into the groove of the clamp (3).
Adjust the lever (1) correspondingly.
Screw the positioner to the bracket (10)
using both its screws.
1. Lever
1.1 Nut
1.2 Disk spring
2. Follower pin
3. Clamp
6. Connecting clamp
6.1 Seal rings
7. Pressure gauge bracket
8. Pressure gauge mounting kit
10. Bracket
11. Screw

**Note:** Always use the connecting plate (6) included in the accessories to connect supply and output. Never screw threaded parts directly into the housing.

**Fig. 7 · Attachment to Type 3510 Micro-flow Valve**
4.4 Attachment to rotary actuators

Refer to Table 4 on page 42 for the required mounting parts as well as the accessories with their order numbers.

Prior to attaching the positioner to the SAMSON Type 3278 Rotary Actuator, mount the associated adapter (5) to the free end of the rotary actuator shaft.

Note: On attaching the positioner as described below, it is imperative that the actuator’s direction of rotation is observed.

1. Place follower clamp (3) on the slotted actuator shaft or the adapter (5).
2. Place coupling wheel (4) with flat side facing the actuator on the follower clamp (3). Refer to Fig. 9 to align slot so that it matches the direction of rotation when the valve is in its closed position.
3. Screw coupling wheel and follower clamp tightly onto the actuator shaft using screw (4.1) and disk spring (4.2) with the bends pointing either to the inside or to the outside (depending on the actuator size) to the actuator case. Position top pair of brackets (10) and screw tight.
4. Mount connecting plate (6) or pressure gauge bracket (7) with pressure gauges to the positioner, making sure both O-rings are seated properly.

For double-acting, springless rotary actuators, a reversing amplifier is required to attach the positioner to the actuator, see section 4.5.

6. Unscrew the standard follower pin (2) from the positioner’s lever (M1). Use the metal follower pin (G5) included in the mounting kit and screw tight into the bore for pin position 90°.
7. Place positioner on the top pair of brackets (10) and screw tight. Considering the actuator’s direction of rotation, adjust lever (1) so that it engages in the slot of the coupling wheel (4) with its follower pin (Fig. 9). It must be guaranteed that the lever (1) is parallel to the long side of the positioner when the actuator is at half its angle of rotation. The lever (1) is parallel to the long side of the positioner and it can be easily read when the valve is installed.
8. Stick scale plate (4.3) on the coupling wheel so that the arrow tip indicates the closed position, and it can be easily read when the valve is installed.

Note: For double-acting, springless rotary actuators, a reversing amplifier is required to attach the positioner to the actuator, see section 4.5.
Attachment to the control valve – Mounting parts and accessories

Legends Figs. 8 + 9
1 Lever
1.1 Nut
1.2 Disk spring
2 Follower pin
3 Follower clamp (Fig. 8)
4 Coupling wheel
4.1 Screw
4.2 Disk spring
4.3 Scale plate
4.3 Scale plate
5 Actuator shaft
Adapter for Type 3278
6.1 Seal rings
7 Pressure gauge bracket
8 Pressure gauge mounting kit
10 Top pair of brackets
10.1 Bottom pair of brackets

Note:
Always use the connecting plate (6) included in the accessories to connect supply and output. Never screw threaded parts directly into the housing.

Fig. 9 - Attachment to rotary actuators

Control valve opens counterclockwise
Control valve opens clockwise
4.4.1 Heavy-duty version

Refer to Table 4 on page 42 for the required mounting parts as well as the accessories with their order numbers.

Both mounting kits contain all the necessary mounting parts. First select correct actuator size. Prepare actuator, and mount required adapter supplied by the actuator manufacturer, if necessary.

1. Mount the housing (10) onto the rotary actuator. In case of VDI/VDE attachment, place spacers (11) underneath, if necessary.

2. For SAMSON Type 3278 and VETEC S160 Rotary Actuator, screw the adapter (5) onto the free end of the shaft or place adapter (5.1) onto the shaft of the VETEC R Actuator.
   Place adapter (3) onto Type 3278, VETEC S160 and VETEC R Actuator. For VDI/VDE version, this step depends on the actuator size.

3. Stick adhesive label (4.3) onto the coupling wheel in such a manner that the yellow part of the sticker is visible in the window of the housing when the valve is OPEN. Adhesive labels with explanatory symbols are enclosed and can be stuck on the housing, if required.

4. Screw tight coupling wheel (4) onto the slotted actuator shaft or adapter (3) using screw (4.1) and disk spring (4.2).

5. Undo the standard follower pin (2) on the lever M (1) of the positioner. Attach the follower pin (Ø 5) included in the mounting kit to pin position 90°.

6. If applicable, mount pressure gauge bracket (7) with pressure gauges or, in case G ¼ threaded connections are required, the connecting plate (6), making sure both seal rings (6.1) are seated properly.
   For double-acting, springless rotary actuators, a reversing amplifier is required to attach the positioner to the actuator. Refer to section 4.5.

7. For actuators with a volume of less than 300 cm³, fit the screw-in restriction (order no.1400-6964) into the signal pressure output of the positioner (or the output of the pressure gauge bracket or connecting plate).

8. Place positioner on housing (10) and screw it tight. Considering the actuator’s direction of rotation, align lever (1) so that it engages in the correct slot of the coupling wheel with its follower pin (Fig. 10).
Attachment to the control valve – Mounting parts and accessories

Fig. 11 · Attachment to rotary actuators (heavy-duty version)

1 Lever
1.1 Nut
1.2 Disk spring
2 Follower pin
3 Adapter
4 Coupling wheel
4.1 Screw
4.2 Disk spring
4.3 Adhesive label
5 Actuator shaft or adapter
5.1 Adapter
6 Connecting plate (only for G 1/4)
6.1 Seal rings
7 Pressure gauge bracket
8 Pressure gauge mounting kit
10 Adapter housing
10.1 Screws
11 Spacers

SAMSON Type 3278 VETEC S160, VETEC R

Attachment acc. to VDE/VDI 3845 (2010) level 1, size AA1 to AA4, refer to section 18.1

Fit screw-in restriction into signal pressure output for actuators with < 300 cm³ volume
4.5 Reversing amplifier for double-acting actuators

For the use with double-acting actuators, the positioner must be fitted with a reversing amplifier, e.g. the SAMSON Type 3710 Reversing Amplifier (see Mounting and Operating Instructions EB 8392 EN).

If a different reversing amplifier (item no. 1079-1118 or 1079-1119) is used, follow the mounting instructions described in section 4.5.1.

4.5.1 Reversing amplifier (1079-1118 or 1079-1119)

The output signal pressure of the positioner is supplied at the output A1 of the reversing amplifier. An opposing pressure, which equals the required supply pressure when added to the pressure at A1, is applied at output A2.

The rule A1 + A2 = Z applies.

Mounting

1. Mount the connecting plate (6) from the accessories in Table 5 to the positioner. Make sure that both O-rings (6.1) are seated correctly.
2. Thread the special nuts (1.3) from the accessories of the reversing amplifier into the boreholes of the connecting plate.
3. Insert the gasket (1.2) into the recess of the reversing amplifier and push both the hollowed special screws (1.1) into the connecting boreholes A1 and Z.
4. Place the reversing amplifier onto the connecting plate (6) and screw tight using both the special screws (1.1).
5. Use a screwdriver (8 mm wide) to screw the enclosed filters (1.6) into the connecting boreholes A1 and Z.

NOTICE
Do not unscrew the sealing plug (1.5) out of the reversing amplifier. The rubber seal (1.4) is not required and can be removed when the sealing plug is used.

Signal pressure connections

A1: Output A1 leading to the signal pressure connection at the actuator which opens the valve when the pressure increases
A2: Output A2 leading to the signal pressure connection at the actuator which closes the valve when the pressure increases

Set slide switch on positioner to AIR TO OPEN.

6. After the initialization is completed, set Code 16 (Pressure limit) to OFF.

Pressure gauge attachment

The mounting sequence shown in Fig. 12 remains unchanged. Screw a pressure gauge bracket onto the connections A1 and Z.

Pressure gauge G ¼ 1400-7106 bracket: ¼ NPT 1400-7107

Pressure gauges for supply air Z and output A1 as listed in Tables 1 to 4.
Attachment to the control valve – Mounting parts and accessories

Fig. 12 · Mounting a reversing amplifier (1079-1118 or 1079-1119)
4.6 Attaching an external position sensor

Refer to Table 6 on p. 43 for the mounting parts as well as the accessories required.

In the positioner version with an external position sensor, the sensor placed in a separate housing is attached over a plate or bracket to the control valve. The travel pick-off corresponds to that of a standard device.

The positioner unit can be mounted as required to a wall or a pipe.

For the pneumatic connection either a connecting plate (6) or a pressure gauge bracket (7) must be fixed to the housing, depending on the accessory chosen. Make sure the seal rings (6.1) are correctly inserted (see Fig. 6, bottom right).

For the electrical connection a 10 meter connecting lead with M12x1 connectors is included in the scope of delivery.

Note:
- In addition, the instructions in sections 5.1 and 5.2 apply for the pneumatic and electrical connection.

Operation and setting are described in sections 6 and 7.
- Since 2009, the back of the position sensor (20) is fitted with two pins acting as mechanical stops for the lever (1). If this position sensor is mounted using old mounting parts, two corresponding Ø 8 mm holes must be drilled into the mounting plate/bracket (21). A template is available for this purpose. Refer to Table 6 on page 43.

4.6.1 Mounting the position sensor with direct attachment

Type 3277-5 Actuator with 120 cm²

The signal pressure from the positioner is routed over the signal pressure connection of the connecting plate (9, Fig. 14 left) to the actuator diaphragm chamber. To proceed, first screw the connecting plate (9) included in the accessories onto the actuator yoke.

- Turn the connecting plate (9) so that the correct symbol for the fail-safe position "Actuator stem extends" or "Actuator stem retracts" is aligned with the marking (Fig. 14, below).
- Make sure that the gasket for the connecting plate (9) is correctly inserted.
- The connecting plate has boreholes with NPT and G threads. Seal the threaded connection that is not used with the rubber seal and square plug.

Type 3277 Actuator with 240 to 700 cm²:

The signal pressure is routed to the connection at the side of the actuator yoke for the
version "Actuator stem extends". For the fail-safe position "Actuator stem retracts" the connection on the top diaphragm case is used. The connection at the side of the yoke must be fitted with a venting plug (accessories).

**Mounting the position sensor**

1. Place the lever (1) on the sensor in mid-position and hold it in place. Unthread the nut (1.1) and remove the lever together with the disk spring (1.2) from the sensor shaft.
2. Screw the position sensor (20) onto the mounting plate (21).
3. Depending on the actuator size and rated valve travel, determine the required lever and position of the follower pin (2) from the travel table on page 19. The positioner is delivered with lever M in pin position 35 on the sensor. If necessary, remove the follower pin (2) from its pin position and move it to the borehole for the recommended pin position and screw tight.
4. Place the lever (1) and disk spring (1.2) on the sensor shaft. Place the lever (1) in mid-position and hold it in place. Screw on the nut (1.1).
5. Place the follower clamp (3) on the actuator stem, align and fasten it, making sure that the fastening screw rests in the groove of the actuator stem.
6. Place the mounting plate (21) together with the sensor onto the actuator yoke so that the follower pin (2) rests on the top.

---

**Fig. 14 · Mounting for Type 3277-5 Actuator (left) and Type 3277 Actuator (right)**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Marking</th>
</tr>
</thead>
<tbody>
<tr>
<td>G</td>
<td>Actuator stem extends</td>
</tr>
<tr>
<td>NPT</td>
<td>Actuator stem retracts</td>
</tr>
</tbody>
</table>

1 Lever
1.1 Nut
1.2 Disk spring
2 Follower pin
3 Follower clamp
9 Connecting plate
11 Cover
20 Position sensor
21 Mounting plate
of the follower clamp (3). It must rest on it with spring force.
Screw tight the mounting plate (21) onto the actuator yoke using both fixing screws.
7. Mount cover (11) on the other side.
Make sure that the vent plug points downwards when the control valve is installed to allow any condensed water that collects to drain off.

4.6.2 Mounting the position sensor with attachment according to IEC 60534-6

For the required mounting parts and the accessories, refer to Table 6 on page 43.

1. Place the lever (1) on the sensor in mid-position and hold it in place.

Unthread the nut (1.1) and remove the lever together with the disk spring (1.2) from the sensor shaft.
2. Screw the position sensor (20) onto the bracket (21).
The standard attached lever M with the follower pin (2) at position 35 is designed for 120, 240 and 350 cm² actuators with 15 mm rated travel.

For other actuator sizes or travels, select the lever and pin position from the travel table on page 19. Lever L and XL are included in the mounting kit.

3. Place the lever (1) and disk spring (1.2) on the sensor shaft.
Place the lever (1) in mid-position and hold it in place. Screw on the nut (1.1).
4. Screw both bolts (14) to the bracket (9.1) of the stem connector (9). Attach
the follower plate (3) and fix with the screws (14.1).

5. Place the bracket with the sensor at the NAMUR rib in such a manner that the follower pin (2) rests in the slot of the follower plate (3), then screw the bracket using its fixing screws onto the valve.

### 4.6.3 Mounting the position sensor to Type 3510 Micro-flow Valve

For the required mounting parts and the accessories, refer to Table 6 on page 43.

1. Place the lever (1) in mid-position and hold it in place. Unscrew the nut (1.1) and remove the standard attached lever M (1) together with the disk spring (1.2) from the sensor shaft.

2. Screw the position sensor (20) onto the bracket (21).

3. Select the lever S (1) from the accessories and screw the follower pin (2) into the hole for pin position 17. Place the lever (1) and disk spring (1.2) on the sensor shaft. Place the lever (1) in mid-position and hold it in place. Screw on the nut (1.1).

4. Place the follower clamp (3) on the stem connector, align it at a right angle and screw tight.

5. Position the bracket (21) with the position sensor on the valve yoke and screw tight, making sure the follower pin (2) slides into the groove of the follower clamp (3).

---

**Fig. 16 · Mounting on a micro-flow valve**
4.6.4 Mounting the position sensor to rotary actuators

For the required mounting parts and the accessories, refer to Table 6 on page 43.

1. Place the lever (1) in **mid-position** and **hold it in place**. Unscrew the nut (1.1) and remove the standard attached lever M (1) together with the disk spring (1.2) from the sensor shaft.

2. Screw the position sensor (20) onto the mounting plate (21).

3. Replace the follower pin (2) normally attached to the lever (1) with the metal follower pin (Ø 5) from the accessories and screw it into the hole for pin position 90°.

4. Place the lever (1) and disk spring (1.2) on the sensor shaft. Place the lever (1) in **mid-position** and **hold it in place**. Screw on the nut (1.1).

Follow the instructions describing attachment to the standard positioner in section 4.4. Instead of the positioner, attach the position sensor (20) with its mounting plate (21).
4.7 Attaching positioners with stainless steel housings

Positioners with stainless steel housings require mounting parts that are completely made of stainless steel or free of aluminum.

Note: The pneumatic connecting plate and a pressure gauge bracket are available in stainless steel (order number listed below). The Type 3710 Pneumatic Reversing Amplifier is also available in stainless steel.

<table>
<thead>
<tr>
<th>Connecting plate (stainless steel):</th>
<th>G ¼</th>
<th>1400-7476</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure gauge bracket (st. steel):</td>
<td>¼ NPT</td>
<td>1400-7477</td>
</tr>
<tr>
<td></td>
<td>Only in</td>
<td>1400-7108</td>
</tr>
</tbody>
</table>

The Tables 1 to 5 (pages 40 and 42) apply for attaching positioners with stainless steel housings with the following restrictions:

Direct attachment
All mounting kits from Tables 1 and 2 can be used. The connection block is not required. The stainless steel version of the pneumatic connecting plate routes the air internally to the actuator.

Attachment according to IEC 60534-6 (NAMUR rib or attachment to rod-type yokes)
All mounting kits from Table 3 can be used. Connecting plate in stainless steel.

Attachment to rotary actuators
All mounting kits from Table 4 can be used except for the heavy-duty version. Connecting plate in stainless steel.

4.8 Air purging function for single-acting actuators

The exhaust air from the positioner is diverted to the actuator spring chamber to provide corrosion protection inside the actuator. The following must be observed:

Direct attachment to Type 3277-5 (stem extends FA/stem retracts FE)
The air purging function is automatically provided.

Direct attachment to Type 3277, 240 to 700 cm²
FA: Remove the stopper 12.2 (Fig. 5 on page 23) at the connection block and make a pneumatic connection to the spring chamber on the vented side.

NOTICE
The method described does not apply to old connection blocks in powder-paint-coated aluminum. In this case, follow the instructions for attachment described below in “Attachment according to IEC 60534-6 (NAMUR rib or attachment to rod-type yokes) and to rotary actuators”.

FE: The air purging function is automatically provided.

Attachment according to IEC 60534-6 (NAMUR rib or attachment to rod-type yokes) and to rotary actuators
The positioner requires an additional port for the exhaust air that can be connected
over piping. An adapter available as an accessory is used for this purpose:

Threaded bushing G ¼ 0310-2619
(M20 x 1.5): ¼ NPT 0310-2550

NOTICE
The adapter uses one of the M20 x 1.5 connections in the housing which means just one cable gland can be installed.

Should other valve accessories be used which vent the actuator (e.g. solenoid valve, volume booster, quick exhaust valve), this exhaust air must also be included in the purging function. The connection over the adapter at the positioner must be protected with a check valve (e.g. check valve G ¼, order no. 8502-0597) mounted in the piping. Otherwise the pressure in the positioner housing would rise above the ambient pressure and damage the positioner when the exhausting components respond suddenly.

4.9 Mounting parts and accessories

<table>
<thead>
<tr>
<th>Table 1 · Direct attachment to Type 3277-5 Actuator (Fig. 4)</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting parts</td>
<td>Mounting parts for actuators 120 cm² or smaller</td>
</tr>
<tr>
<td>Accessories for the actuator</td>
<td></td>
</tr>
<tr>
<td>Switchover plate old for Actuator Type 3277-5xxxxxx.00 (old)</td>
<td>1400-6819</td>
</tr>
<tr>
<td>Switchover plate new for Actuator Type 3277-5xxxxxx.01 (new)</td>
<td>1400-6822</td>
</tr>
<tr>
<td>Connecting plate new for Actuator Type 3277-5xxxxxx.01 (new)</td>
<td>1400-6823</td>
</tr>
<tr>
<td>Connecting plate old for Actuator Type 3277-5xxxxxx.00 (old); G ¼</td>
<td>1400-6820</td>
</tr>
<tr>
<td>Connecting plate old for Actuator Type 3277-5xxxxxx.00 (old); ¼ NPT</td>
<td>1400-6821</td>
</tr>
<tr>
<td>Accessories for the positioner</td>
<td></td>
</tr>
<tr>
<td>Connecting plate (6)</td>
<td>G ¼</td>
</tr>
<tr>
<td></td>
<td>¼ NPT</td>
</tr>
<tr>
<td>Pressure gauge bracket (7)</td>
<td>G ¼</td>
</tr>
<tr>
<td></td>
<td>¼ NPT</td>
</tr>
<tr>
<td>Pressure gauge mounting kit (8) up to max. 6 bar (output/supply)</td>
<td>St. steel/brass</td>
</tr>
<tr>
<td></td>
<td>St. steel/St. st.</td>
</tr>
</tbody>
</table>

1) Only new switchover and connecting plates can be used with new actuators (Index 01). Old and new plates are not interchangeable.
### Table 2 · Direct attachment to Type 3277 Actuator (Fig. 5)

<table>
<thead>
<tr>
<th>Mounting parts</th>
<th>Attachment to actuators with 240, 350, 355, 700 cm²</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessories</td>
<td>Required piping with screw fittings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– for &quot;Actuator stem retracts&quot;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– when the top diaphragm chamber is filled with air</td>
<td></td>
</tr>
<tr>
<td></td>
<td>240 cm²</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Steel 1400-6444</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stainless steel 1400-6445</td>
<td></td>
</tr>
<tr>
<td></td>
<td>350 cm²</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Steel 1400-6446</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stainless steel 1400-6447</td>
<td></td>
</tr>
<tr>
<td></td>
<td>355 cm²/700 cm²</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Steel 1400-6448</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stainless steel 1400-6449</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connection block with seals and screw</td>
<td></td>
</tr>
<tr>
<td></td>
<td>G ¼ 1400-8819</td>
<td></td>
</tr>
<tr>
<td></td>
<td>¼ NPT 1400-8820</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pressure gauge mounting kit up to max. 6 bar (output and supply)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>St. steel/brass 1400-6950</td>
<td></td>
</tr>
<tr>
<td></td>
<td>St. steel/st. steel 1400-6951</td>
<td></td>
</tr>
</tbody>
</table>

### Table 3 · Attachment to NAMUR ribs or control valves with rod-type yokes (20 to 35 mm rod diameter) according to IEC 60534-6 (Figs. 6 and 7)

<table>
<thead>
<tr>
<th>Travel in mm</th>
<th>Lever</th>
<th>For actuators</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.5</td>
<td>S</td>
<td>Type 3271-5 with 60/120 cm² on Type 3510 Valve (Fig. 7)</td>
<td>1400-7457</td>
</tr>
<tr>
<td>5 to 50</td>
<td>M ¹)</td>
<td>Actuators from other manufacturers and Type 3271 with 120 to 700 cm²</td>
<td>1400-7454</td>
</tr>
<tr>
<td>14 to 100</td>
<td>L</td>
<td>Actuators from other manufacturers and Type 3271, versions 1000 and 1400-60</td>
<td>1400-7455</td>
</tr>
<tr>
<td>40 to 200</td>
<td>XL</td>
<td>Actuators from other manufacturers and Type 3271, versions 1400-120 and 2800 cm² with 120 mm travel</td>
<td>1400-7456</td>
</tr>
<tr>
<td>30 or 60</td>
<td>L</td>
<td>Type 3271, versions 1400-120 and 2800 cm² with 30/60 mm travel</td>
<td>1400-7466</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mounting bracket for Emerson and Masoneilan linear actuators In addition, a mounting kit acc. to IEC 60534-6 is required depending on the travel. See row above.</td>
<td>1400-6771</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Valtek Type 25/50</td>
<td>1400-9554</td>
</tr>
<tr>
<td>Accessories</td>
<td></td>
<td>Connecting plate (6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>G ¼ 1400-7461</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>¼ NPT 1400-7462</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pressure gauge bracket (7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>G ¼ 1400-7458</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>¼ NPT 1400-7459</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pressure gauge mounting kit up to max. 6 bar (output/supply)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>St. steel/brass 1400-6950</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>St. steel/st. steel 1400-6951</td>
<td></td>
</tr>
</tbody>
</table>

¹) Lever M is mounted on basic device (included in the scope of delivery)
### Table 4 · Attachment to rotary actuators (Figs. 8 and 9)

<table>
<thead>
<tr>
<th>Mounting parts</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attachment acc. to VDI/VDE 3845 (September 2010), refer to section 18.1 for details</td>
<td>1400-7448</td>
</tr>
<tr>
<td>Actuator surface corresponds to level 1</td>
<td>1400-9244</td>
</tr>
<tr>
<td>Size AA1 to AA4, version with CrNiMo steel bracket</td>
<td>1400-9542</td>
</tr>
<tr>
<td>Size AA1 to AA4, heavy-duty version</td>
<td>1400-9526</td>
</tr>
<tr>
<td>Heavy-duty version (e.g. Air Torque 10 000)</td>
<td>1400-7512</td>
</tr>
<tr>
<td>Bracket surface corresponds to level 2, heavy-duty version</td>
<td></td>
</tr>
<tr>
<td>Attachment for SAMSON Type 3278 with 160/320 cm², CrNiMo steel bracket</td>
<td>1400-7614</td>
</tr>
<tr>
<td>Attachment for SAMSON Type 3278 with 160 cm² and for VETEC Type S160, Type R and Type M, heavy-duty version</td>
<td>1400-9245</td>
</tr>
<tr>
<td>Attachment for SAMSON Type 3278 with 320 cm² and for VETEC Type S320, heavy-duty version</td>
<td>1400-5891</td>
</tr>
<tr>
<td>Attachment to Camflex II</td>
<td>1400-9120</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accessories</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecting plate (6)</td>
<td>G ¼ 1400-7461</td>
</tr>
<tr>
<td>¼ NPT 1400-7462</td>
<td></td>
</tr>
<tr>
<td>Pressure gauge bracket (7)</td>
<td>G ¼ 1400-7458</td>
</tr>
<tr>
<td>¼ NPT 1400-7459</td>
<td></td>
</tr>
<tr>
<td>Pressure gauge mounting kit up to max. 6 bar (output/supply)</td>
<td>St. steel/brass 1400-6950</td>
</tr>
<tr>
<td>St. steel/st. steel 1400-6951</td>
<td></td>
</tr>
</tbody>
</table>

### Table 5 · General accessories

<table>
<thead>
<tr>
<th>Accessories</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumatic reversing amplifier for double-acting actuators</td>
<td>Type 3710</td>
</tr>
<tr>
<td>Cable gland M20 x 1.5, nickel-plated brass</td>
<td>1890-4875</td>
</tr>
<tr>
<td>EMC cable gland M20 x 1.5</td>
<td>8808-0143</td>
</tr>
<tr>
<td>Adapter M 20 x 1.5 to ½ NPT, aluminum</td>
<td>0310-2149</td>
</tr>
<tr>
<td>Retrofit kit for inductive limit switch 1x SJ 2-SN</td>
<td>1400-7460</td>
</tr>
<tr>
<td>Cover plate with list of parameters and operating instructions</td>
<td>German/English (standard) 1990-5328</td>
</tr>
<tr>
<td>EXPERT+ activation code for Type 3730-5 Positioner</td>
<td>1400-9318</td>
</tr>
<tr>
<td>USB dongle for EXPERT+ (specify the number of positioners to be activated)</td>
<td>1400-9555</td>
</tr>
<tr>
<td>Can only be used in combination with TROVIS-VIEW 6661-1058</td>
<td>1400-7700</td>
</tr>
<tr>
<td>TROVIS-VIEW with device module 3730-5 (order no. 6661-1058)</td>
<td>1262295</td>
</tr>
<tr>
<td>Serial interface adapter (SAMSON SSP interface - RS-232 port on computer)</td>
<td>1400-7700</td>
</tr>
<tr>
<td>Isolated USB interface adapter (SAMSON SSP interface - USB port on computer) including TROVIS-VIEW CD-ROM</td>
<td>1400-9740</td>
</tr>
</tbody>
</table>
### Table 6 · Attachment of external position sensor

Template for mounting the position sensor on older mounting parts. See note on page 34.

<table>
<thead>
<tr>
<th>Order no.</th>
<th>Direct attachment</th>
<th>NAMUR attachmt.</th>
<th>Micro-flow valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>1060-0784</td>
<td>Mounting parts for actuators with 120 cm² see Fig. 14 left</td>
<td>Mounting parts for attachment to NAMUR rib w. lever L and XL, see Fig. 15</td>
<td>Mounting parts for Type 3510 Micro-flow Valve, see Fig. 16</td>
</tr>
<tr>
<td>1400-7472</td>
<td>Connecting plate (9, old) for Actuator Type 3277-5xxxxxx.00 G ⅜ 1400-6820</td>
<td>1400-7468</td>
<td>1400-7469</td>
</tr>
<tr>
<td>1400-6821</td>
<td>Connecting plate (new) for Actuator Type 3277-5xxxxxx.01 (new) 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1400-6823</td>
<td>Mounting parts for actuators with 240, 350, 355 and 700 cm², see Fig. 14 right</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1400-7471</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Attachment to rotary actuators**

VDI/VDE 3845 (September 2010), refer to section 18.1 for details

Actuator surface corresponds to level 1
- Size AA1 to AA4 with follower clamp and coupling wheel, version with CrNiMo steel bracket, see Fig. 17
- Size AA1 to AA4, heavy-duty version
- Size AA5, heavy-duty version (e.g. Air Torque 10 000)

Bracket surface corresponds to level 2, heavy-duty version

SAMSON Type 3278 with 160 cm² (also for VETEC Type S160 and Type R), heavy-duty version

SAMSON Type 3278 with 320 cm² and for VETEC Type S320, heavy-duty version

<table>
<thead>
<tr>
<th>Order no.</th>
<th>Accessories for positioner</th>
</tr>
</thead>
<tbody>
<tr>
<td>1400-7473</td>
<td>Connecting plate (6) G ¼ 1400-7461</td>
</tr>
<tr>
<td>1400-7462</td>
<td>¼ NPT 1400-7462</td>
</tr>
<tr>
<td>1400-7458</td>
<td>Pressure gauge bracket (7) G ¼ 1400-7458</td>
</tr>
<tr>
<td>1400-7459</td>
<td>¼ NPT 1400-7459</td>
</tr>
<tr>
<td>1400-6950</td>
<td>Pressure gauge mounting kit up to max. 6 bar (output/supply) St. steel/brass 1400-6950</td>
</tr>
<tr>
<td>1400-6951</td>
<td>St. steel/st. steel 1400-6951</td>
</tr>
<tr>
<td>0309-0111</td>
<td>Bracket to mount the positioner on a wall</td>
</tr>
</tbody>
</table>

**Note:** The other fastening parts are to be provided at the site of installation as wall foundations vary from site to site.

---

1) Only new switchover and connecting plates can be used with new actuators (Index 01). Old and new plates are **not** interchangeable.
5 Connections

WARNING!
Mount the positioner, keeping the following sequence:
1. Remove protective film from pneumatic connections.
2. Mount the positioner on the control valve
3. Connect the supply air
4. Connect the electrical power
5. Perform the start-up settings

The connection of the electrical auxiliary power may cause the actuator stem to move, depending on the operating mode.
Do not touch the actuator stem or obstruct it to avoid risk of injury to hands or fingers.

5.1 Pneumatic connections

NOTICE
Follow the instructions below to avoid damaging the positioner.
- The threaded connections in the positioner housing are not designed direct air connection!
- The screw glands must be screwed into the connecting plate, the pressure gauge mounting block or the connection block from the accessories.
The air connections are optionally designed as a bore with ¼ NPT or G ¼ thread.
The customary fittings for metal and copper pipes or plastic hoses can be used.
- The supply air must be dry and free from oil and dust.
The maintenance instructions for upstream pressure reducing stations must be observed.
Blow through all air pipes and hoses thoroughly prior to connecting them.

If the positioner is attached directly to the Type 3277 Actuator, the connection of the positioner's output pressure to the actuator is fixed. For attachment according to IEC 60534-6 (NAMUR), the signal pressure can be routed to either the top or bottom diaphragm chamber of the actuator, depending on the actuator's fail-safe action "Actuator stem extends" or "Actuator stem retracts".
For rotary actuators, the manufacturer's specifications for connection apply.

5.1.1 Signal pressure gauges

To monitor the supply air (Supply) and signal pressure (Output), we recommend that pressure gauges be attached (see accessories in Tables 1 to 5).

5.1.2 Supply pressure

The required supply air pressure depends on the bench range and the actuator's operating direction (fail-safe action).
The bench range is registered on the nameplate either as spring range or signal pressure range depending on the actuator. The direction of action is marked FA or FE, or by a symbol.

Actuator stem extends FA (AIR TO OPEN)
Fail-safe position "Valve Closed" (for globe and angle valves):
Required supply pressure = Upper bench range value + 0.2 bar, minimum 1.4 bar.
Actuator stem retracts FE (AIR TO CLOSE)

Fail-safe position "Valve Open" (for globe and angle valves):
For tight-closing valves, the maximum signal pressure $p_{st\text{max}}$ is roughly estimated as follows:

$$p_{st\text{max}} = F + \frac{d^2 \cdot \pi \cdot \Delta p}{4 \cdot A} \text{ [bar]}$$

$d$ = Seat diameter [cm]
$\Delta p$ = Differential pressure across the valve [bar]
$A$ = Actuator diaphragm area [cm²]

If there are no specifications, calculate as follows:

Required supply pressure =
Upper bench range value + 1 bar.

5.1.3 Signal pressure (output)

The signal pressure at the output (Output 38) of the positioner can be limited to 1.4, 2.4 or 3.7 bar in Code 16.

The limitation is not activated [OFF] by default.

5.2 Electrical connections

DANGER!
Risk of electric shock and/or the formation of an explosive atmosphere!

- For electrical installation, observe the relevant electrotechnical regulations and the accident prevention regulations that apply in the country of use.

NOTICE
- Adhere to the terminal assignment!
- Switching the assignment of the electrical terminals may cause the explosion protection to become ineffective!
- Do not loosen enameled screws in or on the housing.
- The maximum permissible values specified in the national EC type examination certificates apply when interconnecting intrinsically safe electrical equipment ($U_i$ or $U_o$; $I_i$ or $I_o$; $P_i$ or $P_o$; $C_i$ or $C_o$, and $L_i$ or $L_o$).
Selecting cables and wires:
To install and select cables and wires as well as to run several intrinsically safe circuits in one multi-core cable, observe the installation regulations valid in the country of use. The diameter of an individual wire in a fine-stranded conductor must not be smaller than 0.1 mm. Protect the conductor ends against splicing, e.g. by using wire-end ferrules.

When two separate cables are used for connection, an additional cable gland can be installed.

Seal cable entries left unused with plugs.

Devices used at ambient temperatures below –20 °C must be fitted with metal cable glands.

Equipment for use in zone 2/zone 22
In equipment operated with type of protection EEx nA II (non-sparking equipment) Ex nL (energy-limited equipment), circuits may be connected, interrupted or switched while energized only during installation, maintenance or repair.

Equipment connected to energy-limited circuits with type of protection Ex nL (energy-limited equipment) may be switched under normal operating conditions.

The maximum permissible values specified in the national explosion protection certificates also apply when interconnecting the equipment with energy-limited circuits in type of protection Ex nL IIC/IIB.

Cable entries
The cable entry with M20 x 1.5 cable gland, 6 to 12 mm clamping range.
There is a second M20 x 1.5 threaded bore in the housing that can be used for additional connection, when required.
The screw terminals are designed for wire cross-sections of 0.2 to 2.5 mm². Tighten by at least 0.5 Nm.

Note: The power supply for the positioner can be supplied either over the connection to the fieldbus segment or over a DC voltage source (9 to 32 V) connected to the bus terminals in the positioner.

You are required to observe the relevant regulations for use in hazardous areas.

Bus line
Route the two-wire bus line to the screw terminals marked "IEC 1158-2", whereby no polarity has to be observed.

NOTICE
To connect the limit switch, binary inputs, and forced venting, an additional cable gland that needs to be fitted in place of the existing blanking plug is necessary.
Open cable glands are not permissible as the degree of protection IP 66 only applies when the positioner housing is sealed.
Limit switch

For operation of the limit switches, switching amplifiers have to be connected in the output circuit. Their function is to control the limit values of the control circuit according to EN 60947-5-6, thus ensuring operational reliability of the positioner. If the positioner is installed in hazardous areas, the relevant regulations must be observed.

Binary input 1

An active contact can be operated at binary input 1. The positioner can report the switching state over the bus protocol.

Binary input 2

A passive, floating contact can be operated at binary input 2. The positioner can report the switching state over the bus protocol.

Solenoid valve (forced venting function)

For positioners fitted with the optional solenoid valve for the forced venting function, a voltage of 24 V DC must be connected to the relevant terminals +81 and –82.

NOTICE

If there is no voltage connected for the solenoid valve at terminals +81 and –82 or when the voltage signal is interrupted, the positioner vents the actuator and does not respond to the reference variable. Observe the switching thresholds specified in the technical data.

Fig. 18 · Electrical connections
5.2.1 Establishing communication

The communication structure between the controller, logic solvers (PLC) or automation system, or between a PC or work station and the positioner(s) is implemented to conform with IEC 61158-2.
Connections

Fig. 19 · Connection acc. to FOUNDATION™ fieldbus, without (top) and with explosion protection (bottom)
6 Operator controls and readings

Rotary pushbutton

The rotary pushbutton is located underneath the front protective cover. The positioner is operated on site using the rotary pushbutton:

Turn \( \bigtriangledown \) to select codes and values.
Press \( \bigtriangledown \) to confirm setting.

Slide switch AIR TO OPEN or AIR TO CLOSE

- AIR TO OPEN applies when the increasing signal pressure opens the valve
- AIR TO CLOSE applies when the increasing signal pressure closes the valve

The signal pressure is the air pressure at the output of the positioner which is transferred to the actuator.

For positioners with an attached reversing amplifier for double-acting rotary actuators (section 4.5): switch position AIR TO OPEN.

Volume restriction Q

The volume restriction is used to adapt the air delivery to the actuator size. Two fixed settings are possible depending on how the air is routed at the actuator:

- For actuators smaller than 240 cm² with a loading pressure connection at the side (Type 3271-5), set restriction to MIN SIDE.
- For a connection at the back (Type 3277-5), set restriction to MIN BACK.
- For actuators 240 cm² and larger, set to MAX SIDE for a side connection and to MAX BACK for a connection at the back.

Readings on display

Icons appear on the display that are assigned to parameters, codes and functions.

Operating modes:
- Manual mode (MAN), section 8.2.1
- Automatic mode (AUTO), section 8.2.1
- Fail-safe position (SAFE), section 8.2.2

Bar elements:

- In manual and automatic modes, the bars indicate the system deviation that depends on the sign (+/–) and the value. One bar element appears per 1 % system deviation.
- If the device has not yet been initialized, the \( \bigtriangledown \) icon blinks on the display and the lever position in degrees in relation to the longitudinal axis is indicated. One bar element corresponds to approximately a 5° angle of rotation.
- If the fifth bar element blinks (reading > 30°), the permissible angle of rotation has been exceeded. Lever and pin position must be checked.

Status alarms

- \( \bigtriangledown \) : Maintenance alarm
- \( \bigtriangledown \) : Maintenance required/Maintenance demanded

These icons indicate that an error has occurred.

A classified status can be assigned to each error. Classifications include “No message”, “Maintenance required”, “Maintenance demanded” and “Maintenance alarm” (see section 8.3).

Configuration enabled

This indicates that the codes marked with an asterisk (*) in the code list (section 17.1) are enabled for configuration (see section 8.1).
Operator controls and readings

Displays and their meaning

<table>
<thead>
<tr>
<th>Designation</th>
<th>Position</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance alarm/fault</td>
<td>Manual mode</td>
<td>Closed-loop operation</td>
</tr>
<tr>
<td>Configuration enabled</td>
<td>Maintenance required</td>
<td>Fail-safe position active</td>
</tr>
<tr>
<td>Initialization key</td>
<td>Cap or rotary switch</td>
<td>Metal tag of proximity switch</td>
</tr>
<tr>
<td>SSP interface</td>
<td>Switch for AIR TO OPEN/AIR TO CLOSE</td>
<td>Volume restriction</td>
</tr>
<tr>
<td>Rotary pushbutton</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 20 · Display and operator controls
7 Start-up – Settings

WARNING!
Mount the positioner, keeping the following sequence:
1. Remove protective film from pneumatic connections.
2. Mount the positioner on the control valve
3. Connect the supply air
4. Connect the electrical power
5. **Perform the start-up settings**

Reading on display after connecting the electrical auxiliary power:

- `testing` runs across the display and then the fault alarm icon 
  appears and blinks on the display when the positioner has **not yet been initialized**. The reading indicates the lever position in degrees in relation to the longitudinal axis.

[Image of the display reading `12.2`]

- If Code 0 appears on the display when a positioner has been **initialized**. The positioner is in the last active operating mode.

WARNING!
The actuator stem moves while the start-up settings are being performed.
Do not touch the actuator stem or obstruct it to avoid risk of injury to hands or fingers.

**NOTICE**
Perform the start-up settings in the same sequence as listed (section 7.1 to section 7.6).

Note: The positioner performs a test in the start-up phase while following its automation task at the same time. During the start-up phase, operation on site is unrestricted, yet write access is limited.

7.1 Defining the valve closed position

To adapt the positioner to the operating direction of the actuator, set slide switch to **AIR TO OPEN** or **AIR TO CLOSE**.

- **AIR TO OPEN** = Signal pressure opens the valve, for fail-safe position: actuator stem extends/fail close
- **AIR TO CLOSE** = Signal pressure closes the valve, for fail-safe position: actuator stem retracts/fail open.

**NOTICE**
The **AIR TO OPEN (AtO)** setting always applies to double-acting actuators.

For checking purposes:
After successfully completing initialization, the positioner display should read 0 % when the valve is closed and 100 % when the valve is open. If this is not the case, change the slide switch position and re-initialize the positioner.
Note: The switch position is prompted prior to an initialization. After an initialization has been completed, changing the switch position does not have any effect on the operation of the positioner. The positioner only needs to be initialized again after the fail-safe action of the actuator has been changed.

7.2 Setting the volume restriction Q

The volume restriction Q is used to adapt the air delivery to the size of the actuator:

- Actuators with a transit time \(< 1\, \text{s}\), e.g. linear actuators with an effective area smaller than 240 cm², require a restricted air flow rate (MIN).
- Actuators with a transit time \(\geq 1\, \text{s}\) do not require the air flow rate to be restricted (MAX).

The position of volume restriction Q also depends on how the signal pressure is routed at the actuator in SAMSON actuators:

- The “SIDE” position applies for actuators with a loading pressure connection at the side, e.g. Type 3271-5.
- The “BACK” position applies for actuators with a loading pressure connection at the back, e.g. in Type 3277-5.
- The “SIDE” restriction position always applies for actuators from other manufacturers.

<table>
<thead>
<tr>
<th>Signal pressure</th>
<th>Transit time</th>
<th>(&lt; 1, \text{s})</th>
<th>(\geq 1, \text{s})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connection at the side</td>
<td>MIN SIDE</td>
<td>MAX SIDE</td>
<td></td>
</tr>
<tr>
<td>Connection at the back</td>
<td>MIN BACK</td>
<td>MAX BACK</td>
<td></td>
</tr>
</tbody>
</table>

* Intermediate positions are not permitted.

NOTICE
The positioner needs to be initialized again after the position of the restriction has been changed.

7.3 Adapting the display

The data representation on the positioner display can be turned by 180° to adapt it to how the positioner is mounted.

If the displayed data appear upside down, proceed as follows:
7.4 Limiting the signal pressure

If the maximum actuator force may cause damage to the valve, the signal pressure must be limited.

**NOTICE**
Do not activate the pressure limit function in double-acting actuators (with valve closed position AIR TO OPEN (**OFF** = default) as it is determined automatically during initialization.

Enable configuration at the positioner before activating the pressure limit function:

**Note:** If no settings are entered within 120 seconds, the enabled configuration function becomes invalid.

---

Limiting the signal pressure:

**Turn** → Code 2
Press **Code 2** blinks.
**Turn** → Required direction
Press **Code 2** to confirm reading direction.

**Operating mode**

**Default:** **MAN**

---

7.5 Checking the operating range of the positioner

To check the mechanical attachment and the proper functioning, the valve should be moved through the operating range of the positioner in the **MAN** manual operating mode with the manual reference variable.

Selecting **MAN** manual operating mode:

---

54  EB 8384-5 EN
Checking the operating range:

Turn \( \Theta \) → Code 1
Press \( \Theta \) → Code 1 and \( \circ \) blink.

Turn \( \Theta \) until the pressure in the positioner builds up, and the control valve moves to its final positions so that the travel/angle of rotation can be checked. The angle of rotation on the back of the positioner is indicated. A horizontal lever (mid position) is equal to 0°.

To ensure the positioner is working properly, the outer bar elements may not blink while the valve is moving through the operating range. Exit Code 1 by pressing the rotary pushbutton ( ).

The permissible range has been exceeded when the displayed angle is greater than 30°, and the outer right or left bar element blinks. The positioner changes to the fail-safe position (SAFE). After canceling the fail-safe position (SAFE) (see section 8.2.2) it is absolutely necessary to check the lever and pin position as described in section 4.

WARNING!
To avoid personal injury or property damage caused by the supply air or electrical auxiliary power, disconnect the supply air and electrical auxiliary power (bus line) before exchanging the lever or changing the pin position.

7.6 Initialization

WARNING!
During initialization, the control valve moves through its entire travel/angle of rotation range. Therefore, do not start the initialization procedure while a process is running, but only during start-up when all shut-off valves are closed.

Before starting initialization, check the maximum permissible signal pressure of the control valve. During initialization, the positioner issues an output signal pressure up to the maximum supply pressure supplied. If necessary, limit the signal pressure by connecting an upstream pressure reducing valve.

NOTICE
After the positioner has been mounted on to another actuator or its mounting location has been changed and prior to re-initializing the positioner, the positioner needs to be reset to its basic setting (default values). Refer to section 7.8.

During initialization the positioner adapts itself optimally to the friction conditions and the signal pressure demand of the control valve. The type and extent of self-adaptation depends on the set initialization mode:

- **MAX maximum range** (standard range) Initialization mode for simple start-up of

---

Start-up – Settings

EB 8384-5 EN 55
valves with two clearly defined mechanical end positions, e.g. three-way valves (see section 7.6.1)

- **NOM nominal range**
  Initialization mode for all globe valves (see section 7.6.2)

- **MAN manually selected range**
  Initialization mode for globe valves with an unknown nominal range (see section 7.6.3)

- **SUB substitute calibration** (emergency mode)
  This mode allows a positioner to be replaced while the plant is running, with the least amount of disruption to the plant (see section 7.6.4)

**Note:** For normal operation, simply start initialization by pressing the INIT key after mounting the positioner on the valve and defining the valve closed position and setting the volume restriction. The positioner only needs to work with its default settings. If necessary, perform a reset (see section 7.8).

The time required for an initialization process depends on the transit time of the actuator and takes several minutes.

After a successful initialization, the positioner runs in closed-loop operation indicated by \( \bullet \).

A malfunctioning leads to the process being canceled. The initialization error appears on the display according to how it has been classified by the condensed state. See section 8.3.

**Note:** Positioner with extended EXPERT+ diagnostics automatically start to plot the reference graphs (drive signal steady-state \( d_1 \) and hysteresis \( d_2 \)) after initialization has been completed. \( \text{tESt } d_1 \) or \( \text{tESt } d_2 \) appear on the display in an alternating sequence. An error during the plotting of the reference graphs is indicated on the display by Code 81.

The positioner still works properly, even though the reference graph plotting has not been completed successfully.

**Valve closed position AIR TO CLOSE**

If the slide switch is set to AIR TO CLOSE, the positioner automatically switches to the direction of action increasing/decreasing (\( \uparrow\downarrow \)) on successful completion of initialization.

This results in the following assignment between reference variable and valve position:
Valve closed position | Direction of action | Reference variable
---|---|---
AIR TO OPEN | ⇒ | Valve Closed at Open at
AIR TO CLOSE | ⇐ | 0 % 100 %

The tight-closing function is activated.

**NOTICE**

*Set Code 15 (final position w>) to 99 % for three-way valves.*

**Canceling an initialization process**

The initialization procedure can be canceled while running by pressing the rotary pushbutton ( ). *StOP* appears three seconds long and the positioner then changes to the fail-safe position (SAFE).

Exit the fail-safe position again over Code 0 (see section 8.2.2).

**7.6.1 MAX – Initialization based on maximum range**

The positioner determines travel/angle of rotation of the closing member from the CLOSED position to the opposite side and adopts this travel/angle of rotation as the operating range from 0 to 100 %.

**Enable configuration:**

**Note:** If no settings are entered within 120 seconds, the enabled configuration function becomes invalid.

<table>
<thead>
<tr>
<th><img src="default.png" alt="Image" /> Default OFF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Default OFF</strong></td>
</tr>
<tr>
<td><strong>Turn</strong> → Code 3, display: <strong>OFF</strong></td>
</tr>
<tr>
<td><strong>Press</strong> → <strong>ON</strong></td>
</tr>
<tr>
<td><strong>Press</strong> , display 🔐</td>
</tr>
</tbody>
</table>

**Select the initialization mode:**

<table>
<thead>
<tr>
<th><img src="max.png" alt="Image" /> Initialization mode Default MAX</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initialization mode</strong></td>
</tr>
<tr>
<td><strong>Turn</strong> → Code 6</td>
</tr>
<tr>
<td><strong>Press</strong></td>
</tr>
<tr>
<td><strong>Turn</strong> → <strong>MAX</strong></td>
</tr>
<tr>
<td><strong>Press</strong> to confirm the <strong>MAX</strong> as the initialization mode.</td>
</tr>
</tbody>
</table>

**Start initialization:**

> Press INIT key to start initialization!

The nominal travel/angle of rotation is indicated in % after initialization. Code 5 (nominal range) remains locked. The parameters for travel/angle range start (Code 8) and travel/angle range end (Code 9) can also only be displayed and modified in %.

For a reading in mm/°, enter the pin position (Code 4).
Enter the pin position:

![Pin position display]

Turn \( \bigcirc \rightarrow \text{Code } 4 \)
Press \( \bigcirc \), Code 4 blinks
Turn \( \bigcirc \) → Pin position on lever (see relevant section on attachment)
Press \( \bigcirc \). The reading of the nominal range appears in mm/°.

7.6.2 NOM – Initialization based on nominal range

The calibrated sensor allows the effective valve travel to be set very accurately. During the initialization process, the positioner checks whether the control valve can move through the indicated nominal range (travel or angle) without collision. If this is the case, the indicated nominal range is adopted with the limits of travel/angle range start (Code 8) and travel/angle range end (Code 9) as the operating range.

**Note:** The maximum possible travel must always be greater than the nominal travel entered. If this is not the case, initialization is interrupted (error alarm Code 52) because the nominal travel is not achieved.

Enable configuration:

**Note:** If no settings are entered within 120 seconds, the enabled configuration function becomes invalid.

![Configuration display]

Turn \( \bigcirc \rightarrow \text{Code } 3 \), display: OFF
Press \( \bigcirc \), Code 3 blinks
Turn \( \bigcirc \) → ON
Press \( \bigcirc \), display  

Enter the pin position and nominal range:

![Pin position display]

Nominal range (locked with Code 4 = No)

Turn \( \bigcirc \) → Code 4
Press \( \bigcirc \), Code 4 blinks
Turn \( \bigcirc \) → Pin position on lever (see relevant section on attachment)
Press \( \bigcirc \).
Turn \( \bigcirc \) → Code 5
Press \( \bigcirc \), Code 5 blinks
Turn → Nominal travel/angle
Press .

Select the initialization mode:

![Initialization mode](image)

Default *MAX*

Turn → Code 6
Press , Code 6 blinks

Turn → NOM
Press to confirm the NOM as the initialization mode.

Start initialization:

- Press INIT key to start initialization!

**Note:** After initialization, check the direction of action and, if necessary, change it (Code 7).

7.6.3 MAN – Initialization based on a manually selected range

Before starting initialization, move the control valve manually to the OPEN position by turning in small steps. The valve must move to the required valve position with a monotonically increasing signal pressure. The positioner calculates the differential travel/angle using the OPEN and CLOSED positions and adopts it as the operating range with limits of travel/angle range start (Code 8) and travel/angle range end (Code 9).

Enable configuration:

**Note:** If no settings are entered within 120 seconds, the enabled configuration function becomes invalid.

![Default OFF](image)

Turn → Code 3
Press , Code 3 blinks

Turn → ON
Press , display

Enter the pin position:

![Pin position](image)

Default *OFF*

Turn → Code 4
Press , Code 4 blinks

Turn → Pin position on lever (see relevant section on attachment)

Press . The reading of the nominal range appears in mm/°.
Select the initialization mode:

Select the initialization mode:

- Default: **MAX**

Turn  → Code 6
Press , Code 6 blinks

Turn  → **MAN**
Press  to confirm the **MAN** as the initialization mode.

Enter OPEN position:

- Manual reference variable (the current angle of rotation is displayed)

Turn  → Code 0
Press , Code 0 blinks

Turn  → **MAN**
Press  

Turn  → Code 1
Press , Code 1 blinks
Turn  until the valve reaches its OPEN position.
Press  to confirm the OPEN position.

Start initialization:

- Press INIT key to start initialization!

7.6.4 **SUb substitute calibration**

A complete initialization procedure takes several minutes and requires the valve to move through its entire travel range several times. This initialization mode, however, is an emergency mode, in which the control parameters are estimated and not determined by an initialization procedure. As a result, a high level of accuracy cannot be expected. You should always select a different initialization mode if the plant allows it.

The **SUb** initialization mode is used to replace a positioner while the process is running. For this purpose, the control valve is usually fixed mechanically in a certain position, or pneumatically by means of a pressure signal which is routed to the actuator externally. The blocking position ensures that the plant continues to operate with this valve position.

By entering the blocking position (Code 35), closing direction (Code 34), pin position (Code 4), nominal range (Code 5) and direction of action (Code 7), the positioner can calculate the positioner configuration.

**NOTICE**

Perform a reset before re-initializing the positioner if the substitute positioner has already been initialized. Refer to section 7.8.

Enable configuration:

**Note:** If no settings are entered within 120 seconds, the enabled configuration function becomes invalid.
Enter the pin position and nominal range:

Select the initialization mode:

Enter the direction of action:

Deactivate travel limit:
Change pressure limit and control parameters:

**Note:** Do not change the pressure limit (Code 16). Only change the control parameters KP (Code 17) and TV (Code 18) if the settings of the replaced positioner are known.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure limit</td>
<td>OFF</td>
<td>16</td>
</tr>
<tr>
<td>KP</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>TV</td>
<td>2</td>
<td>18</td>
</tr>
</tbody>
</table>

Turn [ ] → Code 16/17/18
Press [ ], Code 16/17/18 blinks
Turn [ ] to set the control parameter selected.
Press [ ] to confirm the setting.

Enter closing direction and blocking position:

Closing direction
Direction of rotation causing the valve to move to the CLOSED position (view onto positioner display)
Default: CCL (counterclockwise)

[ ]

Blocking position
Default: 0

[ ]

Turn [ ] → Code 34
Press [ ], Code 34 blinks
Turn [ ] → Closing direction (CCL counterclockwise/CL clockwise)
Press [ ].

Turn [ ] → Code 35
Press [ ], Code 35 blinks
Turn [ ] → Blocking position, e.g. 5 mm (read off at travel indicator scale of the blocked valve or measure with a ruler).
Press [ ] to confirm the setting.

Set the valve closed position:

- Set switch for **valve closed position**
  AIR TO OPEN or AIR TO CLOSE as described in section 7.1 on page 52.
- Set volume restriction as described in section 7.2 on page 53.
Start initialization:

- Press INIT key!
  The positioner switches to MAN operating mode.
  The blocking position is indicated.

**Note:** As initialization has not been carried out completely, the error code 76 (no emergency mode) and possibly also error code 57 (control loop) may appear on the display.

These alarms do not influence the positioner’s readiness for operation.

Cancel the blocking position and change to automatic operating mode

For the positioner to follow its reference variable again, the blocking position must be canceled and the positioner must be set to automatic operating mode as follows:

- Turn Code 1
- Press , Code 1 and blink
- Turn in order to move the valve slightly past the blocking position.
- Press to cancel mechanical blocking.
- Turn Code 0
- Press , Code 0 blinks.
- Turn AUTO
- Press . The positioner switches to automatic operating mode. The current valve position is indicated in %.

**Note:** If the positioner shows a tendency to oscillate in automatic operating mode, the parameters $K_p$ and $T_v$ must be slightly corrected. Proceed as follows:

Set $T_v$ to 4 (Code 18).
If the positioner still oscillates, the gain $K_p$ (Code 17) must be decreased until the positioner shows a stable behavior.

Zero point calibration

Finally, if process operations allow it, the zero point must be adjusted according to section 7.7.

7.7 Zero calibration

In case of discrepancies with the closing position of the valve, e.g. with soft-sealed plugs, it may become necessary to recalibrate the zero point.

We recommend re-initializing the positioner in case of deviations in the zero point over 5 %.

**NOTICE**

The valve briefly moves from the current travel/angle of rotation position to the closed position.

**Note:** The positioner must be connected to the supply air to perform the zero calibration.

Enable configuration:

- Turn Code 3
- Press , Code 3 blinks
- Turn ON
Press \( \bigcirc \), display \( \bigtriangledown \)

**Perform zero calibration:**

Turn \( \bigcirc \) → Code 6
Press \( \bigcirc \), Code 6 blinks
Turn \( \bigcirc \) → ZP
Press \( \bigcirc \).

Press INIT key!

Zero calibration is started, the positioner moves the control valve to the CLOSED position and readjusts the internal electrical zero point.

**7.8 Reset to default values**

This function resets all parameters to the factory default values (see code list in section 17.1).

**Enable configuration:**

Turn \( \bigcirc \) → Code 3
Press \( \bigcirc \), Code 3 blinks
Turn \( \bigcirc \) → ON
Press \( \bigcirc \), display \( \bigtriangledown \)

Reset start-up parameters:

Turn \( \bigcirc \) → Code 36
Press \( \bigcirc \), Code 36 blinks
Turn \( \bigcirc \) → RUN
Press \( \bigcirc \). All start-up parameters are reset to their default values.

**7.9 Start-up via local interface (SSP)**

The positioner can either be commissioned, configured and operated on site or by using the fieldbus configuration or operating system over the fieldbus. Alternatively, the TROVIS-VIEW operator interface can be used.

The positioner has a digital serial interface, which is connected to the RS-232 or USB port of a computer using an adapter cable (see Table 5 on page 42).

The positioner can be supplied with power by connecting it to a fieldbus segment or over a DC voltage source (9 to 32 V) connected to the bus terminals in the positioner. The simultaneous operation of TROVIS-VIEW and the fieldbus system is possible without any restrictions when connected to a FOUNDATION™ fieldbus bus segment.
8 Operation

WARNING!
The actuator stem moves while the positioner is being operated.
Do not touch the actuator stem or obstruct it to avoid risk of injury to hands or fingers.

8.1 Enabling and selecting parameters

The codes which are marked with an asterisk (*) in section 17.1 on page 78 onwards must be enabled with Code 3 before the associated parameters can be configured as described below.

You can now configure codes one after the other:

Turn \(\bigcirc\) and select the required code.
Press \(\bigcirc\) to access the selected code. The code number starts to blink.
Turn \(\bigcirc\) and select the setting.
Press \(\bigcirc\) to confirm the selected setting.

Note: If no settings are entered within 120 seconds, the enabled configuration function becomes invalid and the display changes to Code 0.

8.2 Operating modes

8.2.1 Automatic and manual modes

After initialization has been completed successfully, the positioner is in automatic mode.
8.2.1 Manual operating mode

**Switch to manual operating mode**

Turn \( \rightarrow \) Code 0

Press \( \) , display: AUTO, Code 0 blinks.

Turn \( \rightarrow \) MAN

Press \( \) to switchover to \( \) manual mode. The switchover is smooth since the manual mode starts up with the set point last used during automatic mode. The current position is displayed in %.

**Adjust the manual reference variable**

Turn \( \rightarrow \) Code 1

Press \( \) , Code 1 blinks.

Turn \( \) until sufficient pressure has been built up in the positioner and the control valve moves to the required position.

**Note:** The positioner automatically returns to \( \) manual mode with Code 0 if no settings are made within 120 seconds.

**Switch to automatic operating mode**

Turn \( \rightarrow \) Code 0

Press \( \) , Code 0 blinks.

Turn \( \rightarrow \) AUTO

Press \( \). The positioner changes to \( \) automatic operating mode

8.2.2 SAFE – Fail-safe position

If you want to move the valve to fail-safe position determined during start-up (see section 7.1), proceed as follows:

Turn \( \rightarrow \) Code 0

Press \( \) , display: current operating mode (AUTO or MAN), Code 0 blinks.

Turn \( \rightarrow \) SAFE

Press \( \) , display: S. The valve moves to the fail-safe position. Once the positioner is initialized, the current valve position is indicated on the digital display in %.

**Exit the fail-safe position**

Turn \( \rightarrow \) Code 0

Press \( \) , Code 0 blinks.
Turn ☎️ and select the required operating mode **AUtO** or **MAN**.

Press ⠩. The positioner switches to the operating mode selected.

### 8.3 Malfunction/maintenance alarm

All status and fault alarms are assigned to a classified status in the positioner. The default settings of the status classification are listed in the code list.

**Note:** The status classification can be changed in the TROVIS-VIEW operator interface, over the parameters in the DD file or over the FF parameter.

To provide a better overview, the classified alarms are summarized in a condensed state. The following status alarms are available:

- **Maintenance alarm**
  The positioner cannot perform its control task due to a functional fault in the device or in one of its peripherals or an initialization has not yet been successfully completed.

- **Maintenance required**
  The positioner still performs its control task (with restrictions). A maintenance requirement or above average wear has been determined. The wear tolerance will soon be exhausted or is reducing at a faster rate than expected. Maintenance is necessary in the medium term.

- **Maintenance demanded**
  The positioner still performs its control task (with restrictions). A maintenance demand or above average wear has been determined. The wear tolerance will soon be exhausted or is reducing at a faster rate than expected. Maintenance is necessary in the short term.

- **Function check**
  Test or calibration procedures are being performed. The positioner is temporarily unable to perform its control task until this procedure is completed.

**Note:** If an event is assigned to the “No message” status, this event does not have any effect on the condensed state.

The condensed state appears on the display with the following icons:

<table>
<thead>
<tr>
<th>Condensed state</th>
<th>Positioner display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance alarm</td>
<td></td>
</tr>
<tr>
<td>Maintenance required/Maintenance demanded</td>
<td></td>
</tr>
<tr>
<td>Function check</td>
<td>tESting, TunE or tES</td>
</tr>
</tbody>
</table>

If the positioner has not been initialized, the maintenance alarm icon (ToLeft) appears on the display as the positioner cannot follow its reference variable.

If fault alarms exist, the possible source of error is displayed in Code 49 onwards. In this case, **Err** appears on the display.

The cause and recommended action are listed in the code list (section 17.1).
8.3.1 Confirming error messages

Enable configuration:

Note: If no settings are entered within 120 seconds, the enabled configuration function becomes invalid.

Turn \( \odot \rightarrow \) Code 3
Press \( \odot \), Code 3 blinks
Turn \( \odot \rightarrow \) ON
Press \( \odot \), display: \( \odot \)

Confirm error messages:

Turn \( \odot \rightarrow \) Error code which you want to confirm.
Press \( \odot \) to confirm the error message.

9 Status and diagnostic alarms

The Type 3730-5 Positioner contains integrated diagnostics to generate classified status and diagnostic alarms.

There are two different types of on-board diagnostics available: the standard integrated diagnostics (EXPERT) and the optional extended EXPERT+ diagnostics.

Due to the numerous diagnostic functions provided, the positioner generates classified status alarms and diagnostic alarms.

9.1 Standard EXPERT diagnostics

The standard EXPERT diagnostics provides information about positioner states such as operating hours counter, process monitoring, number of zero calibrations and initializations, total valve travel, temperature, initialization diagnostics, zero/control loop errors, logging of the last 30 alarms, etc.

In addition, the standard EXPERT diagnostics generates diagnostic and status alarms which allow faults to be pinpointed quickly when a fault occurs. Besides being displayed on the positioner display, the classified alarms are also available over the device description (DD).

Alarms are classified in the following main groups:

- Status
- Operation
- Hardware
- Initialization
- Data memory
- Temperature
9.2 Extended EXPERT+ diagnostics

In addition to the standard EXPERT diagnostic features, the optional EXPERT+ extended diagnostics provides the following online and offline test functions which enable significant statements on the condition of the entire control valve.

Online test functions (monitoring functions)

- Data logger
- Histograms
- Cycle counter
- Valve end position trend
- \( y = f(x) \) diagram (drive signal)
- Hysteresis test

Offline test functions (manual functions)

- \( y = f(x) \) diagram over the entire valve travel range
- Hysteresis test over the entire valve travel range
- Static characteristic
- Step response test

The diagnostic tests are completely integrated in the positioner. The DD allows parameters to be entered and test results to be read. The graph format depends on the control system used.

Further status alarms are generated from the extensive information gained in the diagnostic tests of EXPERT+ which provide the user with information covering the whole control valve.

The required reference graphs are automatically plotted after initialization and saved in the positioner if EXPERT+ is activated.

The optional diagnostic functions provided by EXPERT+ can be selected when ordering the positioner. Additionally, it is possible to activate EXPERT+ at a later point in time in an existing positioner.

For this purpose, an activation code can be ordered, requiring the serial number of the positioner to be specified.

Note: Details on extended EXPERT+ diagnostics can be found in the Operating Instructions EB 8388-5 EN available on the Internet at http://www.samson.de.
10   **Adjusting the limit switch**

The positioner version with an inductive limit switch has one adjustable tag (1) mounted on the shaft which operates the proximity switch (3).

For operation of the inductive limit switch, the corresponding switching amplifier (see section 5.2.1) must be connected to the output.

If the tag (1) is inside the field of the switch, the switch assumes a high resistance. If the tag is outside of the field, the switch assumes a low resistance.

Normally, the limit switch is adjusted such that it will provide a signal in both end positions of the valve. The switch, however, can also be adjusted to indicate intermediate valve positions.

The desired switching function, i.e. whether the output relay shall be picked up or released when the tag has entered the field, has to be determined, if necessary, at the switching amplifier.

**Setting the switching point:**

**NOTICE**

During adjustment or testing, the switching point must always be approached from mid-position (50 %).

To ensure safe switching under any ambient conditions, the switching point should be adjusted to a value of approx. 5 % before the mechanical stop (OPEN – CLOSED).
For CLOSED position:

1. Initialize positioner.
2. Use the **MAN** function to move the positioner to 5 % (see LC display).
3. Adjust the tag using the yellow adjustment screw (2) until the tag enters or leaves the field and the switching amplifier responds. You can measure the switching voltage as an indicator.

**Contact function:**
Tag leaving the field > contact is made.
Tag entering the field > contact is opened.

For OPEN position:

1. Initialize positioner.
2. Use the **MAN** function to move the positioner to 95 % (see LC display).
3. Adjust the tag (1) using the yellow adjustment screw (2) until the tag enters or leaves the field of the proximity switch (3).
   You can measure the switching voltage as an indicator.

**Contact function:**
Tag leaving the field > Contact is made.
Tag entering the field > Contact is opened.
11 Retrofitting an inductive limit switch

Required retrofit kit:
Limit switch Order no. 1400-7460

Note: For explosion-protected devices, the requirements in section 13 need to be kept.

1. Take off the rotary pushbutton (3) and cap (1), unthread the five fixing screws (2) and lift off the plastic cover (9) together with the display, taking care not to damage the ribbon cable (between PCB and display).
2. Use a knife to cut an opening at the marked location (4).
3. Push the connector (11) with cable through the opening and secure the proximity switch (7) on the cover with a dot of glue.
4. Remove the jumper (8801-2267) at the socket X7 of the top board and insert the cable connector (11).
5. Guide the cable in such a manner that the plastic cover can be placed back onto the positioner. Insert the fixing screws (2) and screw tight. Attach the clamping plate (8) onto the proximity switch.
6. Attach the rotary switch (5). Make sure the flattened side of the positioner shaft is turned so that the rotary switch (5) can be attached with the metal tag next to the proximity switch.
7. Note: On start-up of the positioner, set the option "inductive alarm" under Code 38 from NO to YES.
12 Maintenance

The positioner does not require any maintenance.

There are filters with a 100 µm mesh size in the pneumatic connections for supply and output which can be removed and cleaned, if required.

The maintenance instructions of any upstream supply air pressure reducing stations must be observed.

13 Servicing explosion-protected devices

If a part of the device on which the explosion protection is based needs to be serviced, the device must not be put back into operation until a qualified inspector has assessed it according to explosion protection requirements, has issued an inspection certificate or given the device a mark of conformity.

Inspection by a qualified inspector is not required if the manufacturer performs a routine test on the device prior to putting it back into operation. The passing of the routine test must be documented by attaching a mark of conformity to the device. Replace explosion-protected components only by original, routine-tested components from the manufacturer.

Devices that have already been operated outside hazardous areas and are intended for future use inside hazardous areas must comply with the safety requirements placed on serviced devices. Before being used inside hazardous areas, test the devices according to the specifications for servicing explosion-protected devices.

Read section 15 for maintenance, calibration and adjustment work inside and outside hazardous areas.

14 Firmware update (serial interface)

Firmware updates on positioners currently in operation can be performed as follows:

When updates are performed by a service employee appointed by SAMSON, the update is confirmed on the positioner by the test mark assigned by SAMSON’s Quality Assurance.

In all other cases, only persons from the plant operator with written approval may perform updates. This person must confirm the update on the positioner.

Laptops and PCs connected to the power supply must use an additional safety barrier.

This does not apply to laptops in battery operation. In this case, it is assumed that a battery-powered laptop runs briefly for software programming or for testing purposes.

a) Updates outside the hazardous area:

Remove the positioners from the plant and update them outside the hazardous area.
b.) Updates on site:

Updates on site are only permitted after
the plant operator has presented a sig-
ned hot work permit.

After updating has been completed, add the
current firmware to the nameplate; this can
be done using labels.

15 Maintenance, calibration and
work on equipment

The interconnection with intrinsically safe
circuits to check or calibrate the apparatus
must only be performed with intrinsically
safe current/voltage calibrators and mea-
suring instruments to rule out any damage
to components relevant for explosion pro-
tection.

The maximum values for intrinsically safe
circuits specified in the approvals must be
kept.
16 Fieldbus specification

These instructions are based on the following:

- Fieldbus Foundation Specification "Function Block Application Process Part 1 to 3" Revision 1.5.

16.1 Device description (DD)

The following device description files are needed to integrate the device described into the host system:

Device Description: < 0101.ffo >, < 0101.sym > Capabilities File: < 010101.cff >

These device description files can be downloaded from the Internet, for example, at www.fieldbus.org or www.samson.de.

16.2 FOUNDATION™ fieldbus block model

FOUNDATION™ fieldbus assigns all the functions and data of a device to three different types of blocks. Each type of block has a different range of tasks to fulfill in the block model. The following types of blocks are implemented in the SAMSON Type 3730-5 Positioner:

- **One Resource Block**
  The Resource Block contains all the specific characteristics associated with a device on the Fieldbus, for example, device name, manufacturer number and serial number. A device can only have one Resource Block.

- **One AO Transducer Block**
  Each AI or AO Function Block has a Transducer Block which contains all data and device-specific parameters to connect the device to the process value (sensor or final control element). The positioner output signal can be directly influenced over the AO Transducer Block.

- **Two DI Transducer Blocks**
  The DI Transducer Blocks connect binary input signals for transmission and processing over the fieldbus.

- **One Analog Output Function Block**
  Function blocks are responsible for the control behavior of a FOUNDATION™ fieldbus device. A FOUNDATION™ fieldbus application can be configured by connecting the inputs and outputs of function blocks.
The AO Function Block converts the output value from an upstream function block into a control value for the valve. Execution time: 20 ms

**Two Discrete Input Function Blocks**
The DI Function Blocks are used as inputs to control binary signals. They support the selection of binary switching conditions of various functions. Execution time: 40 ms

**One PID Function Block**
The PID controller has a flexible proportional-integral-differential control algorithm which can be configured as required to match the application. Execution time: 60 ms

16.3 Resetting the device

The positioner can be reset in various ways in accordance with the FF specification.

**RESTART (16) parameter in the Resource Block:**

- **DEFAULTS:** The device data and the link are reset to the values as defined in the FF specification.
- **PROCESSOR:** Warm start of the positioner, restart of the processor.

16.4 Status classification and condensed state

The status alarms are classified in the positioner, i.e. when an alarm is issued, it is assigned a status. The classification of the states can be changed over the following FF parameters in the AO Transducer Block:

- **ERROR_OPTION_INIT_FAILURE (36):** Masking of the initialization error
- **ERROR_OPTION_OPERATION_FAILURE (37):** Masking of the operational error
- **ERROR_OPTION_HW_FAILURE (38):** Masking of the hardware error
- **ERROR_OPTION_DATA_FAILURE (39):** Masking of the data error
- **ERROR_OPTION_ENH_DIAGNOSTIC (40 to 44):** Masking of the status and fault alarms generated by the diagnostics
To provide a better overview, the classified alarms are summarized in a condensed state (CONDENSED_STATE (59) in RES Block). Besides the CONDENSED_STATE parameter, the condensed state can be issued to the discrete output OUT_D of the DI Function Blocks.

Possible states of the condensed state include:

<table>
<thead>
<tr>
<th></th>
<th>ok</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Maintenance required</td>
</tr>
<tr>
<td></td>
<td>The positioner still performs its control task (with restrictions). A maintenance requirement or above average wear has been determined. The wear tolerance will soon be exhausted or is reducing at a faster rate than expected. Maintenance is necessary in the medium term.</td>
</tr>
<tr>
<td>2</td>
<td>Maintenance demanded</td>
</tr>
<tr>
<td></td>
<td>The positioner still performs its control task (with restrictions). A maintenance demand or above average wear has been determined. The wear tolerance will soon be exhausted or is reducing at a faster rate than expected. Maintenance is necessary in the short term.</td>
</tr>
<tr>
<td>3</td>
<td>Maintenance alarm</td>
</tr>
<tr>
<td></td>
<td>The positioner cannot perform its control task due to a functional fault in the device or in one of its peripherals or an initialization has not yet been successfully completed.</td>
</tr>
<tr>
<td>7</td>
<td>Function check</td>
</tr>
<tr>
<td></td>
<td>Test or calibration procedures are being performed. The positioner is temporarily unable to perform its control task until this procedure is completed.</td>
</tr>
</tbody>
</table>

In addition to the condensed status, the block error alarms (BLOCK_ERR) from the Resource Block and Transducer Block can also be assigned to the events. In this case, the individual alarms must be classified in the ERROR_OPTION_… (Index 36 to 44) parameter with another status for block errors.

The following classifications are possible:

- No message
- Maintenance soon
- Maintenance now

The block error (BLOCK_ERR) results from the summary of classified alarms that are active.
## 17 Appendix

### 17.1 Code list

<table>
<thead>
<tr>
<th>Code no.</th>
<th>Parameter – Display, values [default setting]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Operating mode [MAN] Manual mode AUTO Automatic mode SAFE Fail-safe position ESC Escape</td>
<td>Switchover from automatic to manual mode is smooth. In fail-safe mode, the symbol S appears on the display. In MAN and AUTO mode, the system deviation is represented by the bar graph elements. When the positioner is initialized, the numerical display indicates the valve position or the angle of rotation in %, otherwise the position of the lever in relation to the central axis is displayed in degrees °.</td>
</tr>
<tr>
<td>1</td>
<td>Manual w 0 to 100 [0] % of the nominal range</td>
<td>Adjust the manual set point with the rotary pushbutton, the current travel/angle is displayed in % when the positioner is initialized, otherwise the position of the lever in relation to the central axis is indicated in degrees °. <strong>Note:</strong> Can only be selected when Code 0 = MAN</td>
</tr>
<tr>
<td>2</td>
<td>Reading direction [Normal] or upside down ESC</td>
<td>The reading direction of the display is turned by 180°.</td>
</tr>
<tr>
<td>3</td>
<td>Enable configuration [OFF] ON ESC</td>
<td>Enables the option to modify data (automatically deactivated when the rotary pushbutton has not been operated for 120 s.) FF blinks on the display when the on-site operation is locked. Codes marked with an asterisk (*) can only be read and not overwritten. Likewise, codes can only read over the SSP interface.</td>
</tr>
</tbody>
</table>

**Note:** Codes with marked with an asterisk (*) must be enabled with Code 3 prior to configuration.
<table>
<thead>
<tr>
<th>Code no.</th>
<th>Parameter – Display, values [default setting]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4</strong></td>
<td>Pin position</td>
<td>The follower pin must be inserted into the correct pin position according to the valve travel/angle of rotation. For initialization using NOM or SUb, this pin position must be entered.</td>
</tr>
<tr>
<td></td>
<td>17, 25, 35, 50, 70, 100, 200 mm 90° with rotary actuators [OFF], ESC</td>
<td>Note! If you select a pin position in Code 4 that is too small, the positioner switches to SAFE mode for reasons of safety</td>
</tr>
<tr>
<td></td>
<td><strong>Note</strong>: Codes with marked with an asterisk (*) must be enabled with Code 3 prior to configuration.</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>5</strong> Nominal range mm or angle ° ESC</td>
<td>For initialization using NOM or SUb, the nominal travel/angle of rotation of the valve must be entered. The permissible adjustment range depends on the pin position according to the table for Code 4. Code 5 is generally locked until Code 4 is set to OFF, i.e. after a pin position has been entered, Code 5 can be configured. After initialization has been successfully completed, the maximum nominal travel/angle reached on initialization is displayed.</td>
</tr>
<tr>
<td></td>
<td><strong>6</strong> Init mode [MAX] NOM MAN SUb ZP ESC</td>
<td>Select the initialization mode</td>
</tr>
<tr>
<td></td>
<td><strong>6</strong> Init mode [MAX] NOM MAN SUb ZP ESC</td>
<td>MAX: Travel/angle of the closure member from the CLOSED position to the opposite stop in the actuator. NOM: Travel/angle of the closure member measured from the CLOSED position to the indicated OPEN position. MAN: Manually selected range SUb: Substitute calibration (without initialization) ZP: Zero calibration</td>
</tr>
</tbody>
</table>
### Appendix

<table>
<thead>
<tr>
<th>Code no.</th>
<th>Parameter – Display, values [default setting]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7</strong></td>
<td><strong>w/x</strong></td>
<td>Direction of action of the reference variable ( w ) in relation to the travel/angle of rotation ( x )</td>
</tr>
<tr>
<td></td>
<td>[Increasing/increasing]</td>
<td>Automatic adaptation:</td>
</tr>
<tr>
<td></td>
<td>[Increasing/decreasing]</td>
<td>AIR TO OPEN:</td>
</tr>
<tr>
<td></td>
<td>[ESC]</td>
<td>On completing initialization, the direction of action remains increasing/increasing (↑), a globe valve opens as the mA signal increases.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AIR TO CLOSE:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On completing initialization, the direction of action changes to increasing/decreasing (↓), a globe valve closes as the mA signal increases.</td>
</tr>
<tr>
<td><strong>8</strong></td>
<td><strong>Travel/angle range start</strong> (lower x-range value)</td>
<td>Lower range value for the travel/angle of rotation in the nominal or operating range.</td>
</tr>
<tr>
<td></td>
<td>0.0 to 80.0 [0.0] % of the nominal range</td>
<td>The operating range is the actual travel/angle of the control valve and is limited by the lower x-range value (Code 8) and the upper x-range value (Code 9).</td>
</tr>
<tr>
<td></td>
<td>[ESC]</td>
<td>Usually, the operating range and the nominal range are identical. The nominal range can be limited to the operating range by the lower and upper x-range values.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Value is displayed or must be entered.</td>
</tr>
<tr>
<td></td>
<td>Note! Specified in mm or angle ° provided Code 4 is set</td>
<td>The characteristic is adapted. See also the example in Code 9!</td>
</tr>
<tr>
<td><strong>9</strong></td>
<td><strong>Travel/angle range end</strong> (upper x-range value)</td>
<td>Upper range value for the travel/angle of rotation in the nominal or operating range.</td>
</tr>
<tr>
<td></td>
<td>20.0 to 100.0 [100.0] % of the nominal range</td>
<td>Value is displayed or must be entered.</td>
</tr>
<tr>
<td></td>
<td>[ESC]</td>
<td>The characteristic is adapted.</td>
</tr>
<tr>
<td></td>
<td>Note! Specified in mm or angle ° provided Code 4 is set</td>
<td>Example: The operating range is modified, for example, to limit the range of a control valve which has been sized too large. For this function, the entire resolution range of the reference variable is converted to the new limits. 0 % on the display corresponds to the adjusted lower limit and 100 % to the adjusted upper limit.</td>
</tr>
<tr>
<td><strong>10</strong></td>
<td><strong>Travel/angle lower limit</strong> (lower x-limit)</td>
<td>Limitation of the travel/angle of rotation downwards to the entered value, the characteristic is not adapted.</td>
</tr>
<tr>
<td></td>
<td>0.0 to 49.9 % of the operating range [OFF], [ESC]</td>
<td>The characteristic is not adapted to the reduced range. See also example in Code 11.</td>
</tr>
</tbody>
</table>

**Note:** Codes with marked with an asterisk (*) must be enabled with Code 3 prior to configuration.
<table>
<thead>
<tr>
<th>Code no.</th>
<th>Parameter – Display, values [default setting]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Note:</strong> Codes with marked with an asterisk (*) must be enabled with Code 3 prior to configuration.</td>
</tr>
<tr>
<td>11*</td>
<td>Travel/angle upper limit (upper x-limit)</td>
<td>Limitation of the travel/angle of rotation upwards to the entered value, the characteristic is not adapted.</td>
</tr>
<tr>
<td></td>
<td>50.0 to 120.0 [100] % of the operating range</td>
<td><strong>Example:</strong> In some applications, it is better to limit the valve travel, e.g. if a certain minimum medium flow is required or a maximum flow must not be reached.</td>
</tr>
<tr>
<td></td>
<td>OFF, ESC</td>
<td>The lower limit must be adjusted with Code 10, and the upper limit with Code 11.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If a tight-closing function has been set up, it has priority over the travel limitation!</td>
</tr>
<tr>
<td></td>
<td></td>
<td>When set to OFF, the valve can be opened past the nominal travel with a reference variable outside of the 0 to 100 % range.</td>
</tr>
<tr>
<td>14*</td>
<td>Reference variable range start (w-start)</td>
<td>If w approaches the percentage adjusted at the final value that causes the valve to close, the actuator is immediately completely vented (with AIR TO OPEN) or filled with air (with AIR TO CLOSE). This action always lead to maximum tight-closing of the valve.</td>
</tr>
<tr>
<td></td>
<td>0.0 to 49.9 [1.0] % of the span adjusted via Code 12/13</td>
<td>Codes 14/15 have priority over Codes 8/9/10/11.</td>
</tr>
<tr>
<td></td>
<td>OFF, ESC</td>
<td>Codes 21/22 have priority over Codes 14/15.</td>
</tr>
<tr>
<td>15*</td>
<td>Reference variable range end (w-end)</td>
<td>If w approaches the percentage adjusted at the final value that causes the valve to open, the actuator is immediately completely filled with air (with AIR TO OPEN) or vented (with AIR TO CLOSE). This action always lead to the valve being completely opened.</td>
</tr>
<tr>
<td></td>
<td>50.0 to 100.0 % of the span adjusted via Code 12/13</td>
<td>Codes 14/15 have priority over Codes 8/9/10/11.</td>
</tr>
<tr>
<td></td>
<td>[OFF], ESC</td>
<td>Codes 21/22 have priority over Codes 14/15.</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Example:</strong> Set the final position w &gt; to 99 % for three-way valves.</td>
</tr>
<tr>
<td>16*</td>
<td>Pressure limit</td>
<td>The signal pressure to the actuator can be limited in stages.</td>
</tr>
<tr>
<td></td>
<td>1.4  2.4  3.7 bar [OFF], ESC</td>
<td>After changing a pressure limit already set, the actuator must be vented once (e.g. by selecting the fail-safe position (SAFE) over Code 0).</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>NOTICE</strong> Do not activate the pressure limit for double-acting actuators with valve closed position AIR TO OPEN (AtO).</td>
</tr>
</tbody>
</table>
### Appendix

<table>
<thead>
<tr>
<th>Code no.</th>
<th>Parameter – Display, values [default setting]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>17</strong></td>
<td>Proportional-action coefficient KP (step) 0 to 17 [7] ESC</td>
<td>Displaying or changing $\text{KP}$&lt;br&gt;&lt;br&gt;<strong>Note on changing the KP and TV steps:</strong> During the initialization of the positioner, the $\text{KP}$ and $\text{TV}$ values are optimized. Should the positioner show a tendency for impermissibly high post-pulse oscillation due to additional interference, the $\text{KP}$ and $\text{TV}$ steps can be adapted after the initialization. For this, either the $\text{TV}$ step can be increased in increments until the desired response behavior is reached or, when the maximum value of 4 is reached, the $\text{KP}$ step can be decreased in increments.&lt;br&gt;&lt;br&gt;<strong>NOTICE</strong> Changing the $\text{KP}$ step influences the system deviation.</td>
</tr>
<tr>
<td><strong>18</strong></td>
<td>Rate time TV (step) 1 [2] 3 4 OFF OFF, ESC</td>
<td>Displaying or changing $\text{TV}$, see note under $\text{KP}$ step&lt;br&gt;&lt;br&gt;A change of the $\text{TV}$ step has no effect on the system deviation.</td>
</tr>
<tr>
<td><strong>19</strong></td>
<td>Tolerance band 0.1 to 10.0 [5] % of the operating range ESC</td>
<td>Used for error monitoring&lt;br&gt;&lt;br&gt;Determination of the tolerance band in relation to the operating range.&lt;br&gt;&lt;br&gt;Associated lag time [30] s is a reset criterion.&lt;br&gt;&lt;br&gt;If a transit time is determined during initialization which is six times $&gt; 30$ s, the six-fold transit time is accepted as the lag time.</td>
</tr>
</tbody>
</table>

**Note:** Codes with marked with an asterisk (*) must be enabled with Code 3 prior to configuration.
<table>
<thead>
<tr>
<th>Code no.</th>
<th>Parameter – Display, values [default setting]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Note:</strong> Codes with marked with an asterisk (*) must be enabled with Code 3 prior to configuration.</td>
<td></td>
</tr>
<tr>
<td><strong>20</strong></td>
<td><strong>Characteristic</strong>&lt;br&gt;0 to 9 [0]&lt;br&gt;ESC</td>
<td>Select the characteristic:&lt;br&gt;0 Linear&lt;br&gt;1 Equal percentage&lt;br&gt;2 Reverse equal percentage&lt;br&gt;3 SAMSON butterfly valve linear&lt;br&gt;4 SAMSON butterfly valve equal percentage&lt;br&gt;5 VETEC rotary plug valve linear&lt;br&gt;6 VETEC rotary plug valve equal percentage&lt;br&gt;7 Segmented ball valve linear&lt;br&gt;8 Segmented ball valve equal percentage&lt;br&gt;9 User-defined (defined over operating software)&lt;br&gt;&lt;br&gt;<strong>Note:</strong> The various characteristics are listed in the Appendix (section 19).</td>
</tr>
<tr>
<td><strong>21</strong></td>
<td><strong>Required transit time OPEN (w ramp open)</strong>&lt;br&gt;0 to 240 s [0]&lt;br&gt;ESC</td>
<td>The time required to pass through the operating range when the valve opens.&lt;br&gt;Limitation of the transit time (Code 21 and 22):&lt;br&gt;For some applications it is recommendable to limit the transit time of the actuator to prevent it from engaging too fast in the running process.&lt;br&gt;Code 21 has priority over Code 15.&lt;br&gt;&lt;br&gt;<strong>NOTICE</strong>&lt;br&gt;The function is not activated when the fail-safe function or solenoid valve is triggered nor upon failure of the auxiliary power.</td>
</tr>
<tr>
<td><strong>22</strong></td>
<td><strong>Required transit time CLOSED (w ramp closed)</strong>&lt;br&gt;[0] to 240 s&lt;br&gt;ESC</td>
<td>The time required to pass through the operating range when the valve closes.&lt;br&gt;Code 22 has priority over Code 14.&lt;br&gt;&lt;br&gt;<strong>NOTICE</strong>&lt;br&gt;The function is not activated when the fail-safe function or solenoid valve is triggered nor upon failure of the auxiliary power.</td>
</tr>
<tr>
<td><strong>23</strong></td>
<td><strong>Total valve travel</strong>&lt;br&gt;0 to $9 \cdot 10^7$ [0]&lt;br&gt;Exponential reading from 9999 travel cycles onwards&lt;br&gt;RES, ESC</td>
<td>Totaled double valve travel.&lt;br&gt;Can be reset to 0 via RES.&lt;br&gt;&lt;br&gt;<strong>Note:</strong> The total valve travel is saved in a non-volatile memory after every 1000 double travel.</td>
</tr>
<tr>
<td>Code no.</td>
<td>Parameter – Display, values [default setting]</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>-----------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>24</strong></td>
<td>LV total valve travel 1000 to 99 · 10^7 [1 000 000] Exponential reading from 9999 travel cycles onwards ESC</td>
<td>Limit value of total valve travel. If the limit is exceeded, the fault symbol and the wrench symbol corresponding with the collective status appear.</td>
</tr>
<tr>
<td><strong>34</strong></td>
<td>Closing direction CL Clockwise [CCL] Counterclockwise ESC</td>
<td>Turning direction in which the valve is moved to the CLOSED position (view onto the rotary switch motion when the positioner cover is open). Needs only be entered in initialization mode SUB (Code 6).</td>
</tr>
<tr>
<td><strong>35</strong></td>
<td>Blocking position [0] mm/° /% ESC</td>
<td>Entering the blocking position. Distance up to the CLOSED position. Only necessary in initialization mode SUB.</td>
</tr>
<tr>
<td><strong>36</strong></td>
<td>Reset [OFF], RUN, ESC</td>
<td>Resets all start-up parameters to default (factory setting). Does not apply to block configuration. <strong>Note:</strong> After setting RUN, the positioner must be re-initialized.</td>
</tr>
<tr>
<td><strong>38</strong></td>
<td>Inductive alarm [NO], YES, ESC</td>
<td>Indicates whether the inductive limit switch option is installed or not.</td>
</tr>
<tr>
<td><strong>39</strong></td>
<td>System deviation e info –99.9 to 999.9 %</td>
<td>Display only, indicates the deviation from the position required.</td>
</tr>
<tr>
<td><strong>40</strong></td>
<td>Transit time Open info 0 to 240 s [0]</td>
<td>Display only, minimum opening time determined during initialization.</td>
</tr>
<tr>
<td><strong>41</strong></td>
<td>Transit time Closed info 0 to 240 s [0]</td>
<td>Display only, minimum closing time determined during initialization.</td>
</tr>
<tr>
<td><strong>42</strong></td>
<td>Auto-w/manual-w info 0.0 to 100.0 % of the span</td>
<td>Display only, Auto mode: indicates the supplied automatic reference variable Man mode: indicates the supplied manual reference variable</td>
</tr>
<tr>
<td><strong>43</strong></td>
<td>Firmware info control</td>
<td>Display only, indicates the positioner type and current firmware version in alternating sequence.</td>
</tr>
</tbody>
</table>

**Note:** Codes with marked with an asterisk (*) must be enabled with Code 3 prior to configuration.
<table>
<thead>
<tr>
<th>Code no.</th>
<th>Parameter – Display, values [default setting]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>44</td>
<td>y info [0] to 100% OP, MAX, – – –</td>
<td>Display only. Indicates the control signal y in % based on the travel range determined on initialization. MAX: The positioner builds up its maximum output pressure, see description in Code 14 and 15. OP: The positioner vents completely, see description in Code 14 and 15. – – –: The positioner is not initialized.</td>
</tr>
<tr>
<td>45</td>
<td>Solenoid valve info YES, HIGH/LOW, NO</td>
<td>Display only, indicates whether a solenoid valve is installed or not. If a voltage supply is connected at the terminals of the installed solenoid valve, YES and HIGH appear on the display in alternating sequence. If a voltage supply is not connected (actuator vented, fail-safe position indicated on the display by the S icon), YES and LOW appear on the display in alternating sequence.</td>
</tr>
<tr>
<td>46*</td>
<td>Bus address ESC</td>
<td>Select bus address</td>
</tr>
<tr>
<td>47*</td>
<td>Write protection FF YES, [NO], ESC</td>
<td>When the write protection function is activated, device data can only be read, but not overwritten over FF communication.</td>
</tr>
<tr>
<td>48*</td>
<td>Diagnostic parameters d</td>
<td></td>
</tr>
<tr>
<td>d0</td>
<td>Current temperature –55 to 125</td>
<td>Operating temperature [°C] inside the positioner</td>
</tr>
<tr>
<td>d1</td>
<td>Minimum temperature [20]</td>
<td>The lowest temperature below 20 °C that has ever occurred.</td>
</tr>
<tr>
<td>d2</td>
<td>Maximum temperature [20]</td>
<td>The highest temperature above 20 °C that has ever occurred.</td>
</tr>
<tr>
<td>d3</td>
<td>Number of zero calibrations</td>
<td>The number of zero calibrations since the last initialization.</td>
</tr>
<tr>
<td>d4</td>
<td>Number of initializations</td>
<td>The number of initializations that have been performed.</td>
</tr>
<tr>
<td>d5</td>
<td>Zero point limit 0.0 to 100.0% [5%]</td>
<td>Limit for the zero point monitoring.</td>
</tr>
</tbody>
</table>

Note: Codes with marked with an asterisk (*) must be enabled with Code 3 prior to configuration.

Appendix
### Appendix

<table>
<thead>
<tr>
<th>Code no.</th>
<th>Parameter – Display, values [default setting]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note: Codes with marked with an asterisk (*) must be enabled with Code 3 prior to configuration.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 48* | d6 Condensed status | Condensed status, made up from the individual states. |
|     | 0 OK: Okay |
|     | 1 C: Maintenance required |
|     | 2 CR: Maintenance demanded |
|     | 3 B: Maintenance alarm |
|     | 7 I: Function check |

| d7 | Start reference run [OFF], ON, ESC, 1 |
|    | Triggering of a reference run for the functions: Drive signal y steady-state and drive signal y hysteresis. |
|    | The reference run can only be activated in manual operating mode as the valve moves through its entire travel range. |
|    | If EXPERT+ is activated at later point in time, the reference graphs must be plotted in order to activate the diagnostic functions. |

| d8 | EXPERT+ activation |
|    | Enter the activation code for EXPERT+. |
|    | After the activation procedure has been successfully completed, YES appears under d8. |

#### FF parameters FF-P

| F0 | Firmware Rev. Communication |
|    | F1 Binary input 1 1 Active 0 Inactive |
|    | F2 Binary input 2 1 Active 0 Inactive |
|    | F3 Simulate Activation of simulation mode |
|    | F4 to F7 Unassigned |

#### AO Function Block A

<p>| A0 | Target Mode Required operating mode |
|    | A1 Actual Mode Actual operating mode |
|    | A2 CAS_IN value Display of the analog reference variable adopted from an upstream function block |
|    | A3 CAS_IN status and its status |
|    | A4 SP value Displays the set point (reference variable) |
|    | A5 SP status and its status |
|    | A6 Out value Displays the manipulated variable (output value) |</p>
<table>
<thead>
<tr>
<th>Code no.</th>
<th>Parameter – Display, values [default setting]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note:</td>
<td>Codes with marked with an asterisk (*) must be enabled with Code 3 prior to configuration.</td>
<td></td>
</tr>
<tr>
<td>48*</td>
<td>A7 Out status and its status</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A8 Block error Displays the current block error</td>
<td></td>
</tr>
</tbody>
</table>

**PID Function Block P**

<table>
<thead>
<tr>
<th>Code no.</th>
<th>Parameter – Display, values [default setting]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0</td>
<td>Target Mode Required operating mode</td>
<td></td>
</tr>
<tr>
<td>P1</td>
<td>Actual Mode Actual operating mode</td>
<td></td>
</tr>
<tr>
<td>P2</td>
<td>CAS_IN value Display of the analog reference variable adopted from an upstream function block</td>
<td></td>
</tr>
<tr>
<td>P3</td>
<td>CAS_IN status and its status</td>
<td></td>
</tr>
<tr>
<td>P4</td>
<td>SP value Displays the set point (reference variable)</td>
<td></td>
</tr>
<tr>
<td>P5</td>
<td>SP status and its status</td>
<td></td>
</tr>
<tr>
<td>P6</td>
<td>Out value Displays the manipulated variable (output value)</td>
<td></td>
</tr>
<tr>
<td>P7</td>
<td>Out status and its status</td>
<td></td>
</tr>
<tr>
<td>P8</td>
<td>Block error Displays the current block error</td>
<td></td>
</tr>
</tbody>
</table>

**Transducer Blocks A0, DI1, DI2 t**

<table>
<thead>
<tr>
<th>Code no.</th>
<th>Parameter – Display, values [default setting]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>t0</td>
<td>Target Mode AO TRD Required operating mode</td>
<td></td>
</tr>
<tr>
<td>t1</td>
<td>Actual Mode AO TRD Actual operating mode</td>
<td></td>
</tr>
<tr>
<td>t2</td>
<td>Transducer state State of the Transducer Block</td>
<td></td>
</tr>
<tr>
<td>t3</td>
<td>Block error AO TRD Displays the current block error</td>
<td></td>
</tr>
<tr>
<td>t4</td>
<td>Target Mode DI1 Required operating mode</td>
<td></td>
</tr>
<tr>
<td>t5</td>
<td>Actual Mode DI1 TRD Actual operating mode</td>
<td></td>
</tr>
<tr>
<td>t6</td>
<td>Block error DI1 TRD Displays the current block error</td>
<td></td>
</tr>
<tr>
<td>t7</td>
<td>Target Mode DI2 TRD Required operating mode</td>
<td></td>
</tr>
<tr>
<td>t8</td>
<td>Actual Mode DI2 Actual operating mode</td>
<td></td>
</tr>
<tr>
<td>t9</td>
<td>Block error DI2 Displays the current block error</td>
<td></td>
</tr>
</tbody>
</table>

**Resource Block S**

<table>
<thead>
<tr>
<th>Code no.</th>
<th>Parameter – Display, values [default setting]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S0</td>
<td>Resource Target Mode Required operating mode</td>
<td></td>
</tr>
<tr>
<td>Code no.</td>
<td>Parameter – Display, values [default setting]</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>48*</td>
<td>48* S1 Resource Actual Mode</td>
<td>Actual operating mode</td>
</tr>
<tr>
<td>48*</td>
<td>S2 Resource block error</td>
<td>Displays the current block error</td>
</tr>
<tr>
<td>48*</td>
<td>D1 Function Block</td>
<td>Displays the current block error</td>
</tr>
<tr>
<td>I0</td>
<td>Target Mode D1</td>
<td>Required operating mode</td>
</tr>
<tr>
<td>I1</td>
<td>Actual Mode D1</td>
<td>Actual operating mode</td>
</tr>
<tr>
<td>I2</td>
<td>Field_Val_D value</td>
<td>Displays the discrete input variable</td>
</tr>
<tr>
<td>I3</td>
<td>Field_Val_D status</td>
<td>and its status</td>
</tr>
<tr>
<td>I4</td>
<td>OUT_D value</td>
<td>Displays the discrete output variable</td>
</tr>
<tr>
<td>I5</td>
<td>OUT_D status</td>
<td>and its status</td>
</tr>
<tr>
<td>I6</td>
<td>Block error</td>
<td>Displays the current block error</td>
</tr>
</tbody>
</table>

**Note:** The error codes listed in following appear in the display corresponding to their status classification set over the condensed state (Maintenance required/Maintenance demanded: ☢️, Maintenance alarm: ⚠️). If “No message” is assigned to the error code as the status classification, the error is not included in the condensed state.

A status classification is assigned to every error code in the default setting. The status classification of error codes can also be changed as required using an operating software (e.g. TROVIS-VIEW).
## Initialization errors

<table>
<thead>
<tr>
<th>Error codes – Recommended action</th>
<th>Condensed state alarm active, when prompted, Err appears. When fault alarms exist, they are displayed here.</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 x &gt; range</td>
<td>The value supplied by the measuring signal is either too high or too low, the measuring sensor is close to its mechanical limit.</td>
</tr>
<tr>
<td></td>
<td>• Pin positioned incorrectly.</td>
</tr>
<tr>
<td></td>
<td>• Bracket slipped in case of NAMUR attachment or positioner is not central.</td>
</tr>
<tr>
<td></td>
<td>• Follower plate incorrectly attached.</td>
</tr>
<tr>
<td>Status classification</td>
<td>[Maintenance required]</td>
</tr>
<tr>
<td>Recommended action</td>
<td>Check attachment and pin position, set operating mode from SAFE to MAN and re-initialize the positioner.</td>
</tr>
<tr>
<td>51 Δx &lt; range</td>
<td>The measuring span of the sensor is too low.</td>
</tr>
<tr>
<td></td>
<td>• Pin positioned incorrectly.</td>
</tr>
<tr>
<td></td>
<td>• Wrong lever.</td>
</tr>
<tr>
<td></td>
<td>A rotational angle smaller than 16° at the positioner shaft creates just an alarm. An angle below 9° leads to the initialization being canceled.</td>
</tr>
<tr>
<td>Status classification</td>
<td>[Maintenance required]</td>
</tr>
<tr>
<td>Recommended action</td>
<td>Check attachment and re-initialize the positioner.</td>
</tr>
<tr>
<td>52 Attachment</td>
<td>• Positioner attachment incorrect.</td>
</tr>
<tr>
<td></td>
<td>• Nominal travel/angle (Code 5) could not be achieved during initialization under NOM (no tolerance downwards permissible).</td>
</tr>
<tr>
<td></td>
<td>• Mechanical or pneumatic fault, e.g. wrong lever selected or supply pressure too low to move to the required position.</td>
</tr>
<tr>
<td>Status classification</td>
<td>[Maintenance required]</td>
</tr>
<tr>
<td>Recommended action</td>
<td>Check attachment and supply pressure. Re-initialize the positioner.</td>
</tr>
<tr>
<td></td>
<td>Under certain circumstances, it may be possible to check the maximum travel/angle by entering the actual pin position and then performing an initialization under MAX.</td>
</tr>
<tr>
<td></td>
<td>After initialization has been completed, the Code 5 indicates the maximum achieved travel or angle.</td>
</tr>
<tr>
<td>Error codes – Recommended action</td>
<td>Condensed state alarm active, when prompted, <em>Err</em> appears. When fault alarms exist, they are displayed here.</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>53 Initialization time exceeded</strong>&lt;br&gt; (Init time &gt;)</td>
<td>The initialization routine lasts too long.&lt;br&gt;• No pressure on the supply line or there is a leak.&lt;br&gt;• Supply air failure during initialization.</td>
</tr>
<tr>
<td>Status classification</td>
<td>[Maintenance required]</td>
</tr>
<tr>
<td>Recommended action</td>
<td>Check attachment and supply pressure. Re-initialize the positioner.</td>
</tr>
<tr>
<td><strong>54 Initialization - solenoid valve</strong></td>
<td>1) A solenoid valve is installed (Code 45 = YES) and was not or not properly connected so that an actuator pressure could not be built up. The alarm is generated when you attempt to initialize the positioner.&lt;br&gt;2) If you attempt to initialize the device from the fail-safe position (SAFE).</td>
</tr>
<tr>
<td>Status classification</td>
<td>[Maintenance required]</td>
</tr>
<tr>
<td>Recommended action</td>
<td>Re. 1) Check connection and supply voltage of the forced venting Code 45 HIGH/LOW&lt;br&gt;Re. 2) Set the MAN operating mode over Code 0. Then initialize the positioner.</td>
</tr>
<tr>
<td><strong>55 Transit time too short</strong>&lt;br&gt; (transit time &lt;)</td>
<td>The actuator positioning rates determined during the initialization are so short that the positioner cannot adapt itself optimally.</td>
</tr>
<tr>
<td>Status classification</td>
<td>[Maintenance required]</td>
</tr>
<tr>
<td>Recommended action</td>
<td>Check the volume restriction setting as described in section 7.2, re-initialize the positioner.</td>
</tr>
<tr>
<td><strong>56 Pin position</strong></td>
<td>Initialization was canceled because you are required to enter the pin position for the selected initialization modes NOM and SUB.</td>
</tr>
<tr>
<td>Status classification</td>
<td>[Maintenance required]</td>
</tr>
<tr>
<td>Recommended action</td>
<td>Enter pin position over Code 4 and nominal travel/angle over Code 5. Re-initialize the positioner.</td>
</tr>
</tbody>
</table>
## Operational errors

<table>
<thead>
<tr>
<th>Error codes – Recommended action</th>
<th>Condensed state alarm active, when prompted, <em>Err</em> appears. When fault alarms exist, they are displayed here.</th>
</tr>
</thead>
</table>
| **57 Control loop**              | Control loop error, the control valve does not react within the tolerable times of the controlled variable (tolerance band alarm Code 19).  
  • Actuator mechanically blocked.  
  • Attachment of the positioner subsequently shifted.  
  • Supply pressure not sufficient. |
| Status classification            | [Maintenance required]                                                                                     |
| Recommended action               | Check attachment.                                                                                        |
| **58 Zero point**                | Zero point incorrect.  
  Error may arise when the mounting position/linkage of the positioner moves or when the valve seat trim is worn, especially with soft-sealed plugs. |
| Status classification            | [Maintenance required]                                                                                     |
| Recommended action               | Check valve and mounting of the positioner. If OK, perform a zero calibration over Code 6 (see section 7.7 on page 63).  
  If the lever position on the back of the positioner has been changed (e.g. while exchanging the lever), move the lever as far as it will go in both directions to adapt it to the internal measuring lever. |
| **59 Autocorrection**            | Should an error occur in the data range of the positioner, the self-monitoring function recognizes it and automatically corrects it. |
| Status classification            | [No message]                                                                                               |
| Recommended action               | Automatic                                                                                                  |
| **60 Fatal error**               | An error was detected in the data relevant for safety, autocorrection is not possible. This may be due to EMC disturbances.  
  The positioner changes to the fail-safe position (SAFE). |
| Status classification            | Maintenance alarm (cannot be classified)                                                                      |
| Recommended action               | Reset over Code 36.  
  Re-initialize the positioner. |
## Hardware errors

<table>
<thead>
<tr>
<th>Error codes – Recommended action</th>
<th>Condensed state alarm active, when prompted, <strong>Err</strong> appears. When fault alarms exist, they are displayed here.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>62</strong> x signal</td>
<td>Determination of the measured data for the actuator has failed. Conductive plastic element is defective. The positioner continues to run in emergency mode, but should be replaced as soon as possible. The emergency mode on the display is indicated by a blinking closed-loop operation icon and 4 dashes instead of the position indication. <strong>Note on the closed-loop operation:</strong> If the measuring system has failed, the positioner is still in a reliable state. The positioner switches to emergency mode where the position cannot be accurately controlled anymore. However, the positioner continues operation according to its reference variable signal so that the process remains in a safe state.</td>
</tr>
<tr>
<td><strong>64</strong> i/p converter</td>
<td>The circuit of the i/p converter has been interrupted. <strong>Status classification</strong> Maintenance alarm (cannot be classified) <strong>Recommended action</strong> Cannot be remedied. Return the positioner to SAMSON AG for repair.</td>
</tr>
<tr>
<td><strong>65</strong> Hardware</td>
<td>A hardware error has occurred, the positioner changes to the fail-safe position (SAFE). <strong>Status classification</strong> Maintenance alarm (cannot be classified) <strong>Recommended action</strong> Confirm error and return to the automatic operating mode, or perform a reset and re-initialize the device. If this is not successful, return device to SAMSON AG for repair.</td>
</tr>
<tr>
<td><strong>66</strong> Data memory</td>
<td>The writing of data to the data memory does not work anymore, e.g. when the written data deviate from the read data. Valve moves to the fail-safe position. <strong>Status classification</strong> Maintenance alarm (cannot be classified) <strong>Recommended action</strong> Return the positioner to SAMSON AG for repair.</td>
</tr>
</tbody>
</table>
## Error codes – Recommended action

<table>
<thead>
<tr>
<th>Code</th>
<th>Test calculation</th>
<th>Status classification</th>
<th>Recommended action</th>
</tr>
</thead>
<tbody>
<tr>
<td>67</td>
<td>The hardware controller is monitored by means of a test calculation.</td>
<td>Maintenance alarm (cannot be classified)</td>
<td>Confirm error. If this is not possible, return the positioner to SAMSON AG for repair.</td>
</tr>
</tbody>
</table>
## Data errors

<table>
<thead>
<tr>
<th>Error codes – Recommended action</th>
<th>Condensed state alarm active, when prompted, <strong>Err</strong> appears. When fault alarms exist, they are displayed here.</th>
</tr>
</thead>
<tbody>
<tr>
<td>68 Control parameter</td>
<td>Control parameter error</td>
</tr>
<tr>
<td>Status classification</td>
<td>[Maintenance required]</td>
</tr>
<tr>
<td>Recommended action</td>
<td>Confirm error, perform reset and re-initialize the positioner.</td>
</tr>
<tr>
<td>69 Poti parameter</td>
<td>Parameter error of the digital potentiometer.</td>
</tr>
<tr>
<td>Status classification</td>
<td>[Maintenance required]</td>
</tr>
<tr>
<td>Recommended action</td>
<td>Confirm error, perform reset and re-initialize the positioner.</td>
</tr>
<tr>
<td>70 Calibration parameter</td>
<td>Error in the production calibration data. Subsequently, the device runs on default values.</td>
</tr>
<tr>
<td>Status classification</td>
<td>[Maintenance required]</td>
</tr>
<tr>
<td>Recommended action</td>
<td>Return the positioner to SAMSON AG for repair.</td>
</tr>
<tr>
<td>71 General parameters</td>
<td>Parameter errors that are not critical for the control.</td>
</tr>
<tr>
<td>Status classification</td>
<td>[Maintenance required]</td>
</tr>
<tr>
<td>Recommended action</td>
<td>Confirm error. Check and, if necessary, reset required parameters.</td>
</tr>
<tr>
<td>73 Internal device error 1</td>
<td>Internal device error</td>
</tr>
<tr>
<td>Status classification</td>
<td>[Maintenance required]</td>
</tr>
<tr>
<td>Recommended action</td>
<td>Return the positioner to SAMSON AG for repair.</td>
</tr>
<tr>
<td>74 FF parameters</td>
<td>Parameter errors that are not critical for the control.</td>
</tr>
<tr>
<td>Status classification</td>
<td>[Maintenance required]</td>
</tr>
<tr>
<td>Recommended action</td>
<td>Confirm error and perform reset.</td>
</tr>
<tr>
<td>Error codes – Recommended action</td>
<td>Condensed state alarm active, when prompted, <strong>Err</strong> appears. When fault alarms exist, they are displayed here.</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>76 No emergency mode</td>
<td>The travel measuring system of the positioner has a self-monitoring function (see Code 62). An emergency mode (open-loop control) is not available for certain actuators, such as double-acting actuators. In this case, the positioner changes to the fail-safe position (SAFE) when a measuring error occurs. During the initialization, the positioner checks whether the actuator has such a function or not.</td>
</tr>
<tr>
<td>Status classification</td>
<td>[No message]</td>
</tr>
<tr>
<td>Recommended action</td>
<td>Merely information, confirm, if necessary. No further action necessary.</td>
</tr>
<tr>
<td>77 Program loading error</td>
<td>When the positioner starts operation for the first time after the input signal has been applied, it carries out a self-test (<strong>tEStinG</strong> runs across the display). If the positioner loads the wrong program, the valve moves to the fail-safe position. It is not possible to make the valve leave this fail-safe position again.</td>
</tr>
<tr>
<td>Status classification</td>
<td>Maintenance alarm (cannot be classified)</td>
</tr>
<tr>
<td>Recommended action</td>
<td>Interrupt current and restart positioner. Otherwise, return the positioner to SAMSON AG for repair.</td>
</tr>
<tr>
<td>78 Options parameter</td>
<td>Errors in options parameters</td>
</tr>
<tr>
<td>Status classification</td>
<td>[Maintenance required]</td>
</tr>
<tr>
<td>Recommended action</td>
<td>Return the positioner to SAMSON AG for repair.</td>
</tr>
</tbody>
</table>
Diagnosis errors

<table>
<thead>
<tr>
<th>Error codes – <strong>Recommended action</strong></th>
<th>Condensed state alarm active, when prompted, <em>Err</em> appears. When fault alarms exist, they are displayed here.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>79</strong> Diagnostic alarms</td>
<td>Alarms are generated by the extended EXPERT+ diagnostics if EXPERT+ has been activated under Code 48</td>
</tr>
<tr>
<td>Status classification</td>
<td>Maintenance required (cannot be classified)</td>
</tr>
<tr>
<td><strong>80</strong> Diagnostic parameters</td>
<td>Errors that are not critical for control.</td>
</tr>
<tr>
<td>Status classification</td>
<td>Maintenance required (cannot be classified)</td>
</tr>
</tbody>
</table>
| **81** Reference graphs            | An error occurred during plotting the reference graphs for drive signal y steady-state or drive signal y hysteresis.  
• Reference test was interrupted  
• Reference line for drive signal y steady-state or drive signal y hysteresis was not adopted. |
| Status classification              | [No message]                                                                                           |
| Recommended action                 | Check and, if necessary, perform a new reference test                                                  |
17.2 Parameters

Several parameters can only be modified in certain modes (see Read/write capability in the parameter description). In this case, not the actual mode is decisive, but the target mode.

17.2.1 Resource Block

The Resource Block contains all the data that identify the device. It is similar to an electronic device tag.

Resource Block parameters include device type, device name, manufacturer ID, serial number as well as parameters which affect the behavior of all other blocks of the device.

Refer to page 108 for the list of parameters.

All time specifications in the Resource Block are specified in the unit of 1/32 ms according to the Fieldbus Specification Version 1.5.

In the Device Description Library supplied by Fieldbus Foundation upon which the device description of 3730-5 is also based, these parameters are incorrectly specified as the unit of ms. The specified values supplied by the device are, however, always to be interpreted as the unit of 1/32 ms.

17.2.2 Analog Output Transducer Block

The Transducer Block allows the input and output variables of a function block to be influenced. In this way, process data can be used to calibrate measured and control data, linearize characteristics, or convert engineering units. Transducer Block parameters include information on the type of actuator, attachment, engineering units, commissioning, diagnostics as well as device-specific parameters.

The Standard Advanced Positioner Valve Transducer Block receives an output value from an upstream Analog Output Function Block. This value is used to position a control valve. The block contains parameters to adapt the positioner to the actuator and valve as well as for valve commissioning and diagnostics.

Refer to page 118 for the list of parameters.
17.2.3 Discrete Input Transducer Blocks

Discrete Input Transducer Blocks directly connect the physical inputs of the field device to the assigned function blocks. The CHANNEL parameter is used to assign the Transducer Blocks to the function blocks. The Type 3730-5 Positioner has two binary inputs that work independently from one another. A Discrete Input Function Block exists for each input.

The DI Transducer Blocks are implemented according to the FF Specification and do not contain any manufacturer-specific parameters.
17.2.4 Analog Output Function Block

The Analog Output Function Block processes an analog signal from an upstream function block (e.g. PID Block) into an output value intended for the downstream Transducer Block (e.g. valve positioner). It contains scaling functions and ramp functions as well as other functions.

The AO Block receives its set point depending on the mode (MODE_BLK) from one of the input variables CAS_IN, RCAS_IN or SP. An internal working set point is created from it, taking into account the PV_SCALE, SP_HI_LIM and SP_LO_LIM, SP_RATE_UP and SP_RATE_DN. Depending on the IO_OPTS and XD_SCALE parameters, an output value OUT is generated which is passed on to the downstream Transducer Block over the CHANNEL parameter.

A Fault State is included in the AO Block which is activated when a fault condition (of the valid set point) last longer than the time determined in FSTATE_TIME or when SET_FSTATE is activated in the Resource Block.

The Fault State is determined over FSTATE_TIME, FSTATE_VAL and IO_OPTS parameters.

In the Device Description Library supplied by Fieldbus Foundation upon which the device description of 3730-5 is also based, "Fault state to value" is indicated as "Fault state type" in the IO_OPTS parameter of the AO Function Block.

Refer to page 142 for the list of parameters.
Fig. 25 · Analog Output Function Block
17.2.5 Discrete Input Function Block DI1

The Type 3730-5 Positioner is fitted with a standard contact input to process binary voltage signals.

The Discrete Input DI1 Function Block is used for processing the contact input (terminals 87 und 88) and to integrate a FOUNDATION™ fieldbus application.

The connected hardware is assigned to the function block by CHANNEL = 1. The OUT_D parameter is used to link the state of the contact to other function blocks.

Alternatively, an integrated solenoid valve MGV, a discrete valve position with three states POS_D as well as the Condensed State (NAMUR status) can be processed.

The binary signal to be linked can be selected over the SELECT_BINARY_INPUT_1 parameter in the Resource Block.

Refer to page 150 for the list of parameters.

---

**Fig. 26 · Discrete Input Function Block 1**
17.2.6 Discrete Input Function Block DI2

The Type 3730-5 Positioner is optionally fitted with a binary input to process a floating contact. The Discrete Input DI2 Function Block is used for processing the contact input (terminals 85 und 86) and to integrate a FOUNDATION™ fieldbus application. The connected hardware is assigned to the function block by CHANNEL = 2. The OUT_D parameter is used to link the state of the contact to other function blocks. Alternatively, an integrated solenoid valve MGV, a discrete valve position with three states POS_D as well as the Condensed State (NAMUR status) can be processed. The binary signal to be linked can be selected over the SELECT_BINARY_INPUT_2 parameter in the Resource Block. When a pressure sensor (leakage sensor) is connected, its switching state can be issued as a diagnostic alarm in the XD_ERROR_EXT parameter of the AO Transducer Block and logged. In this case, the option LEAKAGE SENSOR must be activated in CONFIG_BINARY_INPUT2. Alternatively, the switching state of the binary input can be issued in the BINARY_INPUT2 parameter of the AO Transducer Block.

Parameters of the Discrete Input Function Block 2

The parameters of the DI Function Block 2 are the same as the parameters of DI Function Block 1.
17.2.7 PID Function Block

A PID Function Block contains the input channel processing, the proportional-integral-derivative (PID) control loop and the analog output channel processing. The configuration of the PID Block (PID controller) depends on the automation task. Simple control loops, control loops with manipulate variable feedforwarding, cascade control and cascade controls with limitation in combination with another controller function block can be implemented. The following options are available for processing the measured variable within the PID Function Block (PID controller): Signal scaling and limiting, mode control, feedforward control, limit control, alarm limit detection and signal status propagation. The PID Block (PID controller) can be used for various automation strategies. The block has a flexible control algorithm that can be configured to match the application.

The PID Block receives its set point depending on the mode (MODE_BLK) from the input variables CAS_IN, RCAS_IN or SP. PV_SCALE, SP_HI_LIM, SP_LO_LIM, SP_RATE_UP and SP_RATE_DN are used to generate an internal operating set point. The block receives the actual value over the IN input variable which is used to generate the process variable PV, taking into account the PV_SCALE and the filter of the first order PV_FTIME.

These values are fed to the internal PID algorithm. This algorithm consists of a proportional, an integral and a derivative component. The manipulated variable is calculated from the set point value SP and the process variable PV (actual value) resulting from the system deviation. The individual PID components are included in the calculation of the manipulated variable as follows:

- **Proportional component:**
  The proportional component reacts immediately and directly when the set point SP or the process variable PV (actual value). The manipulated variable is changed by the proportional factor GAIN. This change corresponds to the system deviation multiplied by the gain factor. If a controller works only with a proportional component, the control loop has a permanent system deviation.

- **Integral component:**
  The system deviation resulting from the calculation of the manipulated variable using the proportional component is integrated over the integral component of the controller until it is negligible. The integral function corrects the manipulated variable depending on the size and duration of the system deviation. If the value for the integration time RESET is set to zero, the controller works as a P or PD controller. The influence of the integral component on the control loop increases when the value of the integration time is reduced.
Derivative component:
In controlled systems with long delay times, e.g. in temperature control loops, it is better to use the derivative component RATE of the controller. Using the derivative component RATE, the manipulated variable is calculated depending on the rate of change of the system deviation.

An output value OUT is formed from the calculated manipulated variable corresponding to the OUT_SCALE, OUT_HI_LIM and OUT_LO_LIM parameters. This output value can be passed on to a downstream connected function block.
The status of the output value OUT can be influenced by the STATUS_OPTS parameter depending on the status of the input variable of the PID Block. This allows, for example, the fault state of a downstream connected output block to be activated.
The BYPASS parameter allows the internal set point to be directly transferred to the correction value. Feedforward is possible over the FF_VAL input variable. TRK_IN_D and TRK_VAL allow the output value to be directly tracked.

Refer to page 154 for the list of parameters.
17.3 Other parameters

17.3.1 Stale Counter

The Stale Counter serves to judge the quality of a process variable received over a configured cyclic connection (publisher/subscriber connection). These connections are used to transfer the process variable linked amongst the various function blocks. For this purpose, the upstream block (publisher) sends the process variable over the bus at scheduled times. The downstream block(s) (subscriber) responds at the scheduled times. The blocks that are to receive data monitor whether a valid value exists at the scheduled time. A value is valid if it exists with the status “Good” at the scheduled time. The Stale Counter defines how many “Bad” (stale) values can be accepted in sequence before the Fault State of the block is activated. This monitoring function is deactivated by setting the Stale Counter to zero.

17.3.2 Link Objects

Link Objects are used to link the inputs and outputs of the function blocks (configurable cyclic connections). A maximum of 22 Link Objects can be configured for each positioner.

17.3.3 LAS Functionality

The number of links and schedules that can be used is matched to the requirements of standard process control systems available on the market. The positioner functioning as an LAS can support the following:

- 1 schedule
- 1 subschedule
- 25 sequences per subschedule
- 25 elements per sequence

In the delivered state, the positioner is configured as a basic device.
### 17.4 Parameter lists

**Legend**

<table>
<thead>
<tr>
<th>SK (class of memory)</th>
<th>S</th>
<th>D</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Static parameter</td>
<td>Dynamic parameter</td>
<td>Non-volatile parameter</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Read/write capability: (access)</th>
<th>r</th>
<th>w</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Read capability</td>
<td>Write capability</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Supported modes</th>
<th>O</th>
<th>M</th>
<th>A</th>
<th>CAS</th>
<th>RCAS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>O/S (out of service) mode</td>
<td>MAN mode</td>
<td>AUTO mode</td>
<td>Cascade mode</td>
<td>Remote cascade mode</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other modes</th>
<th>LO</th>
<th>ROUT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Local override mode</td>
<td>Remote output mode</td>
</tr>
</tbody>
</table>
### Resource Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACK_OPTION</td>
<td>38</td>
<td>S</td>
<td>r/w</td>
<td>O/A</td>
<td>[Undefined] . . . No selection</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DISC ALM . . . Write lock changed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BLOCK ALM . . Block alarm</td>
</tr>
<tr>
<td>ALARM_SUM</td>
<td>37</td>
<td>S</td>
<td>r/w</td>
<td>O/A</td>
<td>DISC ALM . . . Write lock changed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BLOCK ALM . . Block alarm</td>
</tr>
<tr>
<td>ALERT_KEY</td>
<td>4</td>
<td>S</td>
<td>r/w</td>
<td>O/A</td>
<td>1 to 255, [0]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“0” is not a permissible value and will be rejected when transferring data to the device (alarm).</td>
</tr>
<tr>
<td>BLOCK_ALARM</td>
<td>36</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BLOCK_ERR</td>
<td>6</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUS_ADDRESS</td>
<td>55</td>
<td>D</td>
<td>r</td>
<td></td>
<td>1 to 255, [248]</td>
</tr>
<tr>
<td>CLR_FSTATE</td>
<td>30</td>
<td>D</td>
<td>r/w</td>
<td>O/A</td>
<td></td>
</tr>
<tr>
<td>CONDENSED_STATE</td>
<td>59</td>
<td>D</td>
<td>r</td>
<td></td>
<td>0 . . OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 . . Maintenance required</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 . . Maintenance demanded</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 . . Maintenance alarm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7 . . Function check</td>
</tr>
<tr>
<td>CONFIRM_TIME</td>
<td>33</td>
<td>S</td>
<td>r/w</td>
<td>O/A</td>
<td>[640000 1/32 ms]</td>
</tr>
<tr>
<td>CYCLE_SEL</td>
<td>20</td>
<td>S</td>
<td>r/w</td>
<td>O/A</td>
<td>[SCHEDULED]</td>
</tr>
<tr>
<td>CYCLE_TYPE</td>
<td>19</td>
<td>S</td>
<td>r</td>
<td></td>
<td>SCHEDULED</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>COMPLETION OF BLOCK EXECUTION</td>
</tr>
<tr>
<td>DDRESOURCE</td>
<td>9</td>
<td>S</td>
<td>r</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Description:**
Determine the field selection.

**Note:**
Determines the field selection.

**Used to:**
Indicates the selected field.

**Indication:**
Indicates the selected field.

**Note:**
Indicates the selected field.

**Specific:**
Specific field selection.

**Note:**
Specific field selection.
### Resource Block

**Description**

Determines whether an alarm is to be automatically acknowledged in the positioner, i.e. without intervention of the fieldbus host system.

**Note:** The alarm is broadcast to the fieldbus host system, but not acknowledged by it.

Determines the current state of the process alarms in the Resource Block.

---

**Used to specify the identification number of the plant section.**

This information can be used by the fieldbus host system to group alert and events.

**Indicates the current block state with details on all configuration, hardware or system problems in the block.**

**Indicates active block error**

**Note:** The assignment of error or diagnostic alarms to the desired function block is determined using the ERROR_OPTION parameter in the Transducer Block.

- Simulation jumper active, simulation possible
- Block mode is out of service
- Data in EEPROM lost
- Maintenance required soon. Block Alarm (BLOCK_ALM) in Resource Block is triggered.
- Maintenance required immediately. Block Alarm (BLOCK_ALM) in Resource Block is triggered.

---

**Bus address**

Used to manually clear the Fault State of the AO Function Block.

**Indicates the condensed state of the device.**

Each possible event or error is classified. This assignment can be modified in the Transducer Block. The condensed state provides a summary of all classified status alarms.

The state is also indicated on the LCD of the positioner. “Maintenance required” and “Maintenance demanded” are indicated by a wrench symbol, “Maintenance alarm” by the fault symbol. “Function check” is indicated as a text alert.

**Specifies the time the device waits for confirmation that an alert report was received before trying again.**

**Specifies the block execution method determined by the fieldbus host system.**

**Note:** The block execution method is selected directly in the fieldbus host system.

**Indicates the block execution method supported by the device.**

**Specifies the resource that contains the Device Description file in the device.**

**Note:** If the device contains no Device Description, “zero” appears on the display.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DD_REV</td>
<td>13</td>
<td>S</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DESCRIPTOR</td>
<td>46</td>
<td>S</td>
<td>r/w</td>
<td>A/O</td>
<td></td>
</tr>
<tr>
<td>DEV_REV</td>
<td>12</td>
<td>S</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEV_TYPE</td>
<td>11</td>
<td>S</td>
<td>r</td>
<td></td>
<td>2 for Type 3730-5</td>
</tr>
<tr>
<td>DEVICE_CERTIFICATION</td>
<td>45</td>
<td>N</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEVICE_PRODUCT_NUM</td>
<td>48</td>
<td>N</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEVICE_SER_NUM</td>
<td>44</td>
<td>N</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEVICE_MESSAGE</td>
<td>47</td>
<td>N</td>
<td>r/w</td>
<td>A/O</td>
<td></td>
</tr>
<tr>
<td>FAULT_STATE</td>
<td>28</td>
<td>N</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FEATURES</td>
<td>17</td>
<td>S</td>
<td>r</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| FEATURES_SEL            | 18    | S  | r/w    | A/O  | REPORTS .........................  
                        |       |    |        | HARD W LOCK .....................  
                        |       |    |        | FAULTSTATE .......................  
                        |       |    |        | OUT READBACK ....................  |
| FREE_SPACE              | 24    | D  | r      |      |                                  |
| FREE_TIME               | 25    | D  | r      |      |                                  |
| GRANT_DENY              | 14    | D  | r/w    | NA   |                                  |
| HARD_TYPES              | 15    | S  | r      |      | SCALAR OUTPUT (scalable analog output variable) |
| HW_REVISION             | 43    | S  | r      |      |                                  |
| ITK_VER                 | 41    | S  |        |      |                                  |
| LIM_NOTIFY              | 32    | S  | r/w    | A/O  | 0 to [8]                         |

**Note:**

- Field description.
- Specific field.
- Specific.
- Specific field definition.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- Specific.
- S
### Resource Block

<table>
<thead>
<tr>
<th>Description</th>
<th>Appendix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specifies the revision number of the Device Description file.</td>
<td></td>
</tr>
<tr>
<td>Any desired text to describe the application; the text is saved in the field device.</td>
<td></td>
</tr>
<tr>
<td>Indicates the manufacturer’s revision number associated with the device.</td>
<td></td>
</tr>
<tr>
<td>Indicates the manufacturer’s model number associated with the device in decimal format.</td>
<td></td>
</tr>
<tr>
<td>Specifies the type of protection of the device, i.e. whether explosion protection certificates are available for the field device.</td>
<td></td>
</tr>
<tr>
<td>Specifies the positioner’s product number</td>
<td></td>
</tr>
<tr>
<td>Specifies the positioner’s serial number; allows the field device to be clearly identified in conjunction with the MANUFAC_ID and DEV_TYPE parameters.</td>
<td></td>
</tr>
<tr>
<td>Any desired text; the text is saved in the field device.</td>
<td></td>
</tr>
<tr>
<td>Indicates the current status of the Fault State of the Analog Output Function Block</td>
<td></td>
</tr>
<tr>
<td>Specifies the additionally supported Resource Block options, see FEATURES_SEL.</td>
<td></td>
</tr>
<tr>
<td>Enables selection of additionally supported Resource Block options.</td>
<td></td>
</tr>
<tr>
<td>. . Fieldbus host system needs to acknowledge receipt of an alert report.</td>
<td></td>
</tr>
<tr>
<td>. . Hardware write lock switch is evaluated</td>
<td></td>
</tr>
<tr>
<td>. . Fault State can be triggered (see SET_FSTATE /CLR_FSTATE).</td>
<td></td>
</tr>
<tr>
<td>. . Current valve position issued in the PV parameter of the Analog Function Block (otherwise SP).</td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> If the AO Block should not move to the MAN mode when the solenoid valve fails, deactivate this option.</td>
<td></td>
</tr>
<tr>
<td>Indicates the memory in percent available for implementation of additional function blocks.</td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> This parameter is not supported as no further function blocks may be added to the Type 3730-5.</td>
<td></td>
</tr>
<tr>
<td>Indicates the block processing time in percent that is free to process additional blocks.</td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> This parameter is not supported as no further function blocks may be added to the Type 3730-5.</td>
<td></td>
</tr>
<tr>
<td>Grants or denies access of a fieldbus host system to the field device.</td>
<td></td>
</tr>
<tr>
<td><strong>Note:</strong> This parameter is not supported by Type 3730-5.</td>
<td></td>
</tr>
<tr>
<td>Indicates the types of output signal (hardware) available for the Analog Output Function Block.</td>
<td></td>
</tr>
<tr>
<td>Specifies the hardware revision number of the electronic/mechanical components.</td>
<td></td>
</tr>
<tr>
<td>Specifies the version of the Interoperability Tester used by the Fieldbus Foundation on certifying the device as interoperable.</td>
<td></td>
</tr>
<tr>
<td>Specifies the number of alert reports that the device can send without getting a confirmation.</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix Resource Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOCAL_OP_ENA</td>
<td>56</td>
<td>N</td>
<td>r/w</td>
<td>A/O</td>
<td></td>
</tr>
<tr>
<td>MANUFACT_ID</td>
<td>10</td>
<td>S</td>
<td>r</td>
<td></td>
<td>0 x 00E099 = SAMSON AG</td>
</tr>
<tr>
<td>MAX_NOTIFY</td>
<td>31</td>
<td>S</td>
<td>r</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>MEMORY_SIZE</td>
<td>22</td>
<td>S</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MIN_CYCLE_T</td>
<td>21</td>
<td>S</td>
<td>r</td>
<td></td>
<td>640 1/32 ms</td>
</tr>
<tr>
<td>MODE_BLK</td>
<td>5</td>
<td>N</td>
<td>r/w</td>
<td>A/O</td>
<td>AUTO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>O/S</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NV_CYCLE_T</td>
<td>23</td>
<td>S</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>READING_DIRECTION</td>
<td>54</td>
<td>D</td>
<td>r/w</td>
<td>A/O</td>
<td>RUN</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RESOURCE (not supported)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DEFAULTS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RS_STATE</td>
<td>7</td>
<td>D</td>
<td>r</td>
<td></td>
<td>ONLINE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>STANDBY</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ONLINE LINKING</td>
</tr>
<tr>
<td>SELECT_BINARY_INPUT1</td>
<td>57</td>
<td>N</td>
<td>r/w</td>
<td>A/O</td>
<td>D1/2 contact.</td>
</tr>
<tr>
<td>SELECT_BINARY_INPUT2</td>
<td>58</td>
<td>N</td>
<td>r/w</td>
<td>A/O</td>
<td>D1/2 internal solenoid valve.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>D1/2 discrete final valve position</td>
</tr>
</tbody>
</table>

**Note:**

- **Note:**
  - Locks/
  - Indicators:
    - Specifiers:
      - Indicators:
        - Note: The
        - Indicators:
          - Note: The

- **Note:**
  - The
  - In the
  - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
    - Note: The
    - Note: The

- **Note:**
  - Rotates
  - Enables:
Description

Locks/enables local operation.

Indicates the manufacturer’s identification number.

Specifies the maximum number of alert reports that the device can send without getting a confirmation.

Indicates the memory in kilobytes available for additional function blocks.

**Note:** This parameter is not supported as no further function blocks may be added to the Type 3730-5.

Indicates the shortest cycle interval that the device can perform (execution time of AO function block 20 ms).

Indicates the actual operating mode of the Resource Block, the permitted modes supported by the Resource Block, and the normal mode.

. . . The Function Blocks (AO and PID Function Block) are enabled in this mode.
. . . In this mode, the processing of the Function Blocks (AO and PID Function Block) is stopped. The blocks are set to O/S mode.

Specifies the minimum time interval in which device data are stored to the non-volatile memory.

**Note:** The Type 3730-5 saves non-volatile data immediately after transmission.

Rotates the display contents by 180°.

Enables the positioner to be reset in various ways.

. . . Normal operating state

. . . Device data and function block linkings are reset to the default settings listed in the specification.

. . . Warm start of device, processor restarted.

Indicates the current operating state of the Resource Block.

. . . Standard operating state; the function block is in AUTO mode.
. . . The Resource Block is in O/S mode.

. . . The configured links between the function blocks have not been established yet.

Used to select the data to be processed in Discrete Input Block 1/2.

. . . Switching state of binary input 1/2
. . . Switching state of internal solenoid valve

. . . Current valve position as discrete information:

1. Current valve position < x %
2. Current valve position > x %;
3. Intermediate position

The limits for < x % or > x % are set using FINAL_POSITION_VALUE_LIMITS parameter [0.5, 99.5]
## Parameter Index SK Access Mode Selection/display, [initial value]

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continued</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SELECT_BINARY_INPUT1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SELECT_BINARY_INPUT2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SET_FSTATE</td>
<td>29</td>
<td>D</td>
<td>r/w</td>
<td>A/O</td>
<td>DI1/2 condensed state . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td>SHED_RCAS</td>
<td>26</td>
<td>S</td>
<td>r/w</td>
<td>A/O</td>
<td></td>
</tr>
<tr>
<td>SHED_ROUT</td>
<td>27</td>
<td>S</td>
<td>r/w</td>
<td>A/O</td>
<td>[640000 1/32 ms]</td>
</tr>
<tr>
<td>ST_REV</td>
<td>1</td>
<td>N</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STRATEGY</td>
<td>3</td>
<td>S</td>
<td>r/w</td>
<td>A/O</td>
<td>[0]</td>
</tr>
<tr>
<td>SW_REVISION</td>
<td>42</td>
<td>N</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG_DESC</td>
<td>2</td>
<td>S</td>
<td>r/w</td>
<td>A/O</td>
<td>[No text], max. 32 characters</td>
</tr>
<tr>
<td>TEST_RW</td>
<td>8</td>
<td>D</td>
<td>r/w</td>
<td>A/O</td>
<td></td>
</tr>
<tr>
<td>TEXT_INPUT_1</td>
<td>49</td>
<td>N</td>
<td>r/w</td>
<td>A/O</td>
<td></td>
</tr>
<tr>
<td>TEXT_INPUT_2</td>
<td>50</td>
<td>N</td>
<td>r/w</td>
<td>A/O</td>
<td></td>
</tr>
<tr>
<td>TEXT_INPUT_3</td>
<td>51</td>
<td>N</td>
<td>r/w</td>
<td>A/O</td>
<td></td>
</tr>
<tr>
<td>TEXT_INPUT_4</td>
<td>52</td>
<td>N</td>
<td>r/w</td>
<td>A/O</td>
<td></td>
</tr>
<tr>
<td>TEXT_INPUT_5</td>
<td>53</td>
<td>N</td>
<td>r/w</td>
<td>A/O</td>
<td></td>
</tr>
<tr>
<td>UPDATE_EVT</td>
<td>35</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WRITE_ALM</td>
<td>40</td>
<td>D</td>
<td>r/w</td>
<td>A/O</td>
<td></td>
</tr>
</tbody>
</table>
| WRITE_LOCK                                 | 34    | S  | r/w    | A/O  | LOCKED
NOT LOCKED

**Note:**
- The writing of a new address takes place when writing text.
- **Indication:**

- **Note:**
- **Indication:**

- **Note:**
- **Indication:**
Resource Block

Description

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>.</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>Maintenance required</td>
</tr>
<tr>
<td>2</td>
<td>Maintenance demanded</td>
</tr>
<tr>
<td>3</td>
<td>Maintenance alarm</td>
</tr>
<tr>
<td>7</td>
<td>Function check</td>
</tr>
</tbody>
</table>

Enables manual activation of the Fault State of the Analog Output Function Block.

Determines how long function blocks are supposed to check that the connection between the fieldbus host system and the PID Block exists in RCAS mode.
When the time has elapsed, the PID Block switches from RCAS mode to the operating mode selected in the SHED_OPT parameter.

Determines how long function blocks are supposed to check that the connection between the fieldbus host system and the PID Block exists in ROUT mode.
When the time has elapsed, the PID Block switches from ROUT mode to the operating mode selected in the SHED_OPT parameter.

Indicates the revision number of static data.

**Note:** The revision state is incremented by one each time a static parameter in the block is written.

Permits strategic grouping and thus faster processing of blocks.

Blocks are grouped by entering the same number in the STRATEGY parameter of each block.

**Note:** These data are neither checked nor processed by the Resource Block.

Indicates the firmware version (communication/control).

Assigns a unique description to each block for clear identification.

**Note:** This parameter is required for conformity tests only and is not used in normal operation.

Any desired text

Indicates that static data were changed, including date and time stamp.

Indicates the state of the write-lock alarm.

**Note:** The alarm is triggered when the WRITE_LOCK parameter is unlocked.

Indicates the state of the write-lock alarm.

The write-lock can be activated by setting Code 47 to ON.
If setting data are to be changed by remote transmission, set Code 47 to OFF.
Appendix

### Resource Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>WRITE_PRI</td>
<td>39</td>
<td>S</td>
<td>r/w</td>
<td>A/O</td>
<td>[0] ....................................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 ......................................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 ......................................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 to 7 ..................................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8 to 15 ................................</td>
</tr>
</tbody>
</table>

### Parameter index

<table>
<thead>
<tr>
<th>Index</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>1</td>
<td>ST_REV</td>
</tr>
<tr>
<td>2</td>
<td>TAG_DESC</td>
</tr>
<tr>
<td>3</td>
<td>STRATEGY</td>
</tr>
<tr>
<td>4</td>
<td>ALERT_KEY</td>
</tr>
<tr>
<td>5</td>
<td>MODE_BLK</td>
</tr>
<tr>
<td>6</td>
<td>BLOCK_ERR</td>
</tr>
<tr>
<td>7</td>
<td>RS_STATE</td>
</tr>
<tr>
<td>8</td>
<td>TEST_RW</td>
</tr>
<tr>
<td>9</td>
<td>DDRESOURCE</td>
</tr>
<tr>
<td>10</td>
<td>MANUFACT_ID</td>
</tr>
<tr>
<td>11</td>
<td>DEV_TYPE</td>
</tr>
<tr>
<td>12</td>
<td>DEV_REV</td>
</tr>
<tr>
<td>13</td>
<td>DD_REV</td>
</tr>
<tr>
<td>14</td>
<td>GRANT_DENY</td>
</tr>
<tr>
<td>15</td>
<td>HARD_TYPES</td>
</tr>
<tr>
<td>16</td>
<td>RESTART</td>
</tr>
<tr>
<td>17</td>
<td>FEATURES</td>
</tr>
<tr>
<td>18</td>
<td>FEATURES_SEL</td>
</tr>
<tr>
<td>19</td>
<td>CYCLE_TYPE</td>
</tr>
<tr>
<td>20</td>
<td>CYCLE_SEL</td>
</tr>
<tr>
<td>21</td>
<td>MIN_CYCLE_T</td>
</tr>
<tr>
<td>22</td>
<td>MEMORY_SIZE</td>
</tr>
<tr>
<td>23</td>
<td>NV_CYCLE_T</td>
</tr>
<tr>
<td>24</td>
<td>FREE_SPACE</td>
</tr>
<tr>
<td>25</td>
<td>FREE_TIME</td>
</tr>
<tr>
<td>26</td>
<td>SHED_RCAS</td>
</tr>
<tr>
<td>27</td>
<td>SHED_ROUT</td>
</tr>
<tr>
<td>28</td>
<td>FAULT_STATE</td>
</tr>
<tr>
<td>29</td>
<td>SET_FSTATE</td>
</tr>
<tr>
<td>30</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td></td>
</tr>
</tbody>
</table>
### Description

Used to set the priority for the WRITE_ALM parameter.

- The write-lock alarm is not processed.
- The write-lock alarm is not broadcast to fieldbus host system.
- Reserved for block alarms
- The write-lock alarm is issued to notify the operator with the corresponding priority (3 = low, 7 = high).
- The write-lock alarm is issued as a critical alarm with the corresponding priority (8 = low, 15 = high).

<table>
<thead>
<tr>
<th>Index</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>CLR_FSTATE</td>
</tr>
<tr>
<td>31</td>
<td>MAX_NOTIFY</td>
</tr>
<tr>
<td>32</td>
<td>LIM_NOTIFY</td>
</tr>
<tr>
<td>33</td>
<td>CONFIRM_TIME</td>
</tr>
<tr>
<td>34</td>
<td>WRITE_LOCK</td>
</tr>
<tr>
<td>35</td>
<td>UPDATE_EVT</td>
</tr>
<tr>
<td>36</td>
<td>BLOCK_ALARM</td>
</tr>
<tr>
<td>37</td>
<td>ALARM_SUM</td>
</tr>
<tr>
<td>38</td>
<td>ACK_OPTION</td>
</tr>
<tr>
<td>39</td>
<td>WRITE_PRI</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Index</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>WRITE_ALM</td>
</tr>
<tr>
<td>41</td>
<td>ITK_VER</td>
</tr>
<tr>
<td>42</td>
<td>SW_REVISION</td>
</tr>
<tr>
<td>43</td>
<td>HW_REVISION</td>
</tr>
<tr>
<td>44</td>
<td>DEVICE_SER_NUM</td>
</tr>
<tr>
<td>45</td>
<td>DEVICE_CERTIFICATION</td>
</tr>
<tr>
<td>46</td>
<td>DESCRIPTOR</td>
</tr>
<tr>
<td>47</td>
<td>DEVICE_MESSAGE</td>
</tr>
<tr>
<td>48</td>
<td>DEVICE_PRODUCT_NUM</td>
</tr>
<tr>
<td>49</td>
<td>TEXT_INPUT_1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Index</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>TEXT_INPUT_2</td>
</tr>
<tr>
<td>51</td>
<td>TEXT_INPUT_3</td>
</tr>
<tr>
<td>52</td>
<td>TEXT_INPUT_4</td>
</tr>
<tr>
<td>53</td>
<td>TEXT_INPUT_5</td>
</tr>
<tr>
<td>54</td>
<td>READING_DIRECTION</td>
</tr>
<tr>
<td>55</td>
<td>BUS_ADDRESS</td>
</tr>
<tr>
<td>56</td>
<td>LOCAL_OP_ENA</td>
</tr>
<tr>
<td>57</td>
<td>SELECT_BINARY_INPUT1</td>
</tr>
<tr>
<td>58</td>
<td>SELECT_BINARY_INPUT2</td>
</tr>
<tr>
<td>59</td>
<td>CONDENSED_STATE</td>
</tr>
</tbody>
</table>
## Appendix

### Analog Output Transducer Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACT_FAIL_ACTION</td>
<td>21</td>
<td>D</td>
<td>r</td>
<td></td>
<td>UNINITIALIZED . . . Undefined&lt;br&gt;CLOSING . . . . . . (in 0 % position)&lt;br&gt;OPENING . . . . . . (in 100 % position)&lt;br&gt;INDETERMINATE . . None</td>
</tr>
<tr>
<td>ACT_MAN_ID</td>
<td>22</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td>Clearing . . . (in 0 % position)&lt;br&gt;OPENING . . . . . . (in 100 % position)&lt;br&gt;INDETERMINATE . . None</td>
</tr>
<tr>
<td>ACT_MODEL_NUM</td>
<td>23</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>Specification . . .</td>
</tr>
<tr>
<td>ACT_SN</td>
<td>24</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>Specification . . .</td>
</tr>
<tr>
<td>ACTROKE_TIME_DEC</td>
<td>67</td>
<td>D</td>
<td>r</td>
<td></td>
<td>The minimum (consistent with the position) opening the valve</td>
</tr>
<tr>
<td>ACTROKE_TIME_INC</td>
<td>68</td>
<td>D</td>
<td>r</td>
<td></td>
<td>The minimum (consistent with the position) opening the valve</td>
</tr>
<tr>
<td>ADVANCED_PV_BASIC</td>
<td>0</td>
<td>D</td>
<td>r</td>
<td></td>
<td>BLOCK_TAG . . . . Name of block&lt;br&gt;DD_MEMBER . . . . 0 (0x0)&lt;br&gt;DD_ITEM . . . . . Start index of AO&lt;br&gt;Transducer Block&lt;br&gt;DD_REVIS . . . . Revision index of DD&lt;br&gt;PROFILE . . . . . 33037 (0x810d)</td>
</tr>
<tr>
<td>ALERT_KEY</td>
<td>4</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>1 to 255, [0]&lt;br&gt;“0” is not a permissible value and will be rejected when transferring data to the device (error alarm).</td>
</tr>
<tr>
<td>AUTOSTART</td>
<td>111</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td>Specification . . .</td>
</tr>
<tr>
<td>BINARY_INPUT 2</td>
<td>53</td>
<td>D</td>
<td>r</td>
<td></td>
<td>Specification . . .</td>
</tr>
<tr>
<td>BLOCK_ALARM</td>
<td>8</td>
<td>D</td>
<td>r</td>
<td></td>
<td>Specification . . .</td>
</tr>
</tbody>
</table>

---

**Description:**
- Sets the action during failure.
- Specification... Clearly...
- Specification...
- Specification...
- Specification...
- The minimum (consistent with the position) opening the valve.
- Specification...
- Indication...
- PROFILING EXECUTION EXECUTION NUMERICAL...
- Used to...
- This information...

**Note:**
- Indication...
**Analog Output Transducer Block**

**Description**

Sets the fail-safe action to be performed by the actuator in case of a supply air failure, determined automatically during initialization.

---

Specifies the actuator manufacturer’s identification number.

Clearly identifies the manufacturer of the actuator used with the positioner.

---

Specifies the type/model number of the actuator used with the positioner.

---

Specifies the serial number of the actuator used with the positioner.

---

Specifies the minimum transit time to reach CLOSED position.

The minimum transit time to reach CLOSED (0 % position) position is the actual time in seconds that the system (consisting of positioner, actuator and valve) needs to move through the rated travel range/angle of rotation to close the valve (measured during initialization).

---

Specifies the minimum transit time to reach OPEN position.

The minimum transit time to reach OPEN (100 % position) position is the actual time in seconds that the system (consisting of positioner, actuator and valve) needs to move through the rated travel range/angle of rotation to open the valve (measured during initialization).

---

Indicates block-specific and device-specific data.

<table>
<thead>
<tr>
<th>PROFILE_REVISION</th>
<th>. . . 1 (0x1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXECUTION_TIME</td>
<td>. . . Execution time of block</td>
</tr>
<tr>
<td>EXECUTION_PERIOD</td>
<td>. . . Repetition interval</td>
</tr>
<tr>
<td>NUM_OF_PARAMS</td>
<td>. . . No. of block parameters</td>
</tr>
</tbody>
</table>

| NEXT_FB_TO_EXECUTE | . . . Next function block to be executed |
| VIEWS_INDEX        | . . . . . . . Initial address of View objects |
| NUMBER_VIEW_3      | . . . . Number of View-3 objects |
| NUMBER_VIEW_4      | . . . . Number of View-4 objects |

**Note:** Available in versions with ESD diagnostics and higher.

---

Indicates the state of DI2.

The value of the output depends on CONFIG_BINARY_INPUT2.

---

Indicates the current block state with details on all configuration, hardware or system problems in the block.

---
## Appendix

### Analog Output Transducer Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLOCK_ERR</td>
<td>6</td>
<td>D</td>
<td>r</td>
<td></td>
<td>OUT OF SERVICE                                      DEVICE NEEDS MAINTENANCE NOW            DEVICE NEEDS MAINTENANCE SOON            LOCAL OVERRIDE.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>INPUT FAILURE.                                      OUTPUT FAILURE.                                MEMORY FAILURE.                              LOST STATIC DATA.</td>
</tr>
<tr>
<td>BLOCKING_POSITION</td>
<td>76</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td></td>
</tr>
<tr>
<td>CLOSING_DIRECTION</td>
<td>66</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td></td>
</tr>
<tr>
<td>COLLECTION_DIRECTORY</td>
<td>12</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONFIG_BINARY_INPUT2</td>
<td>56</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td>[NOT EVALUATED]                                      ACTIVELY OPEN                                ACTIVELY CLOSED                               ACTIVELY OPEN – LEAKAGE SENSOR              ACTIVELY CLOSED – LEAKAGE SENSOR</td>
</tr>
<tr>
<td>COUNTER_INIT_START</td>
<td>85</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DATALOGGER_SELECT</td>
<td>88</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td>1. . Permanent                                      2. . Trigger</td>
</tr>
<tr>
<td>DEAD_TIME_FALLING</td>
<td>115</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEAD_TIME_RISING</td>
<td>114</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Description

- **BLOCK_ERR**
  - OUT OF SERVICE
  - DEVICE NEEDS MAINTENANCE NOW
  - DEVICE NEEDS MAINTENANCE SOON
  - LOCAL OVERRIDE
  - INPUT FAILURE
  - OUTPUT FAILURE
  - MEMORY FAILURE
  - LOST STATIC DATA

- **BLOCKING_POSITION**
  - Dr/w O/M/A

- **CLOSING_DIRECTION**
  - Dr/w O/M/A

- **COLLECTION_DIRECTORY**
  - r

- **CONFIG_BINARY_INPUT2**
  - Dr/w O/M/A [NOT EVALUATED]
  - ACTIVELY OPEN
  - ACTIVELY CLOSED
  - ACTIVELY OPEN – LEAKAGE SENSOR
  - ACTIVELY CLOSED – LEAKAGE SENSOR

- **COUNTER_INIT_START**
  - r

- **DATALOGGER_PROGRESS**
  - Dr
  - 1. . Trigger select
  - 2. . Trigger not select
  - 3. . Trigger start by travel condition
  - 4. . Trigger start by solenoid condition
  - 5. . End measuring, memory full

- **DATALOGGER_SELECT**
  - Dr/w O/M/A
  - 1. . Permanent
  - 2. . Trigger

- **DEAD_TIME_FALLING**
  - Dr

- **DEAD_TIME_RISING**
  - Dr
Description
Reflects the active errors associated with a block.

- Block mode is out of service.
- Maintenance required immediately (error in the electronics).
- Maintenance required soon (zero error, positioner fault, or total valve travel exceeded).
- Output value set to “local operation” using TROVIS-VIEW, or forced venting function/zero calibration or initialization currently in process.
- Position feedback error or device not initialized
- Device not initialized
- Memory error
- Check sum error

Indicates and modifies the blocking position (see Code 35).
Indicates and modifies the closing direction (see Code 34).

This parameter is not processed by Type 3730-5.

Sets the logic state of DI2.
The parameter is processed by the BINARY_INPUT2 parameter. The parameter settings do not depend on Transducer Block DI2.

Specifies the number of initialization cycles that have been performed since the last reset.
Indicates the state of the data logger.
Available in versions with EXPERT extended diagnostics and higher.

Permits selection of data logger recording method.
Available in versions with EXPERT extended diagnostics and higher

Specifies the time that has elapsed until a change in the valve position x occurs after a falling step change of the reference variable w (during diagnostic test).
Available in versions with EXPERT extended diagnostics and higher.

Specifies the time that has elapsed until a change in the valve position x occurs after a rising step change of the reference variable w (during diagnostic test).
Available in versions with EXPERT extended diagnostics and higher.
## Appendix

### Analog Output Transducer Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DELAY_TIME</td>
<td>46</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>1 to 240 s, [10 s]</td>
</tr>
<tr>
<td>DEVIATION_MAX</td>
<td>98</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEVIATION_MIN</td>
<td>97</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| DEVICE_CHARACTERISTICS     | 32    | S  | r/w    | O/M/A  | ACTUATOR_SIZE,
|                            |       |     |        | ACTUATOR_VERSION,
|                            |       |     |        | ATTACHMENT,
|                            |       |     |        | PRESSURE_RANGE_START,
|                            |       |     |        | PRESSURE_RANGE_END,
|                            |       |     |        | SUPPLY_PRESSURE                  |
| DEVICE_INIT_STATE          | 64    | D  | r      |        |                                    |
| DIAG_LEVEL                 | 101   | D  | r      |        | EXPERT . . . Standard valve diagnostics
|                            |       |     |        | EXPERT* Extended valve diagnostics
|                            |       |     |        | ESD . . . . Emergency shutdown |
| ELAPSED_HOURS_METERS       | 82    | D  | r      |        | ELAPSED_HOURS_TOTAL . . . . . . . . .
|                            |       |     |        | ELAPSED_HOURS_IN_CLOSED_LOOP . . .
|                            |       |     |        | ELAPSED_HOURS_SWITCHED_ON_SINCE_INIT
|                            |       |     |        | ELAPSED_HOURS_IN_CLOSED_LOOP_SINCE_INIT |
| ENHANCED_DIAG_CMD          | 81    | D  | r/w    | O/M/A  | 1 . . No function
|                            |       |     |        | 2 . . Start data logger
|                            |       |     |        | 3 . . Abort data logger |
| ERROR_OPTION_DATA_FAILURE  | 39    | S  | r/w    | O/M/A  | 1 . . Control parameter
|                            |       |     |        | 2 . . Potentiometer parameter
|                            |       |     |        | 3 . . Adjusted parameter |

### Description

- **Parameter Index SK Access Mode Selection/display, [initial value]**

- **DEVIATION_MAX**
  - **Index**: 98
  - **SK**: D
  - **Access**: r
  - **Mode**: 
  - **Selection/display, [initial value]**: 

- **DEVIATION_MIN**
  - **Index**: 97
  - **SK**: D
  - **Access**: r
  - **Mode**: 
  - **Selection/display, [initial value]**: 

- **DEVICE_CHARACTERISTICS**
  - **Index**: 32
  - **SK**: S
  - **Access**: r/w
  - **Mode**: O/M/A
  - **Selection/display, [initial value]**: 

- **DEVICE_INIT_STATE**
  - **Index**: 64
  - **SK**: D
  - **Access**: r
  - **Mode**: 
  - **Selection/display, [initial value]**: 

- **DIAG_LEVEL**
  - **Index**: 101
  - **SK**: D
  - **Access**: r
  - **Mode**: 
  - **Selection/display, [initial value]**: 

- **ELAPSED_HOURS_METERS**
  - **Index**: 82
  - **SK**: D
  - **Access**: r
  - **Mode**: 
  - **Selection/display, [initial value]**: 

- **ENHANCED_DIAG_CMD**
  - **Index**: 81
  - **SK**: D
  - **Access**: r/w
  - **Mode**: O/M/A
  - **Selection/display, [initial value]**: 

- **ERROR_OPTION_DATA_FAILURE**
  - **Index**: 39
  - **SK**: S
  - **Access**: r/w
  - **Mode**: O/M/A
  - **Selection/display, [initial value]**: 

---

- **DEVICE_INIT_STATE**
  - **Index**: 64
  - **SK**: D
  - **Access**: r
  - **Mode**: 
  - **Selection/display, [initial value]**: 

- **DIAG_LEVEL**
  - **Index**: 101
  - **SK**: D
  - **Access**: r
  - **Mode**: 
  - **Selection/display, [initial value]**: 

- **ELAPSED_HOURS_METERS**
  - **Index**: 82
  - **SK**: D
  - **Access**: r
  - **Mode**: 
  - **Selection/display, [initial value]**: 

- **ENHANCED_DIAG_CMD**
  - **Index**: 81
  - **SK**: D
  - **Access**: r/w
  - **Mode**: O/M/A
  - **Selection/display, [initial value]**: 

- **ERROR_OPTION_DATA_FAILURE**
  - **Index**: 39
  - **SK**: S
  - **Access**: r/w
  - **Mode**: O/M/A
  - **Selection/display, [initial value]**: 

---

122 EB 8384-5 EN
Description

Specifies the delay time (reset criterion when control loop monitoring is in progress).
If the entered DELAY_TIME is exceeded and the system deviation is outside the specified TOLERANCE_BAND, a control loop error is issued.

Determined from the minimum transit time during initialization.

Specifies the positioner’s maximum system deviation that has occurred.
Available in versions with EXPERT+ extended diagnostics and higher.

Specifies the positioner’s minimum system deviation.
Available in versions with EXPERT+ extended diagnostics and higher.

Reflects positioner-specific data.

- BOOSTER
- STUFFING_BOX
- SEALING_EDGE (plug/seat facing)
- PRESSURE_BALANCING
- FLOW_CHARACTERISTIC
- FLOW_DIRECTION

Indicates whether the device has been initialized.
Indicates the currently installed diagnostic version.

Indicates the hours the device has been in operation.
- Total hours the device has been switched on
- Device in closed loop
- Hours the device has been switched on since last initialization
- Hours in closed loop control since last initialization

Indicates an extended diagnostic test.
- 4. Hysteresis online test
- 5. Abort hysteresis online test
- 6. Start step response
- 7. Abort step response
- 8. Start tests in turn

Indicates the masking of data errors.
- 4. General parameter
- 5. Internal device error 1
- 6. Valve dimension parameter
- 7. Info parameter
- 8. Check sum program code
### Appendix: Analog Output Transducer Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERROR_OPTION_ENH_DIAGNOSTIC_1 to ERROR_OPTION_ENH_DIAGNOSTIC_5</td>
<td>40 to 44</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td></td>
</tr>
<tr>
<td>ERROR_OPTION_HW_FAILURE</td>
<td>38</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>1. . x signal &lt;br&gt;2. . i/p converter</td>
</tr>
<tr>
<td>ERROR_OPTION_INIT_FAILURE</td>
<td>36</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>1. . x &gt; range &lt;br&gt;2. . Delta x &lt; range &lt;br&gt;3. . Mechanics/pneumatics</td>
</tr>
<tr>
<td>ERROR_OPTION_OPERATION_FAILURE</td>
<td>37</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>1. . Control loop &lt;br&gt;2. . Zero point</td>
</tr>
<tr>
<td>ERRORBYTE</td>
<td>106</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVENT_LOGGING_1</td>
<td>86</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EVENT_LOGGING_2</td>
<td>87</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FINAL_POSITION_VALUE</td>
<td>20</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FINAL_POSITION_VALUE_DISC</td>
<td>52</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td>FINAL_POSITION_VALUE_LIMITS &lt;br&gt;FINAL_POSITION_VALUE_HIGH_LIMIT &lt;br&gt;FINAL_POSITION_VALUE_LOW_LIMIT</td>
</tr>
<tr>
<td>FINAL_POSITION_VALUE_LIMITS</td>
<td>51</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td></td>
</tr>
<tr>
<td>FINAL_VALUE</td>
<td>13</td>
<td>N</td>
<td>r/w</td>
<td>O/M</td>
<td>Scaling over FINAL_VALUE_RANGE</td>
</tr>
<tr>
<td>FINAL_VALUE_CUTOFF_HI</td>
<td>15</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>0 to 125 %, [99 %]</td>
</tr>
</tbody>
</table>

**Description:**

- Specific
- 3. . Hc
- 4. . Do

**Specific:**

- 4. . Failure
- 5. . Ini
- 6. . Tra

**Specific:**

- Available

**Indicators:**

- Indication

**Specific:**

- Conta

**Indication:**

- This action

**Note:**

As this action can occur due to an extended position range, it also results in an excess (corresponding to the high limit).
Description

Specifies the masking of diagnostic status or error alarms.

Specifies the masking of hardware errors.
3. . Hardware
4. . Data memory

Specifies the masking of initialization errors.
4. . Init. time exceeded
5. . Init./solenoid valve
6. . Travel time too short

Specifies the masking of operating errors.
3. . Autocorrection
4. . Fatal error

Specifies the cancellation flag of the step response (criterion for cancellation).
Available in versions with EXPERT+ extended diagnostics and higher.

Indicates the logs 0 – 14 with the time they were recorded.
Indicates the logs 15 – 29 with the time they were recorded.

Specifies the current valve position in % in relation to the operating range FINAL_VALUE_RANGE.

Specifies FINAL_POSITION_VALUE_LIMITS, e.g. limit values reached or status of the value.

Indicates the limit of FINAL_POSITION_VALUE.
This actual value is sent to the AO Transducer Block directly from the valve.

Contains the output value received from the upstream AO Function Block.

Final position if set point exceeds the adjusted value (see Code 15).
If the set point exceeds the adjusted value, the valve is moved to the final position that corresponds to 100 % of the manipulated variable. This causes the actuator to either be vented completely or fully filled with air (corresponding to the fail-safe action).

Note: The function is deactivated by entering –2.5 %.
As this function causes the actuator to be fully vented or filled with air, the valve moves to its absolute final position. Restrictions set by the travel range or travel limitation functions do not apply. In the case that this creates excessive positioning forces, this function must be deactivated.
### Appendix Analog Output Transducer Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>FINAL_VALUE_CUTOFF_HI_ON</td>
<td>75</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td></td>
</tr>
<tr>
<td>FINAL_VALUE_CUTOFF_LO</td>
<td>16</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>−2.5 to 100 %, [1 %]</td>
</tr>
<tr>
<td>FINAL_VALUE_CUTOFF_LO_ON</td>
<td>74</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td></td>
</tr>
<tr>
<td>FINAL_VALUE_RANGE</td>
<td>14</td>
<td>S</td>
<td>r/w</td>
<td>O</td>
<td>FINAL VALUE RANGE EU_100 (see Code 9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FINAL VALUE RANGE EU_0 (see Code 8)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FINAL VALUE RANGE UNITS_INDEX</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FINAL VALUE RANGE DECIMAL</td>
</tr>
<tr>
<td>HIS_TEMPERATURE</td>
<td>100</td>
<td>D</td>
<td></td>
<td></td>
<td>T_CURRENT_TEMPERATURE . . . . . . . . . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T_MAX_TEMPERATURE . . . . . . . . . . . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HIS_T_ZEIT_MAX_TEMPERATUR . . . . . . . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>T_MIN_TEMPERATURE . . . . . . . . . . . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>HIS_T_ZEIT_MIN_TEMPERATUR . . . . . . . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TEMP_PERIOD_TIME_HIGH . . . . . . . . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>TEMP_PERIOD_TIME_LOW . . . . . . . . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td>HISTOGRAMM_X</td>
<td>96</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HISTOGRAMM_Z</td>
<td>99</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HYS_STELL_Y</td>
<td>102</td>
<td>D</td>
<td>r</td>
<td>O/M/A</td>
<td></td>
</tr>
</tbody>
</table>

### Description

**Enable**

Final position

If the selected position in the menu is Active (corresponding to '1'), the signal is in the indicated position. (corresponding to '1'), the signal is in the indicated position.

**Note:**

As this position is not an intermediate position, the output signal is determined by the final position.

**Enable**

Sets the Final Value

The selected position is the Final Position.

**Note:**

Pin POS_P is the Final Value.

**FINAL_VALUE_RANGE**

Sets the Final Value range.

The selected position is the Final Value.

**Note:**

Pin POS_P is the Final Value.

**FINAL_VALUE_CUTOFF_HI**

Sets the cutoff value for HI.

**Note:**

The selected position is the cutoff value.

**FINAL_VALUE_CUTOFF_LO**

Sets the cutoff value for LO.

**Note:**

The selected position is the cutoff value.

**HIS_TEMPERATURE**

Indicates the current, max, min, and average temperature.

**HISTOGRAMM_X**

Reflects the histogram for the X-axis and shows the distribution of data.

**HISTOGRAMM_Z**

Reflects the histogram for the Z-axis and shows the distribution of data.

**HYS_STELL_Y**

Reflects the histogram for the Y-axis and shows the distribution of data.
Analog Output Transducer Block

Description

Enables the final position \( w > \) (see Code 1.5).

Final position if set point falls below adjusted value (see Code 1.4).

If the set point falls below the adjusted value, the valve is moved to the final position that corresponds to 0 % of the manipulated variable. This causes the actuator to either be vented completely or fully filled with air (corresponding to the fail-safe action).

Note: The function is deactivated by entering –2.5 %.

As this function causes the actuator to be fully vented or filled with air, the valve moves to its absolute final positions. Restrictions set by the travel range or travel limitation functions do not apply. In the case that this creates excessive positioning forces, this function must be deactivated.

Enables final position \( w < \) (see Code 1.4).

9) Sets the travel range/angle of rotation.

The set point FINAL_VALUE is sent to the AO Transducer Block directly from an upstream AO Function Block.

Note: The operating range FINAL_VALUE_RANGE is compared with the TRANSM_PIN_POS. If the TRANSM_PIN_POS is changed, the positioner checks whether the setting and unit matches the current operating range FINAL_VALUE_RANGE. If this is not the case, the operating range FINAL_VALUE_RANGE is set to 0-100 %.

Indicates temperature-specific data.

- . . Current temperature
- . . Max. temperature
- . . Duration of max. temperature
- . . Min. temperature
- . . Duration of min. temperature
- . . Time the temperature below 80 °C
- . . Time the temperature below –40 °C

Reflects the valve position \( x \). The valve position histogram provides a static evaluation of the recorded travel positions. The histogram indicates, for example the travel range in which the valve has mainly been operating and whether a recent trend can be recognized, indicating a change of the main operating range.

Available in versions with EXPERT+ extended diagnostics and higher.

The cycle counter records the number of spans and the associated heights of the spans, which are categorized in fixed intervals (classes). The cycle counter histogram provides a static evaluation of the cycle spans, thus furnishing data on the dynamic stress that a bellows or an installed packing are exposed to.

Available in versions with EXPERT+ extended diagnostics and higher.

Specifies the minimum interval at which hysteresis tests are performed.

Available in versions with EXPERT+ extended diagnostics and higher.
### Appendix

#### Analog Output Transducer Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDENT_LIMIT_SWITCHES</td>
<td>55</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td>1. Not implemented&lt;br&gt;2. Binary input 2&lt;br&gt;3. Solenoid valve&lt;br&gt;4. Limit switch&lt;br&gt;[depending on hardware upgrade]</td>
</tr>
<tr>
<td>IDENT_OPTIONS</td>
<td>54</td>
<td>D</td>
<td>r</td>
<td></td>
<td>1. Not implemented&lt;br&gt;2. Binary input 2&lt;br&gt;3. Solenoid valve&lt;br&gt;4. Limit switch</td>
</tr>
<tr>
<td>KP_STEP</td>
<td>17</td>
<td>S</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LATENCY_AFTER_STEP</td>
<td>109</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>0 to 120 s, [1 s]</td>
</tr>
<tr>
<td>LIN_TYPE</td>
<td>69</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>1. Linear&lt;br&gt;2. Equal percentage&lt;br&gt;3. Equal percentage reverse&lt;br&gt;4. SAMSON butterfly linear</td>
</tr>
<tr>
<td>LOGGING_LIMIT</td>
<td>92</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td>1. Lower limit&lt;br&gt;2. Upper limit</td>
</tr>
<tr>
<td>MODE_BLK</td>
<td>5</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>AUTO Automatic&lt;br&gt;O/S Out of Service&lt;br&gt;MAN&lt;br&gt;LO Local Override</td>
</tr>
<tr>
<td>MOVING_DIRECTION</td>
<td>65</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td></td>
</tr>
</tbody>
</table>

**Description**

Specified parameters are provided in the table above. Initial values for parameters are provided where they need to be set.

**Indicators**

- D: Digital
- S: Analog
- r: Read-only
- w: Write-only
- O: Output
- M: Manual
- A: Access mode

**Notes**

- This parameter is set to [initial value] by default.
- Available in [access mode(s)].

**Sets the**

- LATENCY_AFTER_STEP: 0 to 120 s, [1 s]
- AVAILABLE: [access mode(s)]

**Sets the**

- LOGGING_LIMIT: 1. Lower limit<br>2. Upper limit
- AVAILABLE: [access mode(s)]

**Sets the**

- MOVING_DIRECTION: [access mode(s)]
- AVAILABLE: [access mode(s)]

**Sets the**

- MODE_BLK: AUTO Automatic<br>O/S Out of Service<br>MAN<br>LO Local Override
- AVAILABLE: [access mode(s)]

**Sets the**

- AVAILABLE: [access mode(s)]
Analog Output Transducer Block

Description
Specifications whether optional inductive limit switches are installed. Limit switches are not detected automatically; they need to be entered manually (see Code 38).

Indicates which optional components are installed.

Indicates the selected initialization mode (see Code 6).

Specifies $K_p$ (see Code 17).
This parameter can only be read over FOUNDATION fieldbus. The value is detected during initialization.

This parameter sets the waiting time required to jump back from the final value of the first step change to the initial value of the second step change (reverse step change).
Available in versions with EXPERT+ extended diagnostics and higher.

Sets the characteristic (see Code 20)
5. SAMSON butterfly equal percentage
6. VETEC rotary linear
7. VETEC rotary equal percentage
8. Segmented ball valve linear
9. Segmented ball valve equal percentage
10. User defined

Indicates the initial value of an event that triggers logging.
Available in versions with EXPERT+ extended diagnostics and higher.

Used to indicate/select the actual mode of the Resource Block, the permitted modes supported by the Transducer Block, and the normal mode.

In this operating mode, a positioning value is calculated from the output value from the AO Function Block and the control valve is positioned accordingly.

In this operating mode, the output value from the AO Function Block is not used. The control valve is moved to its mechanical fail-safe position set by ACT_FAIL_ACTION. The mode is also changed to O/S when the forced venting function is triggered.

If the device is locally set to the MAN mode, the Analog Output Transducer Block is set to LO.

Specifies the direction of action of the reference variable $w$ in relation to the controlled variable $x$ (see Code 7).
## Appendix

### Analog Output Transducer Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO_OF_ZERO_POINT_ADJ</td>
<td>83</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OVERSHOOT_FALLING</td>
<td>113</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OVERSHOOT_RISING</td>
<td>112</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRESSURE_LIMIT</td>
<td>80</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>1 . Off . . . . . . . . . . . 3 . 2.4 bar</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 . . 3.7 bar . . . . . . . . . 4 . 1.4 bar</td>
</tr>
<tr>
<td>PRESSURE_Y</td>
<td>50</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRETRIGGER_TIME</td>
<td>93</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td></td>
</tr>
<tr>
<td>RAMP_DOWN</td>
<td>108</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td>[0]</td>
</tr>
<tr>
<td>RAMP_UP</td>
<td>107</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td>[0]</td>
</tr>
<tr>
<td>RATED_TRAVEL</td>
<td>58</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>0 to 255.9 mm, [15.0 mm]</td>
</tr>
<tr>
<td>SAMPLE_RATE</td>
<td>90</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td></td>
</tr>
</tbody>
</table>

### Description

- **NO_OF_ZERO_POINT_ADJ**: Specify the number of zero points.
- **OVERSHOOT_FALLING**: Evaluate overshoot during the falling edge.
- **OVERSHOOT_RISING**: Evaluate overshoot during the rising edge.
- **PRESSURE_LIMIT**: Set the pressure limit.
- **PRESSURE_Y**: Set the pressure value.
- **PRETRIGGER_TIME**: Set the pre-trigger time.
- **RAMP_DOWN**: Set the ramp down parameter.
- **RAMP_UP**: Set the ramp up parameter.
- **RATED_TRAVEL**: Set the rated travel parameter.
- **SAMPLE_RATE**: Set the sample rate.

**Note**: Refer to the user manual for detailed specifications and usage instructions.

**Specified Parameters**

- The data type for each parameter is specified.
- For example, the pre-trigger time parameter is available for reading and writing.
- The data representation includes both numerical and textual values.
- The data range is specified for each parameter.

**Access Modes**

- O: Read only
- M: Read/write
- A: Available

**Initial Values**

- Parameters may have default or initial values provided for ease of use.

**Used to**

- Used to configure and control the analog output transducer block parameters.

**Available**

- Parameters are available for configuration and operation.

**Display**

- Parameters can be displayed in the specified mode (O/M/A).

**Selection**

- Parameters can be selected for configuration based on the access mode (r/w).
<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero calibration count</td>
<td>Specifies the number of zero calibrations performed since the last initialization.</td>
</tr>
<tr>
<td>Actuator pressure percentage</td>
<td>Used to set the pressure limit (see Code 16).</td>
</tr>
<tr>
<td>Data logger trigger function</td>
<td>The data logger can be triggered as soon as a certain event occurs. The pretrigger function can be used to display data recorded before this event. This is made possible by a ring buffer in which all events are saved continuously. For example, if the pretrigger time is set to 1 s, all events that occurred in the second before the data logger was triggered are displayed. Available in versions with EXPERT+ extended diagnostics and higher.</td>
</tr>
<tr>
<td>Step response time</td>
<td>The dynamic control response of the control valve can be tested by recording step responses. Sets the time in which the reverse step change is expected to fall. Available in versions with EXPERT+ extended diagnostics and higher.</td>
</tr>
<tr>
<td>Step response time</td>
<td>The dynamic control response of the control valve can be examined by recording step responses. Sets the time in which the reverse step change is expected to rise. Available in versions with EXPERT+ extended diagnostics and higher.</td>
</tr>
<tr>
<td>Rated travel</td>
<td>Specifies the rated travel [mm] or rotational angle [degrees] of the valve (see Code 5). Note: The unit [mm] or [degrees] depends on the VALVE_TYPE parameter.</td>
</tr>
<tr>
<td>Sampling rate</td>
<td>Used to set the sampling rate of the data logger in ms. Available in versions with EXPERT+ extended diagnostics and higher.</td>
</tr>
</tbody>
</table>
## Appendix

### Analog Output Transducer Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SELF_CALIB_STATUS</td>
<td>63</td>
<td>D</td>
<td>r</td>
<td></td>
<td>1. Not active&lt;br&gt;2. Running&lt;br&gt;3. Test aborted&lt;br&gt;4. Zero point adjustment</td>
<td>Indicates self-calibration state&lt;br&gt;Running state&lt;br&gt;Test aborted state&lt;br&gt;Zero point adjustment state</td>
</tr>
<tr>
<td>SERVO_RESET</td>
<td>18</td>
<td>S</td>
<td>r</td>
<td></td>
<td></td>
<td>This parameter controls the servo reset. Allows the servo to be reset.</td>
</tr>
<tr>
<td>SET_FAIL_SAFE_POS</td>
<td>57</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>1. Not active&lt;br&gt;2. Set fail-safe position&lt;br&gt;3. Clear fail-safe position</td>
<td>Indicates the current fail-safe state&lt;br&gt;Activates fail-safe position&lt;br&gt;Clears fail-safe position</td>
</tr>
<tr>
<td>SETP_DEVITATION</td>
<td>45</td>
<td>D</td>
<td>r</td>
<td></td>
<td>1. Indicate deviation&lt;br&gt;2. Display deviation&lt;br&gt;3. Clear deviation</td>
<td>Indicates the deviation from the ideal position&lt;br&gt;Displays deviation&lt;br&gt;Clears deviation</td>
</tr>
<tr>
<td>SIGNAL_PRESSURE_ACTION</td>
<td>77</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
<td>Indicates the signal pressure&lt;br&gt;Displays signal pressure&lt;br&gt;Clears signal pressure</td>
</tr>
<tr>
<td>SOLENOID_SELECT</td>
<td>94</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td></td>
<td>Indicates solenoid status&lt;br&gt;Displays solenoid status&lt;br&gt;Clears solenoid status</td>
</tr>
<tr>
<td>ST_REV</td>
<td>1</td>
<td>S</td>
<td>r</td>
<td></td>
<td></td>
<td>The rev parameter indicates the current position.</td>
</tr>
<tr>
<td>START_VALUE</td>
<td>91</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td></td>
<td>The start value parameter indicates the initial value.</td>
</tr>
</tbody>
</table>
Analog Output Transducer Block

Description

Starts the calibration sequences in the field device and the resetting of error alarms.

13 . . Reset “Autocorrection”
14 . . Reset “Fatal error”
15 . . Reset “Extended diagnosis”
16 . . Reset “x > range”
17 . . Reset “Delta x < range”
18 . . Reset “Attachment”
19 . . Reset “Initialization time exceeded”
20 . . Reset “Initialization/solenoid valve”
21 . . Reset “Travel time too short”
22 . . Reset “Pin position”
23 . . Reset “x signal”
24 . . Reset “i/p converter”
25 . . Reset “Hardware”
26 . . Reset “Control parameter”
27 . . Reset “Poti parameter”
28 . . Reset “Adjustment parameter”
29 . . Reset “General parameter”
30 . . Reset “Internal device error 1”
31 . . Reset “No emergency mode”
32 . . Reset “Program load error”
33 . . Reset “Options parameter”
34 . . Reset “Info parameter”
35 . . Reset “Data memory”
36 . . Reset “Control calculation”
37 . . Reference_Test_Aborted

Indicates the state of the calibration sequence started with SELF_CALIB_CMD.

5 . . Maximum point adjustment
6 . . Detection of mech. steps
7 . . Controller optimization
8 . . Fine adjustment
9 . . Step 1 (step response)
10 . . Step 2 (step response)
11 . . Terminated

This parameter is not processed by Type 3730-5.

Allows the valve to be moved to its actual fail-safe position. Fail-safe position is indicated by an S blinking on the display.

Indicates the system deviation e (see Code 39).

This parameter is determined during initialization and indicates the position of the slide switch (AIR TO OPEN/CLOSE). The positioner needs to be re-initialized when the switch position is changed.

Indicates the status of the solenoid valve (see Code 45).

Note: By selecting “1” (Close) the “Maintenance now” Block of the AO Transducer Block is entered in the AO Block as an “Output Error” block error.

Available in versions with EXPERT+ extended diagnostics and higher.

The revision state of static data is displayed.

Note: The revision state is incremented by one each time a static parameter in the block is written.

The start value is specified for a triggered start condition of the data logger (valve position in %).

Available in versions with EXPERT+ extended diagnostics and higher.
### Analogue Output Transducer Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>STEP_PROGRESS</td>
<td>120</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STEP_SAMPLE_RATE</td>
<td>105</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td>[0.1] to 120 s</td>
</tr>
<tr>
<td>STEP_SELECTION</td>
<td>110</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td>1. . One step 2. . Two steps</td>
</tr>
<tr>
<td>STEPEND</td>
<td>104</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td>0 to [100 %]</td>
</tr>
<tr>
<td>STEPSTART</td>
<td>103</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td>[0] to 100 %</td>
</tr>
<tr>
<td>STRATEGY</td>
<td>3</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>[0]</td>
</tr>
<tr>
<td>SUB_MODE_INIT</td>
<td>62</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TAG_DESC</td>
<td>2</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>Max. 32 characters</td>
</tr>
<tr>
<td>TIME_63_FALLING</td>
<td>117</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIME_63_RISING</td>
<td>116</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIME_98_FALLING</td>
<td>119</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIME_98_RISING</td>
<td>118</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOLERANCE_BAND</td>
<td>47</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>0.1 to 10 %, [5 %]</td>
</tr>
<tr>
<td>TOT_VALVE_TRAV_LIM</td>
<td>49</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>1000 to 990 000 000, [1 000 000]</td>
</tr>
<tr>
<td>TOTAL_VALVE_TRAVEL</td>
<td>48</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Description:**

The parameter tables for the Analogue Output Transducer Block are provided.

**Availability:**

The parameters are generally available for read/write (r/w) access and can be accessed using O/M/A mode.

**Note:**

The notes for each parameter provide additional information about their functionality and usage.

- **Availability:**
  - The parameters are generally available for read/write (r/w) access and can be accessed using O/M/A mode.
  - The parameters include:
    - Step Progress
    - Step Sample Rate
    - Step Selection
    - Step End
    - Step Start
    - Strategy
    - Sub Mode Init
    - Tag Desc
    - Time 63 Falling
    - Time 63 Rising
    - Time 98 Falling
    - Time 98 Rising
    - Tolerance Band
    - Total Valve Travel Limit
    - Total Valve Travel

**Code:**

Code 2
**Analog Output Transducer Block**

### Description

The progress of the step response test is indicated.
Available in versions with EXPERT* extended diagnostics and higher.

Used to set the sampling rate of the step response logging
Available in versions with EXPERT* extended diagnostics and higher.

The dynamic control behavior of the valve can be tested by recording the step responses. Two reference variable steps are performed by default and the course of the valve position x and the manipulated variable y are plotted until they reach a steady state. The first step starts at an initial value defined beforehand and finishes at the determined final value. After the entered waiting time, the second step is performed in reverse starting with the final value back to the initial value.

This parameter is used to select whether just one step is to be performed or whether also the reverse step is to be performed after the first step.
Available in versions with EXPERT* extended diagnostics and higher.

Used to set the final value to perform the step response.
Available in versions with EXPERT* extended diagnostics and higher.

Used to set the initial value to perform the step response.
Available in versions with EXPERT* extended diagnostics and higher.

Permits strategic grouping and thus faster processing of blocks. Blocks are grouped by entering the same number in the STRATEGY parameter of each block.

**Note:** These data are neither checked nor processed by the Transducer Block.

Indicates whether an initialization has been performed in the SUB mode.

Assigns a unique description to each block for clear identification

Determined from the step response test T63 for the falling step.
Available in versions with EXPERT* extended diagnostics and higher.

Determined from the step response test T63 for the rising step.
Available in versions with EXPERT* extended diagnostics and higher.

Determined from the step response test T98 for the falling step.
Available in versions with EXPERT* extended diagnostics and higher.

Determined from the step response test T98 for the rising step.
Available in versions with EXPERT* extended diagnostics and higher.

**Tolerance band (see Code 19)**

Indicates limit of absolute total valve travel (see Code 24).

Absolute total valve travel: Sum of the nominal travel cycles (double strokes), total number of valve strokes (see Code 23).
### Appendix Analog Output Transducer Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRANSDUCER_DIRECTORY</td>
<td>9</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| TRANSDUCER_STATE      | 34    | D  | r      |      | 1. . See operating mode  
|                       |       |     |        |      | 2. . Solenoid valve active  
|                       |       |     |        |      | 3. . Lower travel limit active  |
| TRANSDUCER_TYPE       | 10    | N  | r      |      |                                     |
| TRANSM_PIN_POS        | 59    | S  | r/w    | O/M/A|                                     |
| TRAVEL_LOWER_LIMIT    | 71    | S  | r/w    | O/M/A|                                     |
| TRAVEL_LOWER_LIMIT_ON | 70    | S  | r/w    | O/M/A|                                     |
| TRAVEL_RATE_DEC       | 79    | S  | r/w    | O/M/A|                                     |
| TRAVEL_RATE_INC       | 78    | S  | r/w    | O/M/A|                                     |
| TRAVEL_UPPER_LIMIT    | 73    | S  | r/w    | O/M/A|                                     |
| TRAVEL_UPPER_LIMIT_ON | 72    | S  | r/w    | O/M/A|                                     |
| TRIGGER_SELECT        | 89    | S  | r/w    | O/M/A| 1. . Valve position  
|                       |       |     |        |      | 2. . Solenoid condition  
|                       |       |     |        |      | 3. . Valve position or solenoid condition |
| TV_STEP               | 19    | S  | r      |      |                                     |
| UPDATE_EVT            | 7     | D  | r      |      |                                     |
| USER_CHARACTERISTIC   | 33    | S  | r/w    | O/M/A|                                     |
| VALVE_MAN_ID          | 25    | S  | r/w    | O/M/A|                                     |
| VALVE_MODEL_NUM       | 26    | S  | r/w    | O/M/A|                                     |
| VALVE_SN              | 27    | S  | r/w    | O/M/A|                                     |

### Description

This page lists the parameters of the Analog Output Transducer Block, including their indexes, access modes, and selection/display information. Each parameter has a brief description of its function or the values it can take.

**TRANSDUCER_STATE**
- **Index**: 34
- **Access**: D (read-only)
- **Description**:
  - 1. . See operating mode
  - 2. . Solenoid valve active
  - 3. . Lower travel limit active

**TRANSM_PIN_POS**
- **Index**: 59
- **Access**: S (read/write)
- **Mode**: O/M/A

**TRAVEL_LOWER_LIMIT**
- **Index**: 71
- **Access**: S (read/write)
- **Mode**: O/M/A

**TRAVEL_LOWER_LIMIT_ON**
- **Index**: 70
- **Access**: S (read/write)
- **Mode**: O/M/A

**TRAVEL_RATE_DEC**
- **Index**: 79
- **Access**: S (read/write)
- **Mode**: O/M/A

**TRAVEL_RATE_INC**
- **Index**: 78
- **Access**: S (read/write)
- **Mode**: O/M/A

**TRAVEL_UPPER_LIMIT**
- **Index**: 73
- **Access**: S (read/write)
- **Mode**: O/M/A

**TRAVEL_UPPER_LIMIT_ON**
- **Index**: 72
- **Access**: S (read/write)
- **Mode**: O/M/A

**TRIGGER_SELECT**
- **Index**: 89
- **Access**: S (read/write)
- **Mode**: O/M/A
- **Description**:
  - 1. . Valve position
  - 2. . Solenoid condition
  - 3. . Valve position or solenoid condition

**TV_STEP**
- **Index**: 19
- **Access**: S (read-only)

**UPDATE_EVT**
- **Index**: 7
- **Access**: D (read-only)

**USER_CHARACTERISTIC**
- **Index**: 33
- **Access**: S (read/write)
- **Mode**: O/M/A

**VALVE_MAN_ID**
- **Index**: 25
- **Access**: S (read/write)
- **Mode**: O/M/A

**VALVE_MODEL_NUM**
- **Index**: 26
- **Access**: S (read/write)
- **Mode**: O/M/A

**VALVE_SN**
- **Index**: 27
- **Access**: S (read/write)
- **Mode**: O/M/A

### Note
- The pin positions and travel limits are configurable.
- The following code 4 indicates limits to final position.
- The trigger select parameter allows selection of valve position or solenoid condition.
- The update event parameter is used for event logging.
- The user characteristic parameter allows for additional custom settings.
- The valve model number and serial number are used for identification purposes.
Analog Output Transducer Block

Description

This parameter is not processed in Type 3730-5.

Indicates the state of the Transducer Block.

4. Upper travel limit active
5. End position < active
6. End position > active
7. Fail-safe position active
8. Normal operation

Indicates the type of transducer. Standard Advanced Positioner Valve in this case.

The pin position must be entered for initialization in NOM or SUB modes. The follower pin must be placed in the correct pin position depending on the valve travel/angle of rotation (see Code 4).

Limits the travel/angle of rotation downwards. The characteristic is not adapted compared to the FINAL_VALUE_RANGE (see Code 10).

Enables the lower x-limit (see Code 10).

Indicates the time required by the valve to move through the operating range when the valve closes (see Code 22).

Indicates the time required by the valve to move through the operating range when the valve opens (see Code 21).

Limits the travel/angle of rotation upwards. The characteristic is not adapted compared to FINAL_VALUE_RANGE (see Code 11)

Enables the upper x-limit (see Code 11).

On selecting TRIGGER in DATALOGGER_SELECT parameter, the user can select which events are to trigger the event logger.

Available in versions with EXPERT+ extended diagnostics and higher.

Indicates Tv (see Code 19)

**Note:** This parameter can only be read over FOUNDATION fieldbus. The value is recorded during initialization.

Indicates that static data were changed, including date and time stamp.

Allows the user-defined characteristic to be entered.

The characteristic to be used is selected over the LIN_TYPE parameter (user-defined in this case).

The following condition must be fulfilled in this case: \( x(t-1) < x(t) \), i.e. the values for \( x \) must continually rise.

Clear identification of the manufacturer of the valve that the positioner is mounted on.

Indicates the model version of the valve that the positioner is mounted on.

Indicates the serial number of the valve that the positioner is mounted on.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>VALVE_TYPE</td>
<td>28</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>UNINITIALIZED</td>
</tr>
<tr>
<td>XD_CAL_DATE</td>
<td>30</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td></td>
</tr>
<tr>
<td>XD_CAL_LOC</td>
<td>29</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td></td>
</tr>
<tr>
<td>XD_CAL_WHO</td>
<td>31</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td></td>
</tr>
<tr>
<td>XD_ERROR</td>
<td>11</td>
<td>D</td>
<td>r</td>
<td></td>
<td>NONE (0)</td>
</tr>
<tr>
<td>XD_ERROR_EXT</td>
<td>35</td>
<td>D</td>
<td>r</td>
<td></td>
<td>1. . xd_error_ext_1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“Device not initialized”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“Solenoid valve active” or</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“SET_FAIL_SAFE_POS active”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“Total valve travel limit exceeded”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“Control loop” (see Code 57)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“Zero point” (see Code 58)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“Autocorrection” (see Code 59)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“Fatal error” (see Code 60)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“Extended diagnosis”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“x &gt; range” (see Code 50)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“Delta x &lt; range” (see Code 51)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“Attachment” (see Code 52)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“Initialization time exceeded”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“Initialization/solenoid valve”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“Travel time too short”</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“Pin position” (see Code 56)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“Test or calibration running”</td>
</tr>
</tbody>
</table>
Analog Output Transducer Block

Description

Type of valve

Note! The Type 3730-5 differentiates merely between linear and rotary valves

- (Type 3730-5: Treated like a globe valve)
- (Control valves with straight moving plug, e.g. globe valves)
- (Control valves with rotating closure members)
- (Type 3730-5: Treated like a globe valve)
- The last setting is kept.

Indicates the time when the last calibration was performed.
Indicates the location where the last calibration was performed.
Indicates the person who performed the last calibration.

Errors listed in the Transducer Block

- No error
- Unspecified (device not initialized, initialization or zero calibration in progress or total valve travel exceeded)
- General device error
- Zero point, internal control loop, or initialization error, reference test canceled (Code 81, only with EXPERT+)
- Parameter or characteristic faulty
- i/p converter (Code 64), hardware (Code 65), bus connection
- Fault in the mechanics
- Check sum error
- Dynamic values outside of the range

Extended errors listed in the Transducer Block

2. xd_error_ext_2
   "x signal" (see Code 62)
   "i/p converter" (see Code 64)
   "Hardware" (see Code 65)
   "Control parameter" (see Code 68)
   "Poti parameter" (see Code 69)
   "Adjustment parameter" (see Code 70)
   "General parameter" (see Code 71)
   "Internal device error 1" (see Code 73)
   "No emergency mode" (see Code 76)
   "Program load error" (see Code 77)
   "Options parameters" (see Code 78)
   "Info parameters" (see Code 75)
   "Data memory" (see Code 66)
   "Control calculation" (see Code 67)
   "Reference test aborted" (see Code 81)

3. xd_error_txt_3 (EXPERT+ function)

4. Air supply (EXPERT+ function)
5. Actuator spring (EXPERT+ function)
6. Shifting working range (EXPERT+ function)
7. Friction (EXPERT+ function)
8. Leakage pneumatic (EXPERT+ function)
9. Limit working range (EXPERT+ function)
10. Dynamic stress factor (EXPERT+ function)
11. Inner leakage (EXPERT+ function)
12. External leakage (EXPERT+ function)
13. Observing end position (EXPERT+ function)
14. Connection positioner valve (EXPERT+ function)
15. Working range (EXPERT+ function)
16. Emergency shutdown (EXPERT+ function)
17. Temperature error (EXPERT+ function)
### Appendix

**Analog Output Transducer Block**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ZERO_POINT_LIMIT</td>
<td>84</td>
<td>D</td>
<td>r/w</td>
<td>O/M/A</td>
<td></td>
</tr>
</tbody>
</table>

#### Parameter index

<table>
<thead>
<tr>
<th>Index</th>
<th>Parameter</th>
<th>Index</th>
<th>Parameter</th>
<th>Index</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>ADVANCED_PV_BASIC</td>
<td>22</td>
<td>ACT_MAN_ID</td>
<td>41</td>
<td>ERROR_OPTION_ENH_DIAGNOSTIC_2</td>
</tr>
<tr>
<td>1</td>
<td>ST_REV</td>
<td>23</td>
<td>ACT_MODEL_NUM</td>
<td>42</td>
<td>ERROR_OPTION_ENH_DIAGNOSTIC_3</td>
</tr>
<tr>
<td>2</td>
<td>TAG_DESC</td>
<td>24</td>
<td>ACT_SN</td>
<td>43</td>
<td>ERROR_OPTION_ENH_DIAGNOSTIC_4</td>
</tr>
<tr>
<td>3</td>
<td>STRATEGY</td>
<td>25</td>
<td>VALUE_MAN_ID</td>
<td>44</td>
<td>ERROR_OPTION_ENH_DIAGNOSTIC_5</td>
</tr>
<tr>
<td>4</td>
<td>ALERT_KEY</td>
<td>26</td>
<td>VALUE_MODEL_NUM</td>
<td>45</td>
<td>SETP_DEVIATION</td>
</tr>
<tr>
<td>5</td>
<td>MODE_BLK</td>
<td>27</td>
<td>VALVE_SN</td>
<td>46</td>
<td>DELAY_TIME</td>
</tr>
<tr>
<td>6</td>
<td>BLOCK_ERR</td>
<td>28</td>
<td>VALVE_TYPE</td>
<td>47</td>
<td>TOLERANCE_BAND</td>
</tr>
<tr>
<td>7</td>
<td>UPDATE_EVT</td>
<td>29</td>
<td>XD_CAL_LOC</td>
<td>48</td>
<td>TOTAL_VALVE_TRAVEL</td>
</tr>
<tr>
<td>8</td>
<td>BLOCK_ALARM</td>
<td>30</td>
<td>XD_CAL_DATE</td>
<td>49</td>
<td>TOT_VALVE_TRAV_LIM</td>
</tr>
<tr>
<td>9</td>
<td>TRANSDUCER_DIRECTORY</td>
<td>31</td>
<td>XD_CAL_WHO</td>
<td>50</td>
<td>PRESSURE_Y</td>
</tr>
<tr>
<td>10</td>
<td>TRANSDUCER_TYPE</td>
<td>32</td>
<td>DEVICE_CHARACTERISTICS</td>
<td>51</td>
<td>FINAL_POSITION_VALUE_LIM</td>
</tr>
<tr>
<td>11</td>
<td>XD_ERROR</td>
<td>33</td>
<td>USER_CHARACTERISTIC</td>
<td>52</td>
<td>FINAL_POSITION_VALUE_DISC</td>
</tr>
<tr>
<td>12</td>
<td>COLLECTION_DIRECTORY</td>
<td>34</td>
<td>TRANSDUCER_STATE</td>
<td>53</td>
<td>BINARY_INPUT2</td>
</tr>
<tr>
<td>13</td>
<td>FINAL_VALUE</td>
<td>35</td>
<td>XD_ERROR_EXT</td>
<td>54</td>
<td>IDENT_OPTIONS</td>
</tr>
<tr>
<td>14</td>
<td>FINAL_VALUE_RANGE</td>
<td>36</td>
<td>ERROR_OPTION_INIT_FAILURE</td>
<td>55</td>
<td>IDENT_LIMIT_SWITCHES</td>
</tr>
<tr>
<td>15</td>
<td>FINAL_VALUE_CUTOFF_HI</td>
<td>37</td>
<td>ERROR_OPTION_OPERATION_FAILURE</td>
<td>56</td>
<td>CONFIG_BINARY_INPUT2</td>
</tr>
<tr>
<td>16</td>
<td>FINAL_VALUE_CUTOFF_LO</td>
<td>38</td>
<td>ERROR_OPTION_HW_FAILURE</td>
<td>57</td>
<td>SET_FAIL_SAFE_POS</td>
</tr>
<tr>
<td>17</td>
<td>KP_STEP</td>
<td>39</td>
<td>ERROR_OPTION_DATA_FAILURE</td>
<td>58</td>
<td>RATED_TRAVEL</td>
</tr>
<tr>
<td>18</td>
<td>SERVO_RESET</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>TV_STEP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>FINAL_POSITION_VALUE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>ACT_FAIL_ACTION</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

140 EB 8384-5 EN
## Description

Indicates the zero point limit [%]

<table>
<thead>
<tr>
<th>Index</th>
<th>Parameter</th>
<th>Index</th>
<th>Parameter</th>
<th>Index</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>59</td>
<td>TRANSM_PIN_POS</td>
<td>79</td>
<td>TRAVEL_RATE_DEC</td>
<td>101</td>
<td>DIAG_LEVEL</td>
</tr>
<tr>
<td>60</td>
<td>INIT_METHOD</td>
<td>80</td>
<td>PRESSURE_LIMIT</td>
<td>102</td>
<td>HYS_STELL_Y</td>
</tr>
<tr>
<td>61</td>
<td>SELF_CALIB_CMD</td>
<td>81</td>
<td>ENHANCED_DIAG_CMD</td>
<td>103</td>
<td>STEPSTART</td>
</tr>
<tr>
<td>62</td>
<td>SUB_MODE_INIT</td>
<td>82</td>
<td>ELAPSED_HOURS_METERS</td>
<td>104</td>
<td>STEPEND</td>
</tr>
<tr>
<td>63</td>
<td>SELF_CALIB_STATUS</td>
<td>83</td>
<td>NO_OF_ZERO_POINT_ADJ</td>
<td>105</td>
<td>STEP_SAMPLE_RATE</td>
</tr>
<tr>
<td>64</td>
<td>DEVICE_INIT_STATE</td>
<td>84</td>
<td>ZERO_POINT_LIMIT</td>
<td>106</td>
<td>ERRORBYTE</td>
</tr>
<tr>
<td>65</td>
<td>MOVING_DIRECTION</td>
<td>85</td>
<td>COUNTER_INIT_START</td>
<td>107</td>
<td>RAMP_UP</td>
</tr>
<tr>
<td>66</td>
<td>CLOSING_DIRECTION</td>
<td>86</td>
<td>EVENT_LOGGING_1</td>
<td>108</td>
<td>RAMP_DOWN</td>
</tr>
<tr>
<td>67</td>
<td>ACT_STROKE_TIME_DEC</td>
<td>87</td>
<td>EVENT_LOGGING_2</td>
<td>109</td>
<td>LATENCY_AFTER_STEP</td>
</tr>
<tr>
<td>68</td>
<td>ACT_STROKE_TIME_INC</td>
<td>88</td>
<td>DATALOGGER_SELECT</td>
<td>110</td>
<td>STEP_SELECTION</td>
</tr>
<tr>
<td>69</td>
<td>LIN_TYPE</td>
<td>89</td>
<td>TRIGGER_SELECT</td>
<td>111</td>
<td>AUTOSTART</td>
</tr>
<tr>
<td>70</td>
<td>TRAVEL_LOWER_LIMIT_ON</td>
<td>90</td>
<td>SAMPLE_RATE</td>
<td>112</td>
<td>OVERSHOOT_RISING</td>
</tr>
<tr>
<td>71</td>
<td>TRAVEL_LOWER_LIMIT</td>
<td>91</td>
<td>START_VALUE</td>
<td>113</td>
<td>OVERSHOOT_FALLING</td>
</tr>
<tr>
<td>72</td>
<td>TRAVEL_UPPER_LIMIT_ON</td>
<td>92</td>
<td>LOGGING_LIMIT</td>
<td>114</td>
<td>DEAD_TIME_RISING</td>
</tr>
<tr>
<td>73</td>
<td>TRAVEL_UPPER_LIMIT</td>
<td>93</td>
<td>PRETRIGGER_TIME</td>
<td>115</td>
<td>DEAD_TIME_FALLING</td>
</tr>
<tr>
<td>74</td>
<td>FINAL_VALUE_CUTOFF_LO_ON</td>
<td>94</td>
<td>SOLENOID_SELECT</td>
<td>116</td>
<td>TIME_63_RISING</td>
</tr>
<tr>
<td>75</td>
<td>FINAL_VALUE_CUTOFF_HI_ON</td>
<td>95</td>
<td>DATALOGGER_PROGRESS</td>
<td>117</td>
<td>TIME_63_FALLING</td>
</tr>
<tr>
<td>76</td>
<td>BLOCKING_POSITION</td>
<td>96</td>
<td>HISTOGRAMM_X</td>
<td>118</td>
<td>TIME_98_RISING</td>
</tr>
<tr>
<td>77</td>
<td>SIGNAL_PRESSURE_ACTION</td>
<td>97</td>
<td>DEVIATION_MIN</td>
<td>119</td>
<td>TIME_98_FALLING</td>
</tr>
<tr>
<td>78</td>
<td>TRAVEL_RATE_INC</td>
<td>98</td>
<td>DEVIATION_MAX</td>
<td>120</td>
<td>STEP_PROGRESS</td>
</tr>
</tbody>
</table>
### Analog Output Function Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALERT_KEYS</td>
<td>4</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>1 to 255, [0]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“0” is not a permissible value and will be rejected when transferring data to the device (error alarm).</td>
</tr>
<tr>
<td>BKCAL_OUT</td>
<td>25</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BLOCK_ALM</td>
<td>30</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BLOCK_ERR</td>
<td>6</td>
<td>D</td>
<td>r</td>
<td></td>
<td>OUT OF SERVICE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CONFIGURATION_ERROR</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>INPUT FAILURE PV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>OUTPUT FAILURE</td>
</tr>
<tr>
<td>CAS_IN</td>
<td>17</td>
<td>N</td>
<td>r/w</td>
<td>ALL</td>
<td></td>
</tr>
<tr>
<td>CHANNEL</td>
<td>22</td>
<td>S</td>
<td>r/w</td>
<td>O</td>
<td>[3]</td>
</tr>
<tr>
<td>FSTATE_TIME</td>
<td>23</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[0]</td>
</tr>
<tr>
<td>FSTATE_VAL</td>
<td>24</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>Value and range of PV_SCALE ±10 %, [0]</td>
</tr>
<tr>
<td>GRANT_DENY</td>
<td>13</td>
<td>D</td>
<td>r/w</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

**Description:**

- **ALERT_KEYS**: Used to determine the access mode selection/display, [initial value].
  
  - This information is provided for reference only.

- **FSTATE_TIME**: The value includes the time (100 ms).
  
  - The parameter indicates whether the error or failure has been detected.
  
  - The failure is determined by the failure detection time (default: 200 ms).
  
  - The parameter is used to configure the device for error detection.

- **CAS_IN**: The input value is reflected on the output.
  
  - Assigns the input value to the output.
  
  - Note: The input value is reflected on the output.

- **CHANNEL**: Assigns the input value to the output.
  
  - Note: The input value is reflected on the output.

- **BKCAL_OUT**: Reflects the Block function.
  
  - This value is used to determine the access mode selection/display, [initial value].

- **BLOCK_ALM**: Indicates the alarm status.
  
  - This value is used to determine the access mode selection/display, [initial value].

- **BLOCK_ERR**: Indicates the error status.
  
  - This value is used to determine the access mode selection/display, [initial value].

- **GRANT_DENY**: Grants or denies access to the device.
  
  - Note: The parameter indicates whether the error or failure has been detected.

- **GRANT_DENY**: Grants or denies access to the device.
  
  - Note: The parameter indicates whether the error or failure has been detected.
Analog Output Function Block

Description

Used to specify the identification number of the plant section.
This information can be used by the fieldbus host system to group alert and events.

Reflects the analog output value and its status required by the BKCAL_IN parameter of the upstream Function Block for cascade control.
This value provides windup protection in the upstream block and a bumpless transfer on mode changes.

Indicates the current block state with details on all configuration, hardware or system problems in the block including date and time stamp.

Reflects the active errors associated with a block.

- . . Block mode is out of service.
- . . A configuration error exists in the block.
- . . Position feedback has bad status, e.g. because the Transducer Block is in O/S mode.
- . . OUT cannot be issued, e.g. because the Transducer Block is not initialized or is in LO mode.

Reflects/defines the analog reference variable and its status from an upstream function block.

Assignment between the output of each Analog Output Function Block and the logical hardware channels (Transducer Block)

Note: In order to be able to put the AO Function Block into operation, CHANNEL must be set to a valid value. The valid value is 3 in this case as there are three Transducer Blocks (Standard Advanced Positioner Valve) in the Type 3730-5.

The length of time, in seconds, that the AO Function Block will wait to set Fault State after the recognition of an error of the valid set point.
The Fault State is triggered when the fault still exists after the time interval has elapsed.

Note: The Fault State of the AO Function Block is set in the IO_OPTS parameter of this block.

Determines the set point for the AO Function Block when the Fault State is triggered.

Note: This value is used when the option “Fault State to value” is set in the IO_OPTS parameter.

Grants or denies access of a fieldbus host system to the field device.

Note: This parameter is not used by Type 3730-5.
### Appendix Analog Output Function Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>IO_OPTS</td>
<td>14</td>
<td>S</td>
<td>r/w</td>
<td>O</td>
<td>SP-PV Track in MAN</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Track in LO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SP Track retained target</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Increase to close</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fault State to value</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Use Fault State Value on restart</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Target to MAN if Fault State activated</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Use PV for BKCAL_OUT</td>
</tr>
</tbody>
</table>

| MODE_BLK        | 5     | N  | r/w   | ALL  | O/S                                 |
|                 |       |    |       |      | MAN                                |
|                 |       |    |       |      | AUTO                               |
|                 |       |    |       |      | CAS                                |
|                 |       |    |       |      | RCAS                               |

| OUT             | 9     | N  | r/w   | M/O  | Range of OUT_SCALE ±10 %           |
|                 |       |    |       |      | Unit from XD_SCALE parameter group |

| PV              | 7     | D  | r     |      | Unit from XD_SCALE parameter group |

| PV_SCALE        | 11    | S  | r/w   | O    | 0 to 100 %                         |

| RCAS_IN         | 26    | N  | r/w   | ALL  |                                    |

**Description:**
- Used to control the analog output function block.
- The IO_OPTS parameter is used to select the type of output function block.
- The MODE_BLK parameter is used to select the operating mode.

**Note:**
- The OUT parameter controls the output range.
- The PV parameter controls the process variable.
- The PV_SCALE parameter sets the scale of the PV.

**Internal control:**
- The RCAS_IN parameter controls the internal control signal.
Analog Output Function Block

Description

Used to select how the input/output is processed in the AO Block

- The set point tracks the process variable in MAN mode (ACTUAL_MODE) SP-PV
- The set point tracks the process variable in LO mode (ACTUAL_MODE)
- The set point tracks RCAS_IN or CAS_IN depending on the set TARGET_MODE in LO or MAN mode (ACTUAL_MODE). This option has priority over SP_PV Track in MAN/LO mode.
- The output value to the Transducer Block is inverted (same as direction of action).
- FSTATE_VAL is used as the set point when the Fault State is triggered (see FSTATE_VAL, FSTATE_TIME).
- FSTATE_VAL is used for the set point until there is a valid value on restarting the device.
- On triggering the Fault State, the TARGET_MODE is set to MAN. The original target mode is lost as a result. After leaving the Fault State, the block remains in MAN and must be set to the required target mode by the user.
- The process variable is used instead of the working set point in BKCAL_OUT. If OUT READBACK is set in the FEATURES_SEL parameter in the Resource Block, the current valve position is reported back over BKCAL_OUT.

Indicates the actual mode of the AO Block as well as the target and permitted modes supported by the AO Block and the normal mode.

- The AO algorithm of the block is not processed. The last value is issued at OUT or the determined value when the Fault State is activated.
- The user can directly determine the output value of the AO Block.
- The set point determined by the user is used over the SP parameter on implementation of the AO Block.
- The AO Function Block receives the reference variable directly from an upstream function block over the CAS_IN parameter to calculate the manipulated variable internally. The AO Block is implemented.
- The AO Function Block receives the reference variable directly from the host system over the RCAS_IN parameter to calculate the manipulated variable internally. The AO Block is implemented.

Indicates the manipulated variable, value, limit, and status of the AO Function Block.

**Note:** The output value OUT can be set manually if the MAN mode is selected in MODE_BLK.

Indicates the process variables including their status used for implementation of the function block.

**Note:** If OUT READBACK is set in the FEATURES_SEL parameter in the Resource Block, PV contains the current valve position (same as FINAL_POSITION_VALUE).

Definition of the range (initial and final values), the engineering unit and the number of decimal places used for the process variables (PV).

Input and display of the analog reference variable (value and status) provided by the fieldbus host system for internal calculation of the manipulated variable.

**Note:** This parameter is only active in the RCAS mode.
### Appendix Analog Output Function Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCAS_OUT</td>
<td>28</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>READBACK</td>
<td>16</td>
<td>D</td>
<td>r</td>
<td></td>
<td>Value determined from FINAL_POSITION_VALUE parameter of the associated Transducer Block. Unit from XD_SCALE parameter group</td>
</tr>
<tr>
<td>SHED_OPT</td>
<td>27</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td></td>
</tr>
<tr>
<td>SIMULATE</td>
<td>10</td>
<td>D</td>
<td>r/w</td>
<td>ALL</td>
<td></td>
</tr>
<tr>
<td>SP</td>
<td>8</td>
<td>N</td>
<td>r/w</td>
<td>O/M/A</td>
<td>Value and range from PV_SCALE ±10 % Unit from PV_SCALE</td>
</tr>
<tr>
<td>SP_HI_LIM</td>
<td>20</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>Value and range from PV_SCALE ±10 %, [100]</td>
</tr>
<tr>
<td>SP_LO_LIM</td>
<td>21</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>Value and range from PV_SCALE ±10 %, [0]</td>
</tr>
</tbody>
</table>

**Note:**
- Display [initial value] is set in SP prior to change.
- This value is [initial value].
- Reflects [initial value].
- Value determined from FINAL_POSITION_VALUE parameter of the associated Transducer Block.
- Unit from XD_SCALE parameter group.
Description
Display of analog reference variable (value and status) after ramping.
This value is provided to the fieldbus host system for back calculation to allow action to be taken under mode changes or limited signals.

**Note:** This parameter is only active in the RCAS mode.

Reflects current valve position.

Determines what action is to be taken when the monitoring time is exceeded (see SHED_RCAS parameter in the Resource Block) while the connection between the fieldbus host system and the AO Block in RCAS mode is being checked. When the time has elapsed, the AO Block switches from RCAS mode to the mode selected in SHED_OPT. The action to be taken after the Fault State ends is also determined.

**Note:** This parameter is only active in RCAS mode in the AO Block. The AO Block cannot be set to the RCAS mode when the value is set to Uninitialized.

- . Not initialized
- . On failure of remote connection, change to next possible mode until RCAS mode is restored.
- . On failure of remote connection, change to next possible mode. The block remains in this mode.
- . On failure of remote connection, change to AUTO mode until RCAS mode is restored.
- . On failure of remote connection, change to AUTO mode. No attempt is made to restore the mode and the block remains in AUTO mode.
- . On failure of remote connection, change to MAN mode until RCAS mode is restored.
- . On failure of remote connection, change to MAN mode. No attempt is made to restore the mode and the block remains in MAN mode.
- . On failure of remote connection, the block attempts to attain the retained target mode until RCAS mode is restored.
- . On failure of remote connection, the block sets the target mode to the retained target mode.

The value and status of process variable PV of the block are simulated.

**Note:** During the simulation, the OUT value is not passed on to the Transducer Block. It keeps the last value valid prior to activating the simulation. The simulation can only be activated if the Simulation Enable hardware switch is set in the device (see also Resource Block).

Used to enter the set point (reference variable) in AUTO mode.

Used to enter the upper limit of the set point (reference variable).

**Note:** This value must be adapted correspondingly if the scale end setting is changed in PV_SCALE parameter.

Used to enter the lower limit of the set point (reference variable).

**Note:** This value must be adapted correspondingly if the scale end setting is changed in PV_SCALE parameter.
### Appendix \ Analog Output Function Block

#### Parameter Index

<table>
<thead>
<tr>
<th>Index</th>
<th>Parameter</th>
<th>Index</th>
<th>Parameter</th>
<th>Index</th>
<th>Parameter</th>
<th>Index</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>–</td>
<td>6</td>
<td>BLOCK_ERR</td>
<td>12</td>
<td>XD_SCALE</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>ST_REV</td>
<td>7</td>
<td>PV</td>
<td>13</td>
<td>GRANT_DENY</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>TAG_DESC</td>
<td>8</td>
<td>SP</td>
<td>14</td>
<td>IO_OPTS</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>STRATEGY</td>
<td>9</td>
<td>OUT</td>
<td>15</td>
<td>STATUS_OPTS</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>ALERT_KEYS</td>
<td>10</td>
<td>SIMULATE</td>
<td>16</td>
<td>READBACK</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>MODE_BLK</td>
<td>11</td>
<td>PV_SCALE</td>
<td>17</td>
<td>CAS_IN</td>
<td>23</td>
<td></td>
</tr>
</tbody>
</table>

#### Parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SP_RATE_DOWN</td>
<td>18</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[3402823466 x 10^{38}]</td>
</tr>
<tr>
<td>SP_RATE_UP</td>
<td>19</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[3402823466 x 10^{38}]</td>
</tr>
<tr>
<td>ST_REV</td>
<td>1</td>
<td>N</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STATUS_OPTS</td>
<td>15</td>
<td>S</td>
<td>r/w</td>
<td>O</td>
<td>[Uninitialized] Propagate Fault Backward</td>
</tr>
<tr>
<td>STRATEGY</td>
<td>3</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[0]</td>
</tr>
<tr>
<td>TAG_DESC</td>
<td>2</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[No text], max. 32 characters</td>
</tr>
<tr>
<td>UPDATE_EVT</td>
<td>29</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>XD_SCALE</td>
<td>12</td>
<td>S</td>
<td>r/w</td>
<td>O</td>
<td>0.0 to 100.0 % Specified in [%], [mm] or [degrees]</td>
</tr>
</tbody>
</table>

#### Description

- **SP_RATE_DOWN**
  - Used to
- **SP_RATE_UP**
  - Used to

#### Notes

- **Note:**
- **Note:**
- **Note:**

#### Parameter Index

<table>
<thead>
<tr>
<th>Index</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td></td>
</tr>
</tbody>
</table>
**Analog Output Function Block**

**Description**

Used to enter the ramp rate for downward set point changes in AUTO mode.

**Note:** The set point is used immediately when the ramp rate is set to zero. The rate limit is active for output blocks in the AUTO and CAS modes.

Used to enter the ramp rate for upward set point changes in AUTO mode.

**Note:** The set point is used immediately when the ramp rate is set to zero.

Indicates the revision state of static data.

**Note:** The revision state is incremented by one each time a static parameter in the block is written.

Allows the selection of status options available to determine the handling and processing of the status.

- . . Not initialized
- . . Status of the Transducer Block is passed on to the upstream block over the status of BKCAL_OUT.

Permits strategic grouping and thus faster processing of blocks. Blocks are grouped by entering the same number in the STRATEGY parameter of each block.

**Note:** These data are neither checked nor processed by the AO Function Block.

Assigns a unique description to each block for clear identification.

Indicates that static data were changed, including date and time stamp.

**Definition of the range (initial and final values), the engineering unit and the number of decimal places used to display the manipulated variable (OUT).**

**Note:** When [%] is used, the OUT value is based on a scale of 100 %. In case of [mm] (with globe valves) or [degrees] (with rotary valves), the OUT value corresponds to the value set in the RATED_TRAVEL parameter in the Transducer Block which is scaled as 100 %.

<table>
<thead>
<tr>
<th>Index</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>SP_RATE_DN</td>
</tr>
<tr>
<td>19</td>
<td>SP_RATE_UP</td>
</tr>
<tr>
<td>20</td>
<td>SP_HI_LIM</td>
</tr>
<tr>
<td>21</td>
<td>SP_LO_LIM</td>
</tr>
<tr>
<td>22</td>
<td>CHANNEL</td>
</tr>
<tr>
<td>23</td>
<td>FSTATE_TIME</td>
</tr>
<tr>
<td>24</td>
<td>FSTATE_VAL</td>
</tr>
<tr>
<td>25</td>
<td>BKCAL_OUT</td>
</tr>
<tr>
<td>26</td>
<td>RCAS_IN</td>
</tr>
<tr>
<td>27</td>
<td>SHED_OPT</td>
</tr>
<tr>
<td>28</td>
<td>RCAS_OUT</td>
</tr>
<tr>
<td>29</td>
<td>UPDATE_EVT</td>
</tr>
<tr>
<td>30</td>
<td>BLOCK_ALM</td>
</tr>
</tbody>
</table>
## Appendix

### Discrete Input Function Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACK_OPTION</td>
<td>21</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>[0]. . . . . . . No selection</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BLOCK_ALM . . Block alarm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DISC_ALM . . . Discrete alarm</td>
</tr>
<tr>
<td>ALARM_SUM</td>
<td>20</td>
<td>S/D</td>
<td>r/w</td>
<td>O/M/A</td>
<td>BLOCK_ALM . . Block alarm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DISC_ALM . . . Discrete alarm</td>
</tr>
<tr>
<td>ALERT_KEY</td>
<td>4</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>1 to 255, [0]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>“0” is not a permissible value and will be rejected when transferring data to the device (error alarm).</td>
</tr>
<tr>
<td>BLOCK_ALM</td>
<td>19</td>
<td>D</td>
<td>r</td>
<td></td>
<td>BLOCK_ALM . . . Block alarm</td>
</tr>
<tr>
<td>BLOCK_ERR</td>
<td>6</td>
<td>D</td>
<td>r</td>
<td></td>
<td>OUT OF SERVICE . . . . . . . . . . . .</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CONFIGURATION_ERROR . . . . . . . . .</td>
</tr>
<tr>
<td>CHANNEL</td>
<td>15</td>
<td>S</td>
<td>r/w</td>
<td>O</td>
<td>[1] to 3</td>
</tr>
<tr>
<td>DISC_ALM</td>
<td>24</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DISC_LIM</td>
<td>23</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>[0], 1</td>
</tr>
<tr>
<td>DISC_PRI</td>
<td>22</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>[0]. . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 to 7 . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8 to 15 . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td>FIELD_VAL_D</td>
<td>17</td>
<td>N</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRANT_DENY</td>
<td>12</td>
<td>D</td>
<td>r/w</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>IO_OPTS</td>
<td>13</td>
<td>S</td>
<td>r/w</td>
<td>O</td>
<td>INVERT. . . . . . . . . . . . . . . .</td>
</tr>
</tbody>
</table>

**Description**

<table>
<thead>
<tr>
<th>Field</th>
<th>Access Mode Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACK_OPTION</td>
<td>[0]. . . . . . . No selection</td>
</tr>
<tr>
<td>ALARM_SUM</td>
<td>BLOCK_ALM . . Block alarm</td>
</tr>
<tr>
<td></td>
<td>DISC_ALM . . . Discrete alarm</td>
</tr>
<tr>
<td>ALERT_KEY</td>
<td>1 to 255, [0]</td>
</tr>
<tr>
<td></td>
<td>“0” is not a permissible value and will be rejected when transferring data to the device (error alarm).</td>
</tr>
<tr>
<td>BLOCK_ALM</td>
<td>BLOCK_ALM . . . Block alarm</td>
</tr>
<tr>
<td>BLOCK_ERR</td>
<td>OUT OF SERVICE . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td></td>
<td>CONFIGURATION_ERROR . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td>CHANNEL</td>
<td>[1] to 3</td>
</tr>
<tr>
<td>DISC_ALM</td>
<td></td>
</tr>
<tr>
<td>DISC_LIM</td>
<td>[0], 1</td>
</tr>
<tr>
<td>DISC_PRI</td>
<td>[0]. . . . . . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td></td>
<td>1. . . . . . . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td></td>
<td>2. . . . . . . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td></td>
<td>3 to 7. . . . . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td></td>
<td>8 to 15. . . . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td>FIELD_VAL_D</td>
<td></td>
</tr>
<tr>
<td>GRANT_DENY</td>
<td></td>
</tr>
<tr>
<td>IO_OPTS</td>
<td>INVERT. . . . . . . . . . . . . . . . . . . . .</td>
</tr>
</tbody>
</table>

**Note:**

- Determine the field setting based on the selection in the accessory selection field.

**Description**

- **Note:**
  - Determined using the initial values for the field.

**Note:**

- Used to indicate channels, including channel settings.

- **Note:**
  - Reflects the set value.

- **Note:**
  - Used to indicate the value of a field.

**Note:**

- The value is an integer in the range of 1 to 3.

**Note:**

- The setting can be used for various purposes.

**Note:**

- The range of values is 0 to 15.

**Note:**

- The initial value is 1.

**Note:**

- The value is an integer in the range of 1 to 7.

- **Note:**
  - The value is an integer in the range of 8 to 15.

**Note:**

- The value is an integer in the range of 1 to 255.

**Note:**

- The value is an integer in the range of 0 to 15.

**Note:**

- The value is an integer in the range of 0 to 15.

**Note:**

- The value is an integer in the range of 0 to 15.

**Note:**

- The value is an integer in the range of 0 to 15.

**Note:**

- The value is an integer in the range of 0 to 15.

**Note:**

- The value is an integer in the range of 0 to 15.
## Description

Determines whether an alarm is to be automatically acknowledged in the positioner, i.e. without intervention of the fieldbus host system.

**Note:** The alarm is broadcast to the fieldbus host system, but not acknowledged by it.

Determines the current status of the process alarms in the DI1 Function Block

**Note:** The process alarms can also be deactivated in this parameter group.

Used to specify the identification number of the plant section.
This information can be used by the Fieldbus host system to group alert and events.

## Indicators

- Indicates the current block state with details on all configuration, hardware or system problems in the block including date and time stamp.
- Reflects the active errors associated with a block.
  - Block mode is out of service.
  - A configuration error exists in the block.
- Determines which Transducer Block is assigned to the DI1 Function Block.
- Indicates the status of the discrete alarm including details on the time of the alarm (time and date stamp) and on the value which triggered the alarm.
  - The value entered in DISC_LIM is exceeded.
  - In addition, an active block alarm can be acknowledged manually in this parameter group.
- The state of the discrete input that causes the alarm.
- Determines the action to be taken when the value entered in DISC_LIM is reached.
  - The limit violation is not processed.
  - Alarm is not broadcast to fieldbus host system.
  - Reserved for block alarms
  - Low limit alarm is issued to notify the operator with the corresponding priority (3 = low, 7 = high).
  - High limit alarm is issued as a critical alarm with the corresponding priority (8 = low, 15 = high).
- Indicates the discrete input value of the DI1 Function Block with details on the status.
- Grants or denies access of a fieldbus host system to the field device.
  - This parameter is not processed by Type 3730-5.
- Used to select how the input/output is processed in the DI1 Block.
  - Used to logically invert the value of FIELD_VAL_D before it is stored as OUT_D.
## Appendix

### Discrete Input Function Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE_BLK</td>
<td>5</td>
<td>N</td>
<td>r/w</td>
<td>O/M/A</td>
<td>AUTO . . . . . . . . . . . . . . . . . . . . . . . MAN . . . . . . . . . . . . . . . . . . . . . . . O/S . . . . . . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td>OUT_D</td>
<td>8</td>
<td>N</td>
<td>r/w</td>
<td>O/M</td>
<td>AUTO . . . . . . . . . . . . . . . . . . . . . . . MAN . . . . . . . . . . . . . . . . . . . . . . . O/S . . . . . . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td>PV_D</td>
<td>7</td>
<td>D</td>
<td>r</td>
<td></td>
<td>AUTO . . . . . . . . . . . . . . . . . . . . . . . MAN . . . . . . . . . . . . . . . . . . . . . . . O/S . . . . . . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td>PV_FTIME</td>
<td>16</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>[0]</td>
</tr>
<tr>
<td>SIMULATE_D</td>
<td>9</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>[0]</td>
</tr>
<tr>
<td>STATUS_OPTS</td>
<td>14</td>
<td>S</td>
<td>r/w</td>
<td>O</td>
<td>[Uninitialized] Propagate Fail Fwd</td>
</tr>
<tr>
<td>STRATEGY</td>
<td>3</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>[0]</td>
</tr>
<tr>
<td>ST_REV</td>
<td>1</td>
<td>N</td>
<td>r</td>
<td></td>
<td>AUTO . . . . . . . . . . . . . . . . . . . . . . . MAN . . . . . . . . . . . . . . . . . . . . . . . O/S . . . . . . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td>TAG_DESC</td>
<td>2</td>
<td>S</td>
<td>r/w</td>
<td>O/M/A</td>
<td>[No text], max. 32 characters</td>
</tr>
<tr>
<td>UPDATE_EVT</td>
<td>18</td>
<td>D</td>
<td>r</td>
<td></td>
<td>AUTO . . . . . . . . . . . . . . . . . . . . . . . MAN . . . . . . . . . . . . . . . . . . . . . . . O/S . . . . . . . . . . . . . . . . . . . . . . .</td>
</tr>
</tbody>
</table>

### Parameter index

<table>
<thead>
<tr>
<th>Index</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>ST_REV</td>
</tr>
<tr>
<td>2</td>
<td>TAG_DESC</td>
</tr>
<tr>
<td>3</td>
<td>STRATEGY</td>
</tr>
<tr>
<td>4</td>
<td>ALERT_KEY</td>
</tr>
<tr>
<td>5</td>
<td>MODE_BLK</td>
</tr>
<tr>
<td>6</td>
<td>BLOCK_ERR</td>
</tr>
<tr>
<td>7</td>
<td>PV_D</td>
</tr>
<tr>
<td>8</td>
<td>OUT_D</td>
</tr>
<tr>
<td>9</td>
<td>SIMULATE_D</td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>GRANT_DENY</td>
</tr>
<tr>
<td>13</td>
<td>IO_OPTS</td>
</tr>
<tr>
<td>14</td>
<td>STATUS_OPTS</td>
</tr>
<tr>
<td>15</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td></td>
</tr>
</tbody>
</table>

Note: The parameter index values in the table may not correspond exactly to the parameter names. Use the parameter names in the table to determine the correct index values.

Description:
- The parameter index values listed in the table are for reference purposes only. The actual index values used in the software implementation may differ.
- The parameter index values should be used to access the parameters in the software interface.

Notes:
- The parameter index values are subject to change in future versions of the software.
- The parameter index values are not guaranteed to be unique across different implementations.
- The parameter index values are not guaranteed to be sorted in any specific order.

Updates:
- Updates to the parameter index values will be published in a separate document.
- Updates to the parameter index values will be posted on the manufacturer's website.
- Updates to the parameter index values will be communicated to customers via email.
**Description**

Indicates the actual mode of the DI1 Block, the permitted modes supported by the DI1 Block, and the normal mode.

- The binary input value FIELD_VAL_D is processed by the Function Block and issued as OUT_D.
- The user can directly enter the output value of the Function Block over OUT_D.
- The DI algorithm of the block is not processed. The last value is issued at OUT_D.

Indicates/defines the discrete output value of the DI1 Block with the associated status.

Indicates the discrete state used for the Function Block with status. The parameter is identical to the OUT_D in AUTO mode.

Used to enter the filter time constant (in seconds) of the digital filter until a binary state at the input of the function block is adopted in the PV_D parameter.

A discrete input value FIELD_VAL_D can be simulated with status.

**Note:** The simulation can only be activated when this has been enabled at the field device (Code 48/FF-P/F03) as well as in the Function Block.

Allows the selection of status options available to determine the handling and processing of the status.

Permits strategic grouping and thus faster processing of blocks. Blocks are grouped by entering the same number in the STRATEGY parameter of each block.

**Note:** These data are neither checked nor processed by the DI Function Block.

The revision state of static data is displayed.

**Note:** The revision state will be incremented each time a static parameter in the block is changed.

Assigns a unique description to each block for clear identification.

Indicates whether static block data have been changed, including date and time stamp.

<table>
<thead>
<tr>
<th>Index</th>
<th>Parameter</th>
<th>Index</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>CHANNEL</td>
<td>20</td>
<td>ALARM_SUM</td>
</tr>
<tr>
<td>16</td>
<td>PV_FTIME</td>
<td>21</td>
<td>ACK_OPTION</td>
</tr>
<tr>
<td>17</td>
<td>FIELD_VAL_D</td>
<td>22</td>
<td>DISC_PRI</td>
</tr>
<tr>
<td>18</td>
<td>UPDATE_EVT</td>
<td>23</td>
<td>DISC_LIM</td>
</tr>
<tr>
<td>19</td>
<td>BLOCK_ALM</td>
<td>24</td>
<td>DISC_ALM</td>
</tr>
</tbody>
</table>
## PID Function Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACK_OPTION</td>
<td>46</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[Undefined] HI_HI_ALM HI_ALM LO_LO_ALM LO_ALM DV_HI_ALM DV_LO_ALM BLOCK_ALM</td>
</tr>
<tr>
<td>ALARM_HYS</td>
<td>47</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>0 to 50 %, [0.5 %]</td>
</tr>
<tr>
<td>ALARM_SUM</td>
<td>45</td>
<td>S/D</td>
<td>r/w</td>
<td>ALL</td>
<td>HI_HI_ALM HI_ALM LO_LO_ALM LO_ALM DV_HI_ALM DV_LO_ALM BLOCK_ALM</td>
</tr>
<tr>
<td>ALERT_KEY</td>
<td>4</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>1 to 255, [0] “0” is not a permissible value and will be rejected when transferring data to the device (error alarm)</td>
</tr>
<tr>
<td>BAL_TIME</td>
<td>25</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[0]</td>
</tr>
</tbody>
</table>

---

**Description**

- **ACK_OPTION**: Used to select the Fie.
  
  **Note**: The function is not applicable.

- **ALARM_HYS**: Used to alarm HI_HI_ALM HI_ALM LO_LO_ALM LO_ALM DV_HI_ALM DV_LO_ALM BLOCK_ALM.

- **ALARM_SUM**: Indicates HI_HI_ALM HI_ALM LO_LO_ALM LO_ALM DV_HI_ALM DV_LO_ALM BLOCK_ALM.

- **ALERT_KEY**: Used to set the alert key.
  
  **Note**: “0” is not a permissible value and will be rejected when transferring data to the device (error alarm).

- **BAL_TIME**: Used to set the balance time.

**Note**: Time unit is [s].
Description

Used to select whether an alarm is to be automatically acknowledged in the positioner, i.e. without intervention of the Fieldbus host system.

**Note:** The alarm is broadcast to the fieldbus host system, but not acknowledged by it.

- . . . No selection
- . . . High high alarm
- . . . High alarm
- . . . Low low alarm
- . . . Low alarm
- . . . Deviation high alarm
- . . . Deviation low alarm
- . . . Block alarm

Used to specify the amount the alarm value must return to within the alarm limit before the associated active alarm condition clears. The hysteresis value affects the following alarms of the PID Function Block: HI_HI_LIM; HI_LIM; LO_LO_LIM; LO_LIM; DV_HI_LIM; DV_LO_LIM

**Note:** The hysteresis value is based upon the percent of the range of the PV_SCALE parameter group in the PID Function Block.

Indicates the current status of the process alarm in the PID Function Block.

**Note:** The process alarms can also be deactivated in this parameter group.

- . . . High high alarm
- . . . High alarm
- . . . Low low alarm
- . . . Low alarm
- . . . Deviation high alarm
- . . . Deviation low alarm
- . . . Block alarm

Used to specify the identification number of the plant section.

This information can be used by the fieldbus host system to group alert and events.

Used to specify the time constant at which the integral term will move to obtain balance (calculated manipulated variable > OUT_HI_LIM or < OUT_LO_LIM)

**Note:** Balance is immediately obtained when the value 0 (initial value) is set.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>BKCAL_HYS</td>
<td>30</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>0 to 50 %, [0.5 %]</td>
</tr>
<tr>
<td>BKCAL_IN</td>
<td>27</td>
<td>N</td>
<td>r/w</td>
<td>ALL</td>
<td></td>
</tr>
<tr>
<td>BKCAL_OUT</td>
<td>31</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BLOCK_ALM</td>
<td>44</td>
<td>D</td>
<td>r/w</td>
<td>ALL</td>
<td></td>
</tr>
<tr>
<td>BLOCK_ERR</td>
<td>6</td>
<td>D</td>
<td>r</td>
<td></td>
<td>OUT OF SERVICE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CONFIGURATION_ERROR</td>
</tr>
<tr>
<td>BYPASS</td>
<td>17</td>
<td>S</td>
<td>r/w</td>
<td>M/O</td>
<td>uninitialized</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[OFF]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ON</td>
</tr>
<tr>
<td>CAS_IN</td>
<td>18</td>
<td>N</td>
<td>r/w</td>
<td>ALL</td>
<td></td>
</tr>
<tr>
<td>CONTROL_OPTS</td>
<td>13</td>
<td>S</td>
<td>r/w</td>
<td>O</td>
<td>[None]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Bypass Enable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Direct Acting</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Track Enable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Track in Manual</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PV for BKCAL_OUT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No OUT Limits in Manual</td>
</tr>
</tbody>
</table>

**Description:**

Used to set the hysteresis of the OUT_LO parameter.

If the m value parameter of the parameter is used, the parameter is valid again.

Indicator shows code on fault detection.

This value reflects the change in process parameter for a certain time.

**Note:** When bypass is used, the PV parameter bypass can be used.

Used to set the bypass parameter.

**Note:** When bypass is used, the bypass parameter bypass can be used.

**Note:** When bypass is used, the bypass parameter bypass can be used.

- Bypass Enable
- Direct Acting
- Track Enable
- Track in Manual
- PV for BKCAL_OUT
- No OUT Limits in Manual
**PID Function Block**

**Description**

Used to specify the amount the manipulated variable must change away from its range limits OUT_HI_LIM and OUT_LO_LIM before the limit status is turned off.

If the manipulated variable moves off a limit, in percent of scale, the limit status is indicated in the OUT parameter and passed on to the following blocks.

The range limit status remains active as long as the value of the manipulated variable does not move off the limits again.

Indicates the analog input value and status from the BKCAL_OUT parameter of a downstream function for a cascade control.

This value provides a bumpless transfer on mode changes by backward output tracking.

Reflects the analog output value and status required by the BKCAL_IN parameter of the upstream function block for a cascade control.

This value provides windup protection in the upstream block and a bumpless transfer on mode changes.

Indicates the current block state with information about configuration, hardware, or system failure including details on the time of the alarm (time and date stamp).

Reflects the active errors associated with a block.

- The block mode is out of service.
- A configuration error exists in the block.

Used to activate or deactivate the calculation of the manipulated variable using the PID control algorithm.

**Note:** When “Uninitialized” is set, the block remains in O/S mode. To activate the bypass (set to ON), the bypass must be enabled in the options (CONTROL_OPTS parameters).

- Same as ON
- Bypass deactivated: The manipulated variable determined using the PID control algorithm is issued over the OUT parameter.
- BYPASS activated: The value of the reference variable SP is issued directly over the OUT parameter.

Used to indicate/define the analog reference variable and its status from an upstream function block.

Allows selection of controller options available to determine the automation strategy.

- Enable BYPASS parameter
- Direct action
- Enable tracking
- Tracking in MAN mode
- Value and status of PV parameter used for BKCAL_OUT parameter
- No output limits in MAN mode
### PID Function Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DV_HI_ALM</td>
<td>64</td>
<td>D</td>
<td>r/w</td>
<td>ALL</td>
<td></td>
</tr>
<tr>
<td>DV_HI_LIM</td>
<td>57</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[3402823466 x 10^38]</td>
</tr>
<tr>
<td>DV_HI_PRI</td>
<td>56</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[0]. . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td>DV_LO_ALM</td>
<td>65</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DV_LO_LIM</td>
<td>59</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[-3402823466 x 10^38]</td>
</tr>
<tr>
<td>DV_LO_PRI</td>
<td>58</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[0]. . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td>FF_GAIN</td>
<td>42</td>
<td>S</td>
<td>r/w</td>
<td>M/O</td>
<td>[0]</td>
</tr>
<tr>
<td>FF_SCALE</td>
<td>41</td>
<td>S</td>
<td>r/w</td>
<td>M/O</td>
<td>[0 to 100 %]</td>
</tr>
<tr>
<td>FF_VAL</td>
<td>40</td>
<td>N</td>
<td>r/w</td>
<td>ALL</td>
<td>Range and unit from FF_SCALE</td>
</tr>
<tr>
<td>GAIN</td>
<td>23</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[1.0]</td>
</tr>
</tbody>
</table>

**Description**

- **Indicates** that triggering of the component is required.
- The component is initialized when the component is activated.
- If the component is active, the component is reset internally.
- The component is determined using the parameter.

**Note:**

- The parameter indicates that triggering of the component is required.
- The component is initialized when the component is activated.
- If the component is active, the component is reset internally.
- The component is determined using the parameter.

**Parameter Index**

- **SK** (Security Key)
  - D: discretionary
  - S: security
- **Access Mode**
  - r/w: read/write
  - M/O: master/observer
- **Mode**
  - ALL: all

**Selection/display, [initial value]**

- [Value]: initial value

---

**Note:**

- For more information, please refer to the BLOCK Manual.
Description

Indicates deviation high alarm status including details of time of alarm (date and time stamp) as well as the value that triggered the alarm.

The controlled variable exceeds the reference variable by more than the value determined in DV_HI_LIM parameter.

The setting for the alarm limit used to detect the deviation high alarm condition.

If the controlled variable exceeds the reference variable by this value, the DV_HI_ALM is issued.

Determines the action to be taken when the value for the deviation high alarm is exceeded (DV_HI_LIM).

- The limit for deviation high alarm is not processed.
- Alarm is not broadcast to fieldbus host system.
- Reserved for block alarms
- Deviation high alarm is issued to notify the operator with the corresponding priority (3 = low, 7 = high).
- Deviation high alarm is issued as a critical alarm with the corresponding priority (8 = low, 15 = high).

Indicates deviation low alarm status including details of time of alarm (date and time stamp) as well as the value that triggered the alarm.

The controlled variable does not reach the reference variable by more than the value determined in DV_LO_LIM parameter.

**Note:** In addition, an active alarm can be acknowledged manually in this parameter group.

The setting for the alarm limit used to detect the deviation low alarm condition.

If the controlled variable does not reach the reference variable by this value, the DV_LO_ALM is issued.

Determines the action to be taken when the value for the deviation low alarm is not reached (DV_LO_LIM).

- The limit for deviation low alarm is not processed.
- Alarm is not broadcast to fieldbus host system.
- Reserved for block alarms.
- Deviation low alarm is issued to notify the operator with the corresponding priority (3 = low, 7 = high).
- Deviation low alarm is issued as a critical alarm with the corresponding priority (8 = low, 15 = high).

Used to input the gain of the manipulated variable.

**Note:** The gain is multiplied with the feedforward input (FF_VAL) and the result added to the OUT value.

Defines the measuring range (upper and lower limits), the engineering unit and the number of decimal places used for the feedforward input (FF_VAL).

Indicates/specifies the value and status of the feedforward input.

**Note:** The feedforward input is multiplied with the gain (FF_GAIN) and the result added to the OUT value.

Specifies the proportional gain (factor).

**Note:** The parameter must be set to a value other than 0, otherwise a configuration error will be set in the BLOCK_ERR parameter and the block will go to O/S mode.
# Appendix

## PID Function Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRANT_DENY</td>
<td>12</td>
<td>D</td>
<td>r/w</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>HL_ALM</td>
<td>61</td>
<td>D</td>
<td>r</td>
<td>Unit from PV_SCALE</td>
<td></td>
</tr>
<tr>
<td>HI_HI_ALM</td>
<td>60</td>
<td>D</td>
<td>r/w</td>
<td>Unit from PV_SCALE</td>
<td></td>
</tr>
<tr>
<td>HI_HI_LIM</td>
<td>49</td>
<td>S</td>
<td>r/w</td>
<td>ALL Range and unit from PV_SCALE, [3402823466 x 10^38]</td>
<td></td>
</tr>
<tr>
<td>HI_HI_PRI</td>
<td>48</td>
<td>S</td>
<td>r/w</td>
<td>ALL [0] 1 2 3 to 7 8 to 15</td>
<td></td>
</tr>
<tr>
<td>HI_LIM</td>
<td>51</td>
<td>S</td>
<td>r/w</td>
<td>ALL Range and unit from PV_SCALE, [3402823466 x 10^38]</td>
<td></td>
</tr>
<tr>
<td>HI_PRI</td>
<td>50</td>
<td>S</td>
<td>r/w</td>
<td>ALL 0 1 2 3 to 7 8 to 15 9</td>
<td></td>
</tr>
<tr>
<td>IN</td>
<td>15</td>
<td>N</td>
<td>r/w</td>
<td>ALL</td>
<td></td>
</tr>
<tr>
<td>LO_ALM</td>
<td>62</td>
<td>D</td>
<td>r</td>
<td>Unit from PV_SCALE</td>
<td></td>
</tr>
<tr>
<td>LO_LIM</td>
<td>53</td>
<td>S</td>
<td>r/w</td>
<td>Range and unit from PV_SCALE, [-3402823466 x 10^38]</td>
<td></td>
</tr>
<tr>
<td>LO_LO_ALM</td>
<td>63</td>
<td>D</td>
<td>r</td>
<td>Unit from PV_SCALE</td>
<td></td>
</tr>
<tr>
<td>LO_LO_LIM</td>
<td>55</td>
<td>S</td>
<td>r/w</td>
<td>ALL Range and unit from PV_SCALE, [-3402823466 x 10^38]</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**

- The ALM indicates that trig. can be triggered.
- The LIMIT indicates the value that can be set.
- The PRI indicates the priority.
Description

Grants or denies access of a fieldbus host system to the field device.

**Note:** This parameter is not used by Type 3730-5.

Indicates high alarm status (HI_LIM) including details of time of alarm (date and time stamp) as well as the value that triggered the alarm.

Indicates high high alarm status (HI_HI_LIM) including details of time of alarm (date and time stamp) as well as the value that triggered the alarm.

**Note:** The active alarm can also be acknowledged manually in this parameter group.

The setting for the alarm limit used to detect the high high alarm (HI_HI_ALM) condition.

If the PV value exceeds this limit, the HI_HI_ALM is issued.

Determines the action to be taken when the value for the high high alarm is exceeded (HI_HI_LIM).

- The limit for high high alarm is not processed.
- Alarm is not broadcast to fieldbus host system.
- Reserved for block alarms
- High high alarm is issued to notify the operator with the corresponding priority (3 = low, 7 = high).
- High high alarm is issued as a critical alarm with the corresponding priority (8 = low, 15 = high).

The setting for the alarm limit used to detect the high alarm (HI_ALM) condition.

If the PV value exceeds this limit, the HI_ALM is issued.

Determines the action to be taken when the value for the high alarm is exceeded (HI_LIM).

- The limit for high alarm is not processed.
- Alarm is not broadcast to fieldbus host system.
- Reserved for block alarms
- High alarm is issued to notify the operator with the corresponding priority (3 = low, 7 = high).
- High alarm is issued as a critical alarm with the corresponding priority (8 = low, 15 = high).

Indicates/specifies the analog input variable with details on state and value.

Indicates low alarm status (LO_LIM) including details of time of alarm (date and time stamp) as well as the value that triggered the alarm.

The setting for the alarm limit used to detect the low alarm (LO_ALM) condition.

If the PV value exceeds this limit, the LO_ALM is issued.

Indicates low low alarm status (LO_LO_LIM) including details of time of alarm (date and time stamp) as well as the value that triggered the alarm.

**Note:** The active alarm can also be acknowledged manually in this parameter group.

The setting for the alarm limit used to detect the low low alarm (LO_LO_ALM) condition.

If the PV value falls below this limit, the LO_LO_ALM is issued.
## Appendix

### PID Function Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>LO_LO_PRI</td>
<td>54</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[0] .................................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 ....................................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 ....................................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 to 7 ................................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8 to 18 ................................</td>
</tr>
<tr>
<td>LO_PRI</td>
<td>52</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[0] .................................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 ....................................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 ....................................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 to 7 ................................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8 to 15 ................................</td>
</tr>
<tr>
<td>MODE_BLK</td>
<td>5</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>O/S ....................................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MAN ....................................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AUTO ..................................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CAS ..................................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RCAS ..................................</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ROUT ..................................</td>
</tr>
<tr>
<td>OUT</td>
<td>9</td>
<td>N</td>
<td>r/w</td>
<td>O/M</td>
<td>Range OUT_SCALE ±10 %, Unit from XD_SCALE</td>
</tr>
<tr>
<td>OUT_HI_LIM</td>
<td>28</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>Range OUT_SCALE ±10 %, Unit from OUT_SCALE, [100]</td>
</tr>
<tr>
<td>OUT_LO_LIM</td>
<td>29</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>Range OUT_SCALE ±10 %, Unit from OUT_SCALE, [0]</td>
</tr>
<tr>
<td>OUT_SCALE</td>
<td>11</td>
<td>S</td>
<td>r/w</td>
<td>O</td>
<td>[0 to 100 %]</td>
</tr>
<tr>
<td>PV</td>
<td>7</td>
<td>D</td>
<td>r</td>
<td></td>
<td>Unit from PV_SCALE</td>
</tr>
</tbody>
</table>

### Description

- **LO_LO_PRI**
  - Determines...[initial value]
  - Low
  - Low

- **LO_PRI**
  - Determines...
  - Low
  - Low

- **MODE_BLK**
  - Indicates...
  - O/S
  - Auto
  - CAS

- **OUT**
  - Indicates...
  - Range OUT_SCALE ±10 %, Unit from XD_SCALE

- **OUT_HI_LIM**
  - Range OUT_SCALE ±10 %, Unit from OUT_SCALE, [100]

- **OUT_LO_LIM**
  - Range OUT_SCALE ±10 %, Unit from OUT_SCALE, [0]

- **OUT_SCALE**
  - [0 to 100 %]

- **PV**
  - Unit from PV_SCALE
**Description**

Determines the action to be taken when the value for the low low alarm is not reached (LO_LO_LIM).

- The limit for low low alarm is not processed.
- Alarm is not broadcast to fieldbus host system.
- Reserved for block alarms.
- Low low alarm is issued to notify the operator with the corresponding priority (3 = low, 7 = high).
- Low low alarm is issued as a critical alarm with the corresponding priority (8 = low, 15 = high).

Determines the action to be taken when the value for the low alarm is not reached (LO_LIM).

- The limit for low alarm is not processed.
- Alarm is not broadcast to fieldbus host system.
- Reserved for block alarms.
- Low alarm is issued to notify the operator with the corresponding priority (3 = low, 7 = high).
- Low alarm is issued as a critical alarm with the corresponding priority (8 = low, 15 = high).

Indicates the actual mode of the PID Block, the target and permitted modes supported by the PID Block, and the normal mode.

- The PID algorithm of the block is not implemented. The last value or the value determined when the Fault State is activated is issued at OUT parameter.
- The output value of the block can directly be entered by the user over the OUT parameter.
- The set point determined by the user is used to implement the PID Block over the SP parameter.
- The PID Function Block receives the reference variable directly from an upstream function block over the CAS_IN parameter for internal calculation of the manipulated variable. The AO Block is implemented.
- The AO Function block receives the reference variable directly from the fieldbus host system for internal calculation of the manipulated variable. The AO Block is implemented.
- The PID Function Block receives the manipulated variable directly from the fieldbus host system over the ROUT_IN parameter. The manipulated variable is issued again over OUT without the internal PID algorithm being implemented.

Indicates the manipulated variable, the value, limit, and status of the AO Function Block.

**Note:** If the MAN mode is selected in the MODE_BLK parameter, the output value OUT can be entered manually.

Specifies the upper limit of the analog manipulated variable (OUT).

Specifies the lower limit of the analog manipulated variable (OUT).

Definition of the range (initial and final values), the engineering unit and the number of decimal places used for the manipulated variable (OUT).

Indicates the process variables used to implement the block including their status.
### Appendix: PID Function Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV_FTIME</td>
<td>16</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[0 s]</td>
</tr>
<tr>
<td>PV_SCALE</td>
<td>10</td>
<td>S</td>
<td>r/w</td>
<td>O</td>
<td>[0 to 100 %]</td>
</tr>
<tr>
<td>RATE</td>
<td>26</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[0 s]</td>
</tr>
<tr>
<td>RCAS_IN</td>
<td>32</td>
<td>N</td>
<td>r/w</td>
<td>ALL</td>
<td></td>
</tr>
<tr>
<td>RCAS_OUT</td>
<td>35</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RESET</td>
<td>24</td>
<td>S</td>
<td>r/w</td>
<td></td>
<td>[3402823466 x 10^38 (max. possible value)]</td>
</tr>
<tr>
<td>ROUT_IN</td>
<td>33</td>
<td>N</td>
<td>r/w</td>
<td>ALL</td>
<td></td>
</tr>
<tr>
<td>ROUT_OUT</td>
<td>36</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Description:**
- Used to display the process value.
- This time constant is used for the control system.
- Definitely dependent on the process value.
- Specific input signal for the control system.
- Input and display the process value.
- Display the process value.
- This value changes according to the process value.
- Input and display the measured value.
- Indicates the measured value.
- This value changes according to the measured value.
Description

Used to enter the filter time constant (in seconds) of the first-order digital filter. This time is needed to allow a 63 % change of the input IN in the value of PV to become effective.

Definition of the range (initial and final values), the engineering unit and the number of decimal places used for the process variable (PV).

Specifies the time constant for the differential function.

Input and display of the analog reference variable (value and status) provided by the fieldbus host system for internal calculation of the manipulated variable.

**Note:** This parameter is only active in the RCAS mode.

Display of analog reference variable (value and status) after ramping. This value is provided to the fieldbus host system for back calculation to allow action to be taken under mode changes or limited signals.

**Note:** This parameter is only active in the RCAS mode.

Specifies the time constant for the integral-action function.

**Note:** The initial value or 0 deactivates the integral-action function.

Input and display of the manipulated variable (value and status) provided by the fieldbus host system.

**Note:** This parameter is only active in the ROUT mode.

Indicates the analog reference variable (value and status) that has been written to the ROUT_IN parameter. This value is provided by the fieldbus host system over this parameter to perform back calculation to allow action to be taken under mode changes or limited signals.

**Note:** This parameter is only active in the ROUT mode.
## Appendix

### PID Function Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SHED_OPT</td>
<td>34</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[Uninitialized]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NormalShed_NormalReturn</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NormalShed_NoReturn</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ShedToAuto_NormalReturn</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ShedToAuto_NoReturn</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ShedToManual_NormalReturn</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ShedToManual_NoReturn</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ShedToRetainedTarget_NormalReturn</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>ShedToRetainedTarget_NoReturn</td>
</tr>
<tr>
<td>SP</td>
<td>8</td>
<td>N</td>
<td>r/w</td>
<td>ALL</td>
<td>Value and range from PV_SCALE ±10 %</td>
</tr>
<tr>
<td>SP_HI_LIM</td>
<td>21</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>Value and range from PV_SCALE ±10 %, [100]</td>
</tr>
<tr>
<td>SP_LO_LIM</td>
<td>22</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>Value and range from PV_SCALE ±10 %, [0]</td>
</tr>
<tr>
<td>SP_RATE_DOWN</td>
<td>19</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[3402823466 x 10^{38}]</td>
</tr>
<tr>
<td>SP_RATE_UP</td>
<td>20</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[3402823466 x 10^{38}]</td>
</tr>
<tr>
<td>ST_REV</td>
<td>1</td>
<td>S</td>
<td>r</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Description:**

Determines a specific parameter index.

**Note:**

- Resource is being selected.
- RCAS option.

**Note:**

- On
- On
- On
- On
- On
- On
- On
- On
- On
- On

**Note:**

- [Uninitialized]

**Note:**

- On
- On
- On
- On
- On
- On
- On
- On
- On
- On

**Note:**

- Used to

**Note:**

- Used to

**Note:**

- Used to

**Note:**

- Used to

**Note:**

- Used to

**Note:**

- Used to

**Note:**

- Used to

**Note:**

- Used to

**Note:**

- Used to

**Note:**

- Used to

**Note:**

- Used to
**PID Function Block**

**Description**

Determines what action is to be taken when the monitoring time is exceeded (see SHED_RCAS parameter in the Resource Block) while the connection between the fieldbus host system and the PID Block in RCAS or ROUT mode is being checked. When the time has elapsed, the PID Block switches from RCAS or ROUT mode to the mode selected in SHED_OPT. The action to be taken after the Fault State ends is also determined.

**Note!** This parameter is only active in RCAS or ROUT mode in the PID Block. The PID Block cannot be set to the RCAS or ROUT mode when the value is set to Uninitialized.

- . . On failure of remote connection, change to next possible mode until RCAS or ROUT mode is restored.
- . . On failure of remote connection, change to next possible mode the block remains in this mode.
- . . On failure of remote connection, change to AUTO mode until RCAS or ROUT mode is restored.
- . . On failure of remote connection, change to AUTO mode. No attempt is made to restore the mode and the block remains in AUTO mode.
- . . On failure of remote connection, change to MAN mode until RCAS or ROUT mode is restored.
- . . On failure of remote connection, change to MAN mode. No attempt is made to restore the mode and the block remains in MAN mode.
- . . On failure of remote connection, the block attempts to attain the retained target mode until RCAS or ROUT mode is restored.
- . . On failure of remote connection, the block sets the target mode to the retained target mode.

**Used to enter the set point (reference variable) in AUTO mode.**

**Note:** This value must be adapted correspondingly if the scale end setting is changed in PV_SCALE parameter.

**Used to enter the high limit of the set point (reference variable).**

**Note:** This value must be adapted correspondingly if the scale end setting is changed in PV_SCALE parameter.

**Used to enter the low limit of the set point (reference variable).**

**Used to enter the ramp rate for downward set point changes in AUTO mode.**

**Note:** The set point is used immediately when the ramp rate is set to zero. The rate limit is active for output blocks in the AUTO mode.

**Used to enter the ramp rate for upward set point changes in AUTO mode.**

**Note:** The set point is used immediately when the ramp rate is set to zero. The rate limit is active for output blocks in the AUTO mode.

**Indicates the revision number of static data.**

**Note:** The revision state is incremented by one each time a static parameter in the block is written.
## Appendix

### PID Function Block

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Index</th>
<th>SK</th>
<th>Access</th>
<th>Mode</th>
<th>Selection/display, [initial value]</th>
</tr>
</thead>
<tbody>
<tr>
<td>STATUS_OPT</td>
<td>14</td>
<td>S</td>
<td>r/w</td>
<td>O</td>
<td>[Uninitialized]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>IFS if Bad IN</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>IFS if Bad CAS_IN</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Use Uncertain as Good</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Target In Manual if Bad IN</td>
</tr>
<tr>
<td>STRATEGY</td>
<td>3</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>[0]</td>
</tr>
<tr>
<td>TAG_DESC</td>
<td>2</td>
<td>S</td>
<td>r/w</td>
<td>ALL</td>
<td>max. 32 characters, [no text]</td>
</tr>
<tr>
<td>TRK_IN_D</td>
<td>38</td>
<td>N</td>
<td>r/w</td>
<td>ALL</td>
<td></td>
</tr>
<tr>
<td>TRK_SCALE</td>
<td>37</td>
<td>S</td>
<td>r/w</td>
<td>O/M</td>
<td>[0...100 %]</td>
</tr>
<tr>
<td>TRK_VAL</td>
<td>39</td>
<td>N</td>
<td>r/w</td>
<td>ALL</td>
<td></td>
</tr>
<tr>
<td>UPDATE_EVT</td>
<td>43</td>
<td>D</td>
<td>r</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Parameter index

<table>
<thead>
<tr>
<th>Index</th>
<th>Parameter</th>
<th>Index</th>
<th>Parameter</th>
<th>Index</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>–</td>
<td>11</td>
<td>OUT_SCALE</td>
<td>22</td>
<td>SP_LO_LIM</td>
</tr>
<tr>
<td>1</td>
<td>ST_REV</td>
<td>12</td>
<td>GRANT_DENY</td>
<td>23</td>
<td>GAIN</td>
</tr>
<tr>
<td>2</td>
<td>TAG_DESC</td>
<td>13</td>
<td>CONTROL_OPTS</td>
<td>24</td>
<td>RESET</td>
</tr>
<tr>
<td>3</td>
<td>STRATEGY</td>
<td>14</td>
<td>STATUS_OPT</td>
<td>25</td>
<td>BAL_TIME</td>
</tr>
<tr>
<td>4</td>
<td>ALERT_KEY</td>
<td>15</td>
<td>IN</td>
<td>26</td>
<td>RATE</td>
</tr>
<tr>
<td>5</td>
<td>MODE_BLK</td>
<td>16</td>
<td>PV_FTIME</td>
<td>27</td>
<td>BKCAL_IN</td>
</tr>
<tr>
<td>6</td>
<td>BLOCK_ERR</td>
<td>17</td>
<td>BYPASS</td>
<td>28</td>
<td>OUT_HI_LIM</td>
</tr>
<tr>
<td>7</td>
<td>PV</td>
<td>18</td>
<td>CAS_IN</td>
<td>29</td>
<td>OUT_LO_LIM</td>
</tr>
<tr>
<td>8</td>
<td>SP</td>
<td>19</td>
<td>SP_RATE_DN</td>
<td>30</td>
<td>BKCAL_HYS</td>
</tr>
<tr>
<td>9</td>
<td>OUT</td>
<td>20</td>
<td>SP_RATE_UP</td>
<td>31</td>
<td>BKCAL_OUT</td>
</tr>
<tr>
<td>10</td>
<td>PV_SCALE</td>
<td>21</td>
<td>SP_HI_LIM</td>
<td>32</td>
<td>RCAS_IN</td>
</tr>
</tbody>
</table>

### Description

**STATUS_OPT**

- Allows
- The
- Use Uncertain as Good
- Target In Manual if Bad IN

**STRATEGY**

- Permits
- On active
- Defined

**TAG_DESC**

Assign

**TRK_IN_D**

Defined

**TRK_SCALE**

Explicit
Description

Allows the selection of status options available to determine the handling and processing of the status:

- Trigger IFS substate of downstream AO Function Block, if the input value (IN) changes the status to BAD.
- Trigger IFS substate if the external reference variable (CAS_IN) changes the status to BAD.
- The status UNCERTAIN is used as GOOD.
- Reverts to MAN mode if the input value changes the status to BAD.

Permits strategic grouping and thus faster processing of blocks. Blocks are grouped by entering the same number in the STRATEGY parameter of each block.

Note: These data are neither checked nor processed by the PID Function Block.

Assigns a unique description to each block for clear identification.

Indicates/specifies the discrete input (value and status) which activates the external or output tracking.

On activating tracking, the block changes to LO mode. The manipulated variable at OUT adopts the value defined over the input TRK_VAL.

Definition of the range (initial and final values), the engineering unit and the number of decimal places used for external tracking value (TRK_VAL).

Indicates/specifies the analog input value and status from another function block for external tracking function.

Indicates that static data were changed, including date and time stamp.

<table>
<thead>
<tr>
<th>Index</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>ROUT_IN</td>
</tr>
<tr>
<td>34</td>
<td>SHED_OPT</td>
</tr>
<tr>
<td>35</td>
<td>RCAS_OUT</td>
</tr>
<tr>
<td>36</td>
<td>ROUT_OUT</td>
</tr>
<tr>
<td>37</td>
<td>TRK_SCALE</td>
</tr>
<tr>
<td>38</td>
<td>TRK_IN_D</td>
</tr>
<tr>
<td>39</td>
<td>TRK_VAL</td>
</tr>
<tr>
<td>40</td>
<td>FF_VAL</td>
</tr>
<tr>
<td>41</td>
<td>FF_SCALE</td>
</tr>
<tr>
<td>42</td>
<td>FF_GAIN</td>
</tr>
<tr>
<td>43</td>
<td>UPDAT_EVT</td>
</tr>
<tr>
<td>44</td>
<td>BLOCK_ALM</td>
</tr>
<tr>
<td>45</td>
<td>ALARM_SUM</td>
</tr>
<tr>
<td>46</td>
<td>ACK_OPTION</td>
</tr>
<tr>
<td>47</td>
<td>ALARM_HYS</td>
</tr>
<tr>
<td>48</td>
<td>HI_HI_PRI</td>
</tr>
<tr>
<td>49</td>
<td>HI_HI_LIM</td>
</tr>
<tr>
<td>50</td>
<td>HI_PRI</td>
</tr>
<tr>
<td>51</td>
<td>HI_LIM</td>
</tr>
<tr>
<td>52</td>
<td>LO_PRI</td>
</tr>
<tr>
<td>53</td>
<td>LO_LIM</td>
</tr>
<tr>
<td>54</td>
<td>LO_LO_PRI</td>
</tr>
<tr>
<td>55</td>
<td>LO_LO_LIM</td>
</tr>
<tr>
<td>56</td>
<td>DV_HI_PRI</td>
</tr>
<tr>
<td>57</td>
<td>DV_HI_LIM</td>
</tr>
<tr>
<td>58</td>
<td>DV_LO_PRI</td>
</tr>
<tr>
<td>59</td>
<td>DV_LO_LIM</td>
</tr>
<tr>
<td>60</td>
<td>HI_HI_ALM</td>
</tr>
<tr>
<td>61</td>
<td>HI_ALM</td>
</tr>
<tr>
<td>62</td>
<td>LO_ALM</td>
</tr>
<tr>
<td>63</td>
<td>LO_LO_ALM</td>
</tr>
<tr>
<td>64</td>
<td>DV_HI_ALM</td>
</tr>
<tr>
<td>65</td>
<td>DV_LO_ALM</td>
</tr>
</tbody>
</table>
Fig. 29a · NAMUR and direct attachment
Heavy-duty version

Light version

* Reversing amplifier
  - Type 3710 (see drawing of heavy-duty version for dimensions)
  - 1079-1118/1079-1119, no longer available
    (see drawing of light version for dimensions)

Fig. 29b · Attachment to rotary actuators VDI/VDE 3845 (Sept. 2010), fixing level 1, size AA1 to AA4
18.1 Fixing levels according to VDI/VDE 3845 (September 2010)

Dimensions in mm

<table>
<thead>
<tr>
<th>Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>Ød</th>
<th>M_{min}</th>
<th>ØD*</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA0</td>
<td>50</td>
<td>25</td>
<td>15</td>
<td>5.5 for M5</td>
<td>66</td>
<td>50</td>
</tr>
<tr>
<td>AA1</td>
<td>80</td>
<td>30</td>
<td>20</td>
<td>5.5 for M5</td>
<td>96</td>
<td>50</td>
</tr>
<tr>
<td>AA2</td>
<td>80</td>
<td>30</td>
<td>30</td>
<td>5.5 for M5</td>
<td>96</td>
<td>50</td>
</tr>
<tr>
<td>AA3</td>
<td>130</td>
<td>30</td>
<td>30</td>
<td>5.5 for M5</td>
<td>146</td>
<td>50</td>
</tr>
<tr>
<td>AA4</td>
<td>130</td>
<td>30</td>
<td>50</td>
<td>5.5 for M5</td>
<td>146</td>
<td>50</td>
</tr>
<tr>
<td>AA5</td>
<td>200</td>
<td>50</td>
<td>80</td>
<td>6.5 for M6</td>
<td>220</td>
<td>50</td>
</tr>
</tbody>
</table>

* Flange type F05 according to DIN EN ISO 5211
19 Valve characteristic selection

The characteristics that can be selected in Code 20 are shown in following in graph form.

**Note:** A characteristic can only be defined (user-defined characteristic) using a workstation/operating software (e.g. TROVIS-VIEW).

- **Linear** (select characteristic: 0)
- **Equal percentage** (select characteristic: 1)
- **Rev. equal percentage** (select characteristic: 2)
Test report for Information of the Applicant

Testing of the Degree of Protection on enclosures of Type 2730 and Type 3731 Positioners

This test report contains the result of a single investigation carried out on the product submitted. A sample of this product was tested to find the accordance with the thereafter listed standards resp. parts of standards.

The test report does not entitle to use a VDE Certification mark and the "C65-geprüfte Sicherheit (test safety)" and does not refer to all VDE specifications applicable to the tested product.

This report may only be passed to a third party in its complete wording including this preamble and the date of issue.

Any publication or reproduction requires the prior written approval of the VDE Testing and Certification Institute.

1 Assignment

The samples described in 2 below were tested for compliance with the IP 66 degree of protection.

2 Samples
   2.1 Type 2730 Positioner
   2.2 Type 3731 Positioner

3 Basis of assessment

DIN EN 60529/VDE 0470 Part 1/2000-09
Degree of protection provided by enclosures (IP Code)
German version EN 60529:1999+A1:2000

4 Execution of the tests

The dust test had already been carried out on the Type 2730 Positioner under the reference number: 479000-9010-0001/32752 and on the Type 3731 Positioner under the reference number: 479000-9010-0001/38945 with suction as per category 3 at the connecting enclosures of the positioners and solenoid valves. The vacuum pressure was 2 kPa and the test lasted 8 hours.

5 Test results

The testing of the samples described in 2 above yielded the following results:

- Protecting against access to hazardous parts and against ingress of solid foreign objects according to DIN EN 60529/VDE 0470 Part 1/2000-09
  - IPX6 satisfied

- Protecting against ingress of water according to DIN EN 60529/VDE 0470 Part 1/2000-09
  - IPX6 satisfied

The positioner enclosures in the versions submitted meet the requirements of IP 66 degree of protection.

There was no ingress of either dust or water.

VDE-Prüf- und Zertifizierungsinstitut

D-65849 Offenbach

(Signature)

Gerhard Biedl
IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

Certificate No.: IECEx PTB 06.0054
Status: Current
Date of Issue: 2006-11-02

Applicant:
SAMSON AG Meß- und Regeltechnik
Waalsdorferstrasse 3
D-65763 Frankfurt am Main
Germany

Electrical Apparatus:
Bus-powered field Up-Positioners types 3720-41 and 3720-91

Optional accessory:

Type of Protection:
General Requirements, Intrinsic Safety

Marking:
Ex ia IIC T6

Approved for issue on behalf of the IECEx Certification Body:
Dr. Ing. Ulrich Johannsmeier
Department Head of Intrinsic Safety and Safety of Systems

Certificate issued by:
Physikalisch-Technische Bundesanstalt (PTB)
Bundesallee 100
38116 Braunschweig
Germany

Manufacturers:
SAMSON AG Meß- und Regeltechnik
Waalsdorferstrasse 3
D-65763 Frankfurt am Main
Germany

This certificate is issued on condition that the complete, representative sample of the apparatus was examined and found to comply with the IECEx Standards and other relevant safety standards. The manufacturer is subject to the conditions as outlined in the IECEx Scheme Rules, IECEx 02 and Operational Documents.

STANDARDS:
The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents were found to comply with the following standards:

IEC 60079-10: 2004
Edition 4.0

Electrical apparatus for explosive gas atmospheres - Part 11: Intrinsic safety

This Certificate does not indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:
A summary of the equipment tested is successfully met the examination and test requirements as recorded in the Test Report.

DEPTBE/TB08 000560
Quality Assessment Report:
KB/TEUNI/98021136
**Schedule**

**EQUIPMENT:**

Equipment and systems covered by this certificate are as follows:

- The Model 3730-41 and 3730-61 up-Positioners are two-positioned field devices
  with communication capability and serve for adjusting the winch stereoposition
  in compliance with a control signal. They are intended for attachment to either
  linear or valve actuators.

- Communication with field devices programmable logic control systems and
  distributed control systems is compliant either according to Profinet PA
  (Model 3730-41...), or in accordance with the FOUNDATION Fieldbus
  Specification (Typ 3730-61...).

For further information see annex

**CONDITIONS OF CERTIFICATION:** NO
Annex to Certificate of Conformity IECEx PTB 06.0054

Equipment:
Model 3730-41 Profilex PA Positioner
Model 3730-51 FOUNDATION Fieldbus Positioner

Submitted by:
SAMSON AG Mess- und Regeltechnik
Weinzeilerstrasse 3, 66031 Frankfurth

Manufactured by:
SAMSON AG Mess- und Regeltechnik
Weinzeilerstrasse 3, 66031 Frankfurth

Groups:
HC / HB

Type of Protection:
ia

Temperature Classification:
Ta / 60°C

Degree of Ingress Protection:
IP 54 IP 65 and IP 66

Conditions of Manufacture
Routine testing and high-voltage testing between the individual circuit and the enclosure with 500 V, 50Hz.

Schedule

The positioners come in several versions. The following model designation code applies:

System code number

Positioner
4 = Profilex PA
5 = FOUNDATION Fieldbus

Ex-approvals
1 = Ex ia according EN and IECEx

Additional equipment
Inductive limit switches
1 = provided
0 = not provided

Zwangsenteilung (solenoid valve)
4 = provided
0 = not provided

Vibration sensor
2 = provided
0 = not provided

Binary input
3 = provided
0 = not provided

External position sensor
1 = provided
0 = not provided

Connections
Pneumatic connections
Electric connections
1+2 = M 20x1.5 (plastic)
5+6 = M 20x1.5 (metal)

The data in the model designation code will be substituted for numerals identifying the equipment version.

Scope
Ex ia [HC/IIia T6] -40°C ≤ Ta ≤ T6 60°C / -40°C ≤ Ta ≤ T5 70°C / -40°C ≤ Ta ≤ T4 80°C ; IP 54 or IP 65

Testing and assessment according IEC 60079-0 and IEC 60079-14** type of protection Ex ia IIC T6 degree of protection IP 54 and IP 65 according to IEC 60529

Table: Summary of results

<table>
<thead>
<tr>
<th>Group</th>
<th>FOUNDATION Fieldbus</th>
<th>FISCO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HC</td>
<td>HB</td>
</tr>
<tr>
<td>U [V]</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>I [mA]</td>
<td>174 (n)</td>
<td>360 (n)</td>
</tr>
<tr>
<td>P [W]</td>
<td>2.08 (n)</td>
<td>1.04 (n)</td>
</tr>
</tbody>
</table>

Im = maximum current for intrinsically safe relay circuits according to EN 50029
Im = maximum current according to Profibus User Organization
P Christian = maximum power of the intrinsically safe circuit upon matching
P Christian = maximum power in the consumer upon matching

Model 3730-41 and 3730-51 lp Positioners – Permissible maximum values for intrinsic safety according to IEC Type Examination Certificate PTB 04-1 ATEX 2109

The Model 3730-41 and 3730-51 lp Positioners are bus-powered field devices with communication capability and serve for adjusting the valve stem position incompliance with a control signal. They are intended for attachment to either linear or rotary actuators.

Communication is optionally either according to Profibus PA in compliance with the FISCO concept (Typ.3730-41) or in accordance with the FOUNDATION Fieldbus Specification (Typ.3730-51).

The Model Typ 3730-41 and 3730-51 are passive two-terminal networks which may be connected in all certified intrinsically safe circuits, provided the permissible maximum values of UI, Ii and DI are not exceeded.
Annex to Certificate of Conformity IECEx PTB 06.0054

For instrument air non-combustible media are used.

The equipment is intended for use in hazardous locations.

The correlation between temperature classification and the permissible ambient temperature ranges is shown in the table below:

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-40°C ... 60°C</td>
</tr>
<tr>
<td>T5</td>
<td>-40°C ... 70°C</td>
</tr>
<tr>
<td>T4</td>
<td>-40°C ... 80°C</td>
</tr>
</tbody>
</table>

**Electrical data**

BUS connection signal circuit
(terminals 1/12)

Type of protection:
Intrinsic safety Ex ia IIC/IIIB
only for connection to an intrinsically safe circuit

The correlation between the type of protection and the electrical data is shown in the tables below:

**Maximum values: Model 3730-A.**

<table>
<thead>
<tr>
<th>Ex ia IIC/IIIB</th>
<th>Ex ia IIIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>$U_i = 24$ V DC</td>
<td>$U_i = 24$ DC</td>
</tr>
<tr>
<td>$I_i = 380$ mA</td>
<td>$I_i = 380$ mA</td>
</tr>
<tr>
<td>$P_i = 5.32$ W</td>
<td>$P_i = 5.32$ W</td>
</tr>
</tbody>
</table>

**Maximum values: Model 3730-S.**

<table>
<thead>
<tr>
<th>Ex ia IIC</th>
<th>Ex ia IIIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>$U_i = 24$ DC</td>
<td>$U_i = 24$ DC</td>
</tr>
<tr>
<td>$I_i = 750$ mA</td>
<td>$I_i = 380$ mA</td>
</tr>
<tr>
<td>$P_i = 5.22$ W</td>
<td>$P_i = 2.58$ W</td>
</tr>
</tbody>
</table>

$C_i = 5$ nF; $L_i = 10$ µH

**Limit switch, inductive**
(terminals 41/42)

Type of protection: Intrinsic safety Ex ia IIC,
only for connection to an intrinsically safe circuit

**Maximum values:**

$U_i = 16$ V; $I_i = 52$ mA;
$P_i = 169$ mW

$L_i = 100$ µH; $C_i = 30$ nF

or

$U_i = 16$ V; $I_i = 25$ mA;
$P_i = 65$ mA

3 of 5

**Forced ventilation function**
(terminals 81/82)

Type of protection: Intrinsic safety Ex ia IIC
only for connection to an intrinsically safe circuit

**Maximum values:**

$U_i = 25$ V; $I_i = 115$ mA
$P_i = 500$ mW

$C_i = $ negligible

**Binary input 1**
(terminals 87/88)

Type of protection: Intrinsic safety Ex ia IIC/IIIB
only for connection to an intrinsically safe circuit

**Maximum values:**

$U_i = 30$ V; $I_i = 100$ mA
$L_i$ and $C_i$ = negligible

**Binary input 2**
(terminals 87/88)

Type of protection: Intrinsic safety Ex ia IIC/IIIB
only for connection to an intrinsically safe circuit

**Maximum values:**

$U_i = 5.88$ V; $I_i = 1$ mA
$P_i = 7.2$ mW

The correlation between the type of protection and the permissible external capacitances and inductances is shown in the table below:

<table>
<thead>
<tr>
<th>Ex ia IIC</th>
<th>Ex ia IIIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C_i = 2$ µF</td>
<td>$C_i = 4$ µF</td>
</tr>
<tr>
<td>$L_i = 10$ mH</td>
<td>$L_i = 4$ mH</td>
</tr>
</tbody>
</table>

$L_i$ and $C_i$ negligible

**Serial interface BU**

Type of protection: Intrinsic safety Ex ia IEC

**Maximum values:**

4 of 5
Annex to Certificate of Conformity IECEx PTB 06.0054

$U_a = 8.61\,\text{V}$, $I_a = 55\,\text{mA}$

$P_0 = 250\,\text{mW}$

The correlation between the type of protection and the permissible external capacitances and inductances is shown in the table below:

<table>
<thead>
<tr>
<th>$C_a$ in mF</th>
<th>$C_a$ in mF</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C_a = 0.61,\mu\text{F}$</td>
<td>$C_a = 6,\mu\text{F}$</td>
</tr>
<tr>
<td>$L_a = 9,\text{mH}$</td>
<td>$L_a = 9,\text{mH}$</td>
</tr>
</tbody>
</table>

Only for connection to a certified intrinsically safe circuit

Maximum values:

$I_i = 16\,\text{mA}$, $I_i = 25\,\text{mA}$

$P_i = 64\,\text{mW}$

$L_i$ and $C_i$ negligible

In case of interconnection the rules for interconnecting intrinsically safe circuits shall be complied with.

External position sensor
(Analog relay, pins 9, 10, 11)

Type of protection: Intrinsic safety IEx ia IIIC

Maximum values:

$U_0 = 8.61\,\text{V}$, $I_a = 55\,\text{mA}$

$P_0 = 250\,\text{mW}$

The correlation between the type of protection and the permissible external capacitances and inductances is shown in the table below:

<table>
<thead>
<tr>
<th>$C_a$ in mF</th>
<th>$C_a$ in mF</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C_a = 0.61,\mu\text{F}$</td>
<td>$C_a = 6,\mu\text{F}$</td>
</tr>
<tr>
<td>$L_a = 9,\text{mH}$</td>
<td>$L_a = 9,\text{mH}$</td>
</tr>
</tbody>
</table>

$L_i = 370\,\mu\text{F}$, $C_i = 730\,\mu\text{F}$
TRANSLATION

EC TYPE EXAMINATION CERTIFICATION


2) EC Type Examination Certificate Number

PTB 04 ATEX 2109

3) Equipment: Model 3730-4 and 3730-5 I/P Positioners

4) Manufacturer: SAMSON AG, Mess- und Regeltechnik

5) Address: Waismühlenstr. 3, D-60314 Frankfurt, Germany

6) The equipment and any acceptable variations thereof are specified in the schedule to this certificate.

7) The Physikalisch-Technische Bundesanstalt, notified body number 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment 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 as specified in Annex II to the Directive.

The examination and test results are recorded in confidential report
PTB Ex 04-4-002.

8) The Essential Health and Safety Requirements are satisfied by compliance with


9) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

10) This EC Type Examination Certificate relates only to the design and examination of the specified equipment in compliance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment. These requirements are not covered by this Certificate.

11) The marking of the equipment shall include the following:

II 2G Ex ia IIC T6 and II 2D IP 65 T 80 °C

Zertifizierungsstelle Explosionsschutz Braunschweig, 25 October 2004

By order

(Signature) (Seal)

Dr. Ing. U. Janschmeyer
Regierungsdirektor

PTB
Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

PTB
Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

PTB
Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
**Schedule**

EC TYPE EXAMINATION CERTIFICATE No. PTB 04 ATEX 2109

**Description of Equipment**

The Model 3730-4 and 3730-5. I/P Positioners are bus-powered field devices with communication capability and serve for adjusting valve stem positions in compliance with a control signal. They are intended for attachment to linear or rotary actuators.

Communication is optionally either according to Profinet PA in compliance with the PESCO concept (Model 3730-4.) or in compliance with the FOUNDATION™ Fieldbus Specification (Model 3730-5.)

The Model 3730-4 and 3730-5. I/P Positioners are passive two-terminal networks which may be connected to any certified intrinsically safe circuit, provided the permissible maximum values for UI, II and PI are not exceeded.

For air supply non-combustible media are used.

The devices are intended for use inside the hazardous locations.

The correlation between temperature classification, permissible temperature ranges is shown in the tables below:

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-40 °C ... 60 °C</td>
</tr>
<tr>
<td>T5</td>
<td>-40 °C ... 70 °C</td>
</tr>
<tr>
<td>T4</td>
<td>-40 °C ... 80 °C</td>
</tr>
</tbody>
</table>

**Electrical data**

**BUS connection, signal circuit (terminals 11/12)**

Type of protection: Intrinsic safety EEx ia IIC.

Only for connection to a certified intrinsically safe circuit

The correlation between type of protection and the electrical data is shown in the table below:

<table>
<thead>
<tr>
<th>Electrical data</th>
<th>Maximum values</th>
<th>Type of protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ue = 16 V</td>
<td>Li = 52 mA</td>
<td>IIC</td>
</tr>
<tr>
<td>Pi = 169 mW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Li = 100 μH</td>
<td>Ci = 30 nF</td>
<td></td>
</tr>
<tr>
<td>Ue = 16 V</td>
<td>Li = 25 mA</td>
<td></td>
</tr>
<tr>
<td>Pi = 64 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Li = 100 μH</td>
<td>Ci = 30 nF</td>
<td></td>
</tr>
</tbody>
</table>

The correlation between temperature classification, the permissible ambient temperature ranges, the maximum short-circuit currents and the maximum power for analyzers is shown in the table below:

**Maximum values:**

Model 3730-4...

<table>
<thead>
<tr>
<th>EEx ia IIC/IA</th>
<th>UI = 17.5 V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Li = 380 mA</td>
<td>Pi = 5.32 W</td>
</tr>
</tbody>
</table>

Model 3730-5...

<table>
<thead>
<tr>
<th>EEx ia IIC/RB</th>
<th>UI = 24 V DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Li = 380 mA</td>
<td>Pi = 5.32 W</td>
</tr>
</tbody>
</table>

Inductive proximity switch (terminals 11/12)

Type of protection: Intrinsic safety EEx ia IIC, only for connection to a certified intrinsically safe circuit.

<table>
<thead>
<tr>
<th>Electrical data</th>
<th>Maximum values</th>
<th>Type of protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ue = 16 V</td>
<td>Li = 52 mA</td>
<td>IIC</td>
</tr>
<tr>
<td>Pi = 169 mW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Li = 100 μH</td>
<td>Ci = 30 nF</td>
<td></td>
</tr>
<tr>
<td>Ue = 16 V</td>
<td>Li = 25 mA</td>
<td></td>
</tr>
<tr>
<td>Pi = 64 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Li = 100 μH</td>
<td>Ci = 30 nF</td>
<td></td>
</tr>
</tbody>
</table>

EC Type Examination Certificate: Without signature and seal are invalid.

This EC Type Examination Certificate may only be reproduced in its entirety and without any changes, schedule included. Incomplete or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.
Temperature class | Permissible ambient temperature range | $I_e / P_o$
---|---|---
T6 | 45°C | |
T5 | -40°C .. 60°C | 52mA / 159mW |
T4 | 75°C | |
T6 | 60°C | |
T5 | -40°C .. 80°C | 25mA / 64mW |
T4 | 80°C | |

Forced venting function
(terminals 81/82)

Type of protection: Intrinsic safety EEEx ia IIC only for connection to a certified intrinsically safe circuit

Maximum values:
- $U_i = 28 \text{ V}$
- $I_i = 115 \text{ mA}$
- $P_i = 500 \text{ W}$
- $C_i = \text{ negligible}$

Serial interface BU

Type of protection: Intrinsic safety EEEx ia IIC

Maximum values:
- $U_i = 8,61 \text{ V}$
- $I_i = 55 \text{ mA}$
- $P_i = 250 \text{ mW}$

The correlation between the type of protection and the permissible maximum allowed capacitances and inductances is shown in the table below.

<table>
<thead>
<tr>
<th>EEEx ia IIC</th>
<th>EEEx ia IIb</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C_i = 2 \mu F$</td>
<td>$C_o = 4 \mu F$</td>
</tr>
<tr>
<td>$L_i = 10 \text{ mH}$</td>
<td>$L_o = 1 \text{ H}$</td>
</tr>
</tbody>
</table>

The correlation between the type of protection and the permissible maximum allowed capacitances and inductances is shown in the table below.

<table>
<thead>
<tr>
<th>EEEx ia IIC</th>
<th>EEEx ia IIb</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C_i = 0,61 \mu F$</td>
<td>$C_o = 4 \mu F$</td>
</tr>
<tr>
<td>$L_i = 9 \text{ mH}$</td>
<td>$L_o = 9 \text{ mH}$</td>
</tr>
</tbody>
</table>

For interconnection, the rules for interconnecting intrinsically safe circuits shall be complied with.

External position sensor
(analog PCB pins p9, p10, p11)

Type of protection: Intrinsic safety EEEx ia IIC

Maximum values:
- $U_i = 8,61 \text{ V}$
- $I_i = 55 \text{ mA}$
- $P_i = 250 \text{ mW}$

The correlation between the type of protection and the permissible maximum allowed capacitances and inductances is shown in the table below.

<table>
<thead>
<tr>
<th>EEEx ia IIC</th>
<th>EEEx ia IIb</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C_i = 2 \mu F$</td>
<td>$C_o = 4 \mu F$</td>
</tr>
<tr>
<td>$L_i = 10 \text{ mH}$</td>
<td>$L_o = 1 \text{ H}$</td>
</tr>
</tbody>
</table>

This EC Type Examination Certificate may only be reproduced in its entirety and without any changes, schedule included.

Extract or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig

PTB 047-2750-14-41.doc

Physikalisch-Technische Bundesanstalt, Bundesallee 100, D-38116 Braunschweig

PTB 047-2750-14-41.doc
PTB

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

<table>
<thead>
<tr>
<th>EEx ia IIC</th>
<th>EEx ia IIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co = 0,61 µF</td>
<td>Co = 4 µF</td>
</tr>
<tr>
<td>Lo = 9 mH</td>
<td>Lo = 9 mH</td>
</tr>
</tbody>
</table>

U i = 370 µH
C i = 730 nF

(16) Test Report: PTB Ex 04-24202

(17) Special conditions for safe use

None

(18) Special Health and Safety Requirements

In compliance with the standards specified above.

Zertifizierungsstelle Explosionsschutz

Braunschweig, 25 October 2004

By order

(Signature) (seal)

Dr. Ing. U. Johannesmeyer
Regierungsdirektor

---

EC Type Examination Certificate with all signatures and seal are sealed.

The EC Type Examination Certificate may only be reproduced in its entirety and without any changes, schedule included. 

Details or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.
Translation

Addendum No. 1

in compliance with Directive 94/9/EC Annex III Clause 6
to the EC Type Examination Certificate PTB 04 ATEX 2109

Equipment:
Model 3730-41, and 3730-51

Marking:

II 2G Ex ia IIC T6 and

II 2D Ex ia IIC 20°C

Manufacturer:
SAMSON AG Mess- und Regeltechnik

Address:
Weibenslebenstr. 3, D-60314 Frankfurt, Germany

1. Description of the additions and modifications

The Model 3730-4, and 3730-5, are permitted to be manufactured in the future also in compliance with the document specified in the Test Report. The input wiring of the bus connection circuit has been modified and the pbt layout has been adapted.

The clause below replaces Clause (15) Part. 2 of the EC Type Examination Certificate.

"Bus connection (coupling) can be made according to the FISCO Concept both for the PreFilter FA and the Foundation FieldBus Specification."

The table presentation of the electrical data relating to the bus connection signal circuit has been modified:

<table>
<thead>
<tr>
<th>FISCO supply unit</th>
<th>BUS supply unit, general</th>
</tr>
</thead>
<tbody>
<tr>
<td>U1 = 17.5 V DC</td>
<td>U1 = 24 V DC</td>
</tr>
<tr>
<td>I1 = 380 mA</td>
<td>I1 = 360 mA</td>
</tr>
<tr>
<td>P1 = 5.12 W</td>
<td>P1 = 1.94 W</td>
</tr>
</tbody>
</table>

All the other electrical data and other data specified in the EC Type Examination certificate apply also this Amendment No. 1

Test report: PTB Ex 06-20685

Zertifizierungsstelle Explosionschutz

Braunschweig, 13 July 2005

(Signature)

Dr.-Ing. U. Johannsen
Director and Professor

(Scale)
TRANSLATION
ADDENDUM No.: 2

in compliance with Directive 94/9/EC, Annex III, Clause 6
to the EC Type Examination Certificate PTB 04 ATEX 2109

Equipment: Model 3740-4 ... and Model 3750-5 ... Positioners

Marking:
- Ex H 2 G Ex ia IIC T 6
- Ex d IIC T 65°C

Manufacturer: SAMSON AG Mess- und Regeltechnik

Address: Wissenschaftsstrasse 3
60344 Frankfurt am Main, Germany

Description of the additions and modifications

The Models 3740-4 ... and 3750-5 ... Positioners are permitted as manufactured in the future also in compliance with the test documents specified in the Test Report.

The electrical data of the forced ventilation modules of the Models 3740-41 and 3750-51 are modified as follows:

Forced ventilation only for (terminals 81/92)

Type of protection: Intrinsically Safe Ex ia IIC
connection to a certified intrinsically safe circuit

Maximum values:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>U_i</td>
<td>28 V</td>
</tr>
<tr>
<td>I_i</td>
<td>115 mA</td>
</tr>
<tr>
<td>I_d</td>
<td>negligible</td>
</tr>
<tr>
<td>C_i</td>
<td>5.3 mF</td>
</tr>
</tbody>
</table>

All other electrical data and other data specified in the EC Type Examination Certificate apply also to this Addendum No. 2.

Test report: PTB Ex 07-27260

Zertifizierungsstelle Explosionsschutz

By order

Dr.-Ing. U. Johannsen,
Director and Professor


Page 1 of 1
TRANSLATION

Statement of Conformity


(2) EC Type Examination Certificate Number

PTB 05 ATEX 2010 X


(5) Manufacturer: SAMSON AG, Mess- und Regeltechnik

(6) Address: Weismüllerstr. 3, D-60314 Frankfurt, Germany

(7) The equipment and any acceptable variations thereof are specified in the schedule to this certificate.

(8) The Physikalisch-Technische Bundesanstalt, notified body number 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment 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 as specified in Annex II to the Directive.

The examination and test results are recorded in confidential report PTB Ex 05-24319.

(9) The Essential Health and Safety Requirements are satisfied by compliance with

EN 50021:1999 EN 50281-1-1:1998

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

In compliance with the Directive 94/9/EC this Statement of Conformity relates only to the design and construction of the equipment specified. Further requirements of this Directive apply to manufacture and marketing of the equipment.

The marking of the equipment shall include the following:

II 3G Ex nA II T6 or II 3G Ex nL IIC T6 or
II 3D IP 54 T 80 °C or II 2D IP 65 T 80 °C

Zertifizierungsstelle Explosionschutz

Braunschweig, 16 February 2005

By order

(Signature) (Seal)

Dr. Ing. U. Johannsmeyer
Regierungsdirektor
**Schedule**

**EC Type Examination Certificate No: PTB 05 ATEX 2010 X**

**Description of Equipment**

The Model 3730-48 and 3730-58 positioners are bus-powered field devices with communication capability and serve for translating control signals into valve stem positions. They are intended for attachment to linear or rotary actuators.

For instrument air non-combustible media are used.

The equipment is intended for use inside the hazardous locations.

The correlation between temperature classification, permissible temperature ranges is shown in the table below:

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>-40°C to 60°C</td>
</tr>
<tr>
<td>T5</td>
<td>-40°C to 70°C</td>
</tr>
<tr>
<td>T4</td>
<td>-40°C to 80°C</td>
</tr>
</tbody>
</table>

**Electrical data**

BUS connection, signal circuit (terminals 11/12)

Type of protection: EEx nA II or Ex nIIC resp.

<table>
<thead>
<tr>
<th>Gas group</th>
<th>Maximum values</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIC</td>
<td>Uo = 20 V, Io = 466mA, Po = 2.32 W</td>
</tr>
<tr>
<td></td>
<td>Uo = 24 V, Io = 261mA, Po = 1.56 W</td>
</tr>
<tr>
<td></td>
<td>Uo = 30 V, Io = 152mA, Po = 1.14 W</td>
</tr>
<tr>
<td>IIB</td>
<td>Uo = 20 V, Io = 1.17 A, Po = 5.88 W</td>
</tr>
<tr>
<td></td>
<td>Uo = 24 V, Io = 650mA, Po = 3.89 W</td>
</tr>
<tr>
<td></td>
<td>Uo = 30 V, Io = 379mA, Po = 2.85 W</td>
</tr>
</tbody>
</table>

Ci = 5 nF; Li = 10 pF

**Type of protection: EEx nA II or Ex nIIC resp.**

Maximum values:

Uo = 20 V
Li = 52 A
Po = 169 W

Li = 100 μF
Ci = 30 μF

The correlation between temperature classification, the permissible ambient temperature ranges, the maximum short-circuit currents and the maximum power for analyzers is shown in the table below:

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature range</th>
<th>Io / Po</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>+45°C</td>
<td></td>
</tr>
<tr>
<td>T5</td>
<td>-40°C to +60°C</td>
<td>52mA / 169mW</td>
</tr>
<tr>
<td>T4</td>
<td>+75°C</td>
<td></td>
</tr>
<tr>
<td>T6</td>
<td>+60°C</td>
<td>25mA / 64mW</td>
</tr>
<tr>
<td>T5</td>
<td>-40°C to +80°C</td>
<td></td>
</tr>
<tr>
<td>T4</td>
<td>+80°C</td>
<td></td>
</tr>
</tbody>
</table>

Forced ventilation function (terminals 81/82)

Type of protection: EEx nA II or Ex nIIC/IB resp.

Maximum values:

Uo = 30 V
Li = 100 mA

Li = negligible
Ci = 5.3 μF

Binary input 1 (terminals 87 / 88)

Type of protection: EEx nA II or Ex nIIC/IB resp.

Maximum values:

Uo = 30 V
Li = 100 mA

Li = negligible
Ci = negligible
Binary input 2
(terminals 85 / 86)
Type of protection: EEx n A II or Ex n IIC/IB resp.
only for connection of a floating passive contact circuit

Maximum values:
\[ U_0 = 5.88 \text{ V} \]
\[ I_0 = 1 \text{ mA} \]
\[ P_0 = 7.2 \text{ mW} \]

The correlation between the gas group and the permissible maximum allowed capacitances and inductances is shown in the table below:

<table>
<thead>
<tr>
<th>Gas group IIC</th>
<th>Gas group IIIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>( C_0 = 1.8 \mu \text{F} )</td>
<td>( C_0 = 5.8 \mu \text{F} )</td>
</tr>
<tr>
<td>( L_0 = 9.7 \text{ mH} )</td>
<td>( L_0 = 1 \text{ H} )</td>
</tr>
</tbody>
</table>

\( C_{i} = \text{negligible} \)
\( L_{i} = \text{negligible} \)

Serial interface BU
Type of protection: EEx n A II or Ex n IIC/IB resp.

Maximum values (active):
\[ U_0 = 8.61 \text{ V} \]
\[ I_0 = 55 \text{ mA} \]
\[ P_0 = 250 \text{ mW} \]

The correlation between the gas group and the permissible maximum allowed capacitances and inductances is shown in the table below:

<table>
<thead>
<tr>
<th>Gas group IIC</th>
<th>Gas group IIIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>( C_0 = 0.61 \mu \text{F} )</td>
<td>( C_0 = 0.4 \mu \text{F} )</td>
</tr>
<tr>
<td>( L_0 = 9 \text{ mH} )</td>
<td>( L_0 = 9 \text{ mH} )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gas group IIC</th>
<th>Gas group IIIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>( L_i = 370 \mu \text{H} )</td>
<td>( L_i = 730 \mu \text{H} )</td>
</tr>
</tbody>
</table>

(16) Test Report: PTB Ex 05-24319
(17) Special conditions for safe use
(18) Basic safety and health requirements
In compliance with the standards specified above.

Zertifizierungsstelle Explosionsschutz
By order

[Signature] (stencil)
Dr. Ing. U. Johannesmeyer
Regierungsbeauftragter

Braunschweig, 16 February 2005
ADDENDUM No. 1

to the Statement of Conformity PTB 05 ATEX 2010 X

Equipment: Model 3730-48, and 3750-58 Positioners

Marking: EX II 3 G EEx a I H T6 or EX II 3 G EEx a II H T6

EX II 3 D IP 54 T 80°C or EX II 3 D IP 65 T 80°C

Manufacturer: SAMSON AG Mess- und Regeltechnik

Address: Weimüllnerstr. 3
06144 Frankfurt am Main

Description of the additions and modifications

The Model 3730-48, and 3750-58 Positioners are permitted to be manufactured in the future also in compliance with the documents specified in the Test Report. The input wiring of the bus connection circuit has been modified and the pin layout has been adapted.

The clause below supplements the description of the equipment under clause (15) Para. 2 of the EC Type Examination Certificate:

"BUS connection (coupling) can be made according to the FISCO Concept both for the Profinet PA and the Foundation Fieldbus Specification."

The electrical data, special conditions and all the other data of the EC Type Examination Certificate continue to apply unchanged also in this Addendum No. 1.

Test report: PTB Ex 06-26086


By order

(Signature) (Seal)

Dr. Ing. U. Johannuusser
Director and Professor

Page 1 of
Addendum Page 1


Communication is optionally either according to the FOUNDATION™ Fieldbus Specification or according to PROFIBUS PA in compliance with FISCO-Concept.

The FISCO-Concept allows interconnections of intrinsically safe apparatus to associated apparatus not specifically examined in such combination. The criteria for interconnection is that the voltage (Vmax) the current (Imax) and the power (Pmax) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (Veto) the current (Ieto) and the power (Peto) which can be delivered by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotection capacitance (Cui) and inductance (Li) of each apparatus (other than the termination) connected to the fieldbus must be less than or equal to 5 µF and 10 µH respectively. In each segment only one active device, normally the associated apparatus, is allowed to provide the necessary energy for the fieldbus system. The allowed voltage (Veto) of the associated apparatus is limited to the range of 14V DC to 24V DC. All other equipment connected to the bus cable has to be passive, meaning that they are not allowed to provide energy to the system, except for a leakage current of 50mA for each connected device. Separately powered equipment needs a galvanic isolation to assure that the intrinsically safe fieldbus circuit remains passive.

The cable used to interconnect the devices need to have the parameters in the following range:

- Loop resistance R: 15 ... 150 Ohm/km
- Inductance per unit length L: 0.4 ... 1 mH/km
- Capacitance per unit length C: 80 ... 200 nF/km
- C = C line/line + 0.5 C line/screen, if both lines are floating or C = C line/line + C line/screen, if the screen is connected to one line
- Length of spur cable: ≤ 30 m
- Length of trunk cable: ≤ 1 km
- Length of spur cable: ≤ 30 m
- At each end of the trunk cable an approved industrial termination with the following parameters is suitable:
  - R = 90 ... 1000 Ohm
  - C = 0 ... 22 µF

One of the allowed terminations might already be integrated in the associated apparatus.

The number of passive devices connected to the bus segment is not limited due safety reasons. If the above rules are respected, the inductance and capacitance of the cable will not impair the intrinsic safety of the installation.

Notes:

1. Approved associated apparatus must be installed in accordance with manufacturer instructions
2. Approved associated apparatus must meet the following requirements:
   - Veto ≤ Vmax, Ieto ≤ Imax, Peto ≤ Pmax
3. The maximum non-hazardous area voltage must not exceed 250 V.
4. The installation must be in accordance with the Canadian Electrical code Part 1.
5. Each set of wires must be grounded shield. The shield must extend as close to the terminal as possible and it must be grounded shield at U.S. Barrier ground.
6. Caution: Use only supply wires suitable for 5 °C above surrounding temperature.
7. Warning: Substitution of components may impair intrinsic safety. PE = I. S. Ground
8. The polarity for connecting 11 and 12 is of no importance due to an internal rectifier.
9. FISCO concept applies to fieldbus / circuit only.
10. Entity parameters apply to circuit 2, 3 and 4 and further required to meet the following conditions:
    - C ≥ C + Cable, L = 2 Li + Leakage

Addendum Page 2

Intrinsically safe if installed as specified in manufacturer's installation manual.

Type 4 Enclosure

Exia HCT6

Class I, Division 1, Groups A, B, C and D; Class II, Division 1, Groups E, F + G; Class III.

CSA-certified apparatus suitable for Profibus PA or FOUNDATION FF

CSA-certified associated apparatus suitable for FIELDBUS

CSA-certified apparatus suitable for PROFIBUS DP or FOUNDATION FF

Notes:

1. Approved associated apparatus must be installed in accordance with manufacturer instructions
2. Approved associated apparatus must meet the following requirements:
   - Veto ≤ Vmax, Ieto ≤ Imax, Peto ≤ Pmax
3. The maximum non-hazardous area voltage must not exceed 250 V.
4. The installation must be in accordance with the Canadian Electrical code Part 1.
5. Each set of wires must be grounded shield. The shield must extend as close to the terminal as possible and it must be grounded shield at U.S. Barrier ground.
6. Caution: Use only supply wires suitable for 5 °C above surrounding temperature.
7. Warning: Substitution of components may impair intrinsic safety. PE = I. S. Ground
8. The polarity for connecting 11 and 12 is of no importance due to an internal rectifier.
9. FISCO concept applies to fieldbus / circuit only.
10. Entity parameters apply to circuit 2, 3 and 4 and further required to meet the following conditions:
    - C ≥ C + Cable, L = 2 Li + Leakage

Revisions Control No. 1: March 2006

Addendum to EB 8384-5 EN
Table 1: Intrinsic Safety Parameters

<table>
<thead>
<tr>
<th>Fieldbus</th>
<th>Limit-switches</th>
<th>Forced venting function</th>
<th>Binary - input</th>
<th>Serial-Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation</td>
<td>Profibus</td>
<td>Inductive</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Circuit No.</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Terminal No.</td>
<td>11 / 12 (IEC 1148-2)</td>
<td>11 / 12 (IEC 1148-2)</td>
<td>41 / 42</td>
<td>81 / 82</td>
</tr>
<tr>
<td>Groups</td>
<td>IIC</td>
<td>HIC</td>
<td>IIC</td>
<td>BB</td>
</tr>
<tr>
<td>U0 or V0C [V]</td>
<td>24</td>
<td>17.5</td>
<td>16</td>
<td>28</td>
</tr>
<tr>
<td>Io or IC [mA]</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>25</td>
</tr>
<tr>
<td>Power [W]</td>
<td>1.04</td>
<td>2.58</td>
<td>5.32</td>
<td>6.4mW</td>
</tr>
<tr>
<td>C1 [nF]</td>
<td>2</td>
<td>60</td>
<td>5.3</td>
<td>0</td>
</tr>
<tr>
<td>C0 or Ca [µF]</td>
<td>2</td>
<td>60</td>
<td>5.3</td>
<td>0</td>
</tr>
<tr>
<td>L1 [µH]</td>
<td>10</td>
<td>100</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>L0 or La [µH]</td>
<td>#/#</td>
<td>#/#</td>
<td>#/#</td>
<td>#/#</td>
</tr>
</tbody>
</table>

**Binary-input 1:** For connection of an active signal circuit

**Binary-input 2:** For connection of a passive contact circuit directly on the control valve, e.g. passive pressure switch for leakage monitoring

**Notes:**
1. Entity parameters must meet the following requirements:
   - $V_0C \leq V_{max}$, $I_{loc} \leq I_{max}$, $P_0 \leq P_{max}$
   - $C_0$ or $C_a \geq C_{cable} + C_{cable}$ and $L_0 \leq L_{cable} + L_{cable}$
2. Install in accordance with the Canadian Electrical Code Part 1
3. Cable entry M 20 x1.5 or metal conduit acc. to dwg. No. 1050-0540

* Circuit 3 can be connected to a CSA Certified zener barrier that is rated as follows:
  - Supply channel (connect to Terminal 81): $V_{0C} \leq 28$V max. and $R_{min} \geq 245$ Ω
  - Return channel (connect to Terminal 82): $\leq 28$V max with diodes Return (zero current)

** Circuit 4 can be connected to a CSA Certified zener barrier that is rated as follows:
  - Supply channel (connect to Terminal 87): $V_{0C} \leq 30$V and $R_{min} \geq 300$ Ω
  - Return channel (connect to Terminal 88): $V_{0C} \leq 30$V max with diodes Return (zero current)

Revisions Control No. 1: March.2006

Table 2: CSA – certified barrier parameters of circuit 4

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Supply barrier</th>
<th>Evaluation barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Voc</td>
<td>R_{min}</td>
</tr>
<tr>
<td>circuit 3</td>
<td>$\leq 28$V</td>
<td>$\geq 245$Ω</td>
</tr>
<tr>
<td>circuit 4</td>
<td>$\leq 30$V</td>
<td>$\geq 300$Ω</td>
</tr>
</tbody>
</table>

The correlation between temperature classification and permissible ambient temperature ranges is shown in the table 3 below:

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>$-60^\circ$C</td>
</tr>
<tr>
<td>T5</td>
<td>$-40^\circ$C $\leq T_a \leq 70^\circ$C</td>
</tr>
<tr>
<td>T4</td>
<td>$-80^\circ$C</td>
</tr>
</tbody>
</table>

Table 4: Energy-Limited (Non-Incendive) Parameters

<table>
<thead>
<tr>
<th>Fieldbus</th>
<th>Limit-switches</th>
<th>Forced venting function</th>
<th>Binary - input</th>
<th>Serial-Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation</td>
<td>Profibus PA (Non incendive Equipment)</td>
<td>Inductive</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Groups</td>
<td>A, B and HIC</td>
<td>C, D and HIC</td>
<td>#/#</td>
<td>#/#</td>
</tr>
<tr>
<td>U0 or V0C [VDC]</td>
<td>28V</td>
<td>24V</td>
<td>30V</td>
<td>28V</td>
</tr>
<tr>
<td>I0 or ISC</td>
<td>1mA</td>
<td>55mA</td>
<td>#/#</td>
<td>#/#</td>
</tr>
<tr>
<td>Pmax [W]</td>
<td>1,04</td>
<td>2,58</td>
<td>5,32</td>
<td>6,4mW</td>
</tr>
<tr>
<td>C1 [nF]</td>
<td>2</td>
<td>60</td>
<td>5,3</td>
<td>0</td>
</tr>
<tr>
<td>C0 or Ca [µF]</td>
<td>2</td>
<td>60</td>
<td>5,3</td>
<td>0</td>
</tr>
<tr>
<td>L1 [µH]</td>
<td>10</td>
<td>100</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>L0 or La</td>
<td>#/#</td>
<td>#/#</td>
<td>#/#</td>
<td>#/#</td>
</tr>
</tbody>
</table>

**Notes:**
1. Entity parameters must meet the following requirements:
   - $V_0C \leq V_{max}$, $I_{loc} \leq I_{max}$, $P_0 \leq P_{max}$
   - $C_0$ or $C_a \geq C_{cable} + C_{cable}$ and $L_0 \leq L_{cable} + L_{cable}$

2. Install in accordance with the Canadian Electrical Code Part 1
3. Cable entry M 20 x1.5 or metal conduit acc. to dwg. No. 1050-0540

* Circuit 3 can be connected to a CSA Certified zener barrier that is rated as follows:
  - Supply channel (connect to Terminal 81): $V_{0C} \leq 28$V max. and $R_{min} \geq 245$ Ω
  - Return channel (connect to Terminal 82): $\leq 28$V max with diodes Return (zero current)

** Circuit 4 can be connected to a CSA Certified zener barrier that is rated as follows:
  - Supply channel (connect to Terminal 87): $V_{0C} \leq 30$V and $R_{min} \geq 300$ Ω
  - Return channel (connect to Terminal 88): $V_{0C} \leq 30$V max with diodes Return (zero current)

Revisions Control No. 1: March.2006

Addendum to EB 8384-5 EN
Addendum Page 5

CSA certified for hazardous locations:
Ex nA II T6 / Ex nL IIC T6
Class I, Div. 2; Groups A, B, C, D; Class II, Div. 2 Groups E, F + G; Class III

Type 4 Enclosure

Addendum Page 6

Installation drawing Control Relay KHA5-OTI/Ex2, KHA6-OTI/Ex1 or
KHA6-OTI/Ex2 with Model SJ-b-N Proximity Sensors

CSA certified for hazardous locations:
Ex nA II T6 / Ex nL IIC T6
Class I, Div. 2; Groups A, B, C, D; Class II, Div. 2 Groups E, F + G; Class III

Type 4 Enclosure

Division 2 wiring method shall be in accordance to the Canadian Electrical Code Part I

System parameters

<table>
<thead>
<tr>
<th>Terminal No.</th>
<th>Groups</th>
<th>L (mH)</th>
<th>C (µF)</th>
<th>VoC (V)</th>
<th>Ioc (mA)</th>
<th>Vmax (V)</th>
<th>Rmin (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A + B</td>
<td>E</td>
<td>0.2</td>
<td>0.9</td>
<td>10.5</td>
<td>1.5</td>
<td>10.5</td>
<td>10.5</td>
</tr>
<tr>
<td>C + E</td>
<td>D, F, G</td>
<td>1000</td>
<td>21.5</td>
<td>10.5</td>
<td>1.5</td>
<td>10.5</td>
<td>10.5</td>
</tr>
</tbody>
</table>

Communication is optionally either according to the FOUNDATION Fieldbus Specification or according to PROFIBUS PA in compliance FISCO-Concept.

The FISCO Concept allows interconnected intrinsically safe apparatus to associate apparatus not specifically examined in such combination. The criteria for interconnection is that the voltage \( V_{oc} \) (the current \( I_{oc} \)) and the power \( P_{oc} \) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage \( V_{oc} \) (the current \( I_{oc} \)) and the power \( P_{oc} \) levels which can be derived by the associated apparatus, considering faults and applicable factors. In addition, the maximum unprotected capacitance \( C \) and inductance \( L \) of each apparatus (other than the termination) connected to the fieldbus must be less than or equal to 5 nF and 10 µH respectively.

In each segment only one active device, normally the associated apparatus, is allowed to provide the necessary energy for the fieldbus system. The allowed voltage \( V_{oc} \) of the associated apparatus is limited to the range of 14 V DC to 24 V DC. All other equipment connected to the bus cable has to be passive, meaning that they are not allowed to provide energy to the system, except to a leakage current of 5 mA for each connected device. Separately powered equipment needs galvanic isolation to assure that the intrinsically safe fieldbus circuit remains passive.

The cable used to interconnect the devices must have the parameters in the following range:

- Loop resistance: \( R \) ≤ 150 Ohm/km
- Inductance per unit length: \( L \) ≤ 0.4 nH/m
- Capacitance per unit length: \( C \) ≤ 80 nF/m
- \( C = C_{line/line} + 0.5 C_{line/screen} \), if both lines are floating or, \( C = C_{line/line} + C_{line/screen} \), if the screen is connected to one line
- Length of spur cable: \( L ≤ 30 \) m
- Length of trunk cable: \( L ≤ 1 \) km

At each end of the trunk cable an approved infallible line termination with the following parameters is suitable:

\[ R = 90 \ldots 100 \text{ Ohm} \]
\[ C = 0 \ldots 0.02 \mu \text{F} \]

One of the allowed terminations might already be integrated in the associated apparatus.

The number of passive devices connected to the bus segment is not limited due to I.S. reasons. If the above rules are expected, the inductance and capacitance of the cable will not impair the intrinsic safety of the installation.

Notes:
1. Approved associated apparatus must be installed in accordance with manufacturer instructions
2. Approved associated apparatus must meet the following requirements:
   - \( U_{oc} \) or \( V_{oc} \) or \( I_{oc} \) or \( P_{oc} \) ≤ 15 V or 30 mA
   - [other limits]
3. The maximum non-hazardous area voltage must not exceed 250 V
4. The installation must be in accordance with the National Electrical Code ANSI/NFPA 70 and ANSI/ISA RP 12.06.01
5. Each set of wires must be provided with ground shield. The shield must extend as close to the terminal as possible and it must be grounded at the I.S. Barrier ground.
6. Caution: Use only supply wires suitable for 5 °C above surrounding.
7. Warning: Substitution of components may impair intrinsic safety. PE = I.S. Ground
8. The polarity for connecting 11 and 12 is of no importance due to an internal rectifier.
9. FISCO Concept applies to fieldbus / circuit only.
10. Entity parameters apply to circuit 2, 3 and 4 and further required to meet the following conditions:
    - \( C ≥ C_{i} \)
    - \( L ≤ L_{i} \)

Revisions Control No: 1: March, 2006

Addendum to EB 8384-5 EN

Field enclosure NEMA 4X

The installation must be in accordance with the National Electrical Code ANSI/NFPA 70 and ANSI/ISA RP 12.06.01
### Table 1: Maximum values

<table>
<thead>
<tr>
<th>Fieldbus</th>
<th>Limit-switches</th>
<th>Forced-venting-function</th>
<th>Binary-input</th>
<th>Serial-Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation Profibus inductive</td>
<td>1 2</td>
<td>1 2</td>
<td>active passive</td>
<td></td>
</tr>
<tr>
<td>Circuit No.</td>
<td>1 1</td>
<td>2 3</td>
<td>4 5 6 6</td>
<td></td>
</tr>
<tr>
<td>Terminal No.</td>
<td>11 / 12</td>
<td>11 / 12</td>
<td>41 / 42</td>
<td>81 / 82</td>
</tr>
<tr>
<td>Groups</td>
<td>A, B, C, D</td>
<td>HIC, IIB</td>
<td>A, B, C, D</td>
<td>HIC, IIB</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ui or Vmax [V]</td>
<td>24</td>
<td>17.5</td>
<td>16</td>
<td>28</td>
</tr>
<tr>
<td>Ii or Imax [mA]</td>
<td>360</td>
<td>360</td>
<td>380</td>
<td>25</td>
</tr>
<tr>
<td>P or Pmax [W]</td>
<td>1,04</td>
<td>2,58</td>
<td>5,32</td>
<td>64 mW</td>
</tr>
<tr>
<td>Ci [nF]</td>
<td>5</td>
<td>60</td>
<td>5,3</td>
<td>0</td>
</tr>
<tr>
<td>Li [µH]</td>
<td>10</td>
<td>100</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Binary-input 1:** For connection of an active signal circuit  
**Binary-input 2:** For connection of an passive contact circuit directly on the control valve, e.g. passive pressure switch for leakage monitoring

**Notes:**
1. Entity parameters must meet the following requirements:
   - \( U_0 \leq U_i \) or \( V_{max} \); \( I_0 \leq I_i \) or \( P_{max} \)
   - \( C_0 \) or \( C_i \geq C + C_{Cable} \) and \( L_0 \) or \( L_i \geq L + L_{Cable} \)
2. The installation must be in accordance with the National Electrical Code ANSI/NFPA 70 and ANSI/ISA RP 12.06.08
3. Cable entry M 20 x 1,5 or metal conduit acc. to dwg. No. 3050-0540

### Table 2: FM – approved barrier parameters of circuit 4

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Supply barrier</th>
<th>Evaluation barrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voc</td>
<td>Rmin</td>
<td>Inc</td>
</tr>
<tr>
<td>circuit 3</td>
<td>( \leq 28V )</td>
<td>( \geq 345\Omega )</td>
</tr>
<tr>
<td>circuit 4</td>
<td>( \leq 30V )</td>
<td>( \geq 300\Omega )</td>
</tr>
</tbody>
</table>

The correlation between temperature classification and permissible ambient temperature ranges is shown in the table 3 below:

### Table 3:

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>Permissible ambient temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T6</td>
<td>( +60^\circ C )</td>
</tr>
<tr>
<td>T5</td>
<td>(-40^\circ C \leq T_a \leq 70^\circ C )</td>
</tr>
<tr>
<td>T4</td>
<td>( +80^\circ C )</td>
</tr>
</tbody>
</table>

### Table 4:

<table>
<thead>
<tr>
<th>Foundation Fieldbus or Profibus PA (Non incendive Field wiring)</th>
<th>Limit-switches (inductive)</th>
<th>Forced-venting function</th>
<th>Binary-Input 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal</td>
<td>11 / 12</td>
<td>41 / 42</td>
<td>81 / 82</td>
</tr>
<tr>
<td>Groups</td>
<td>A, B and HIC</td>
<td>C, D and IIB</td>
<td>#/##</td>
</tr>
<tr>
<td>U or Vmax [VDC]</td>
<td>20V</td>
<td>24V</td>
<td>30V</td>
</tr>
<tr>
<td>I or Imax [mA]</td>
<td>400</td>
<td>361</td>
<td>152</td>
</tr>
<tr>
<td>P or Pmax [W]</td>
<td>2,32</td>
<td>1,56</td>
<td>1,14</td>
</tr>
<tr>
<td>Ci [nF]</td>
<td>50F</td>
<td>60</td>
<td>5,3</td>
</tr>
<tr>
<td>Li [µH]</td>
<td>10µH</td>
<td>100</td>
<td>0</td>
</tr>
</tbody>
</table>
FM approved for hazardous locations:
Ex nA II T6; Ex nL IIC T6 Zone 2.
Class I, II, Div. 2 Groups A, B, C, D, E+F.

Field enclosure NEMA 4X

Addendum Page 11

Installation drawing Control Relay KHA5-OTI/Ex2, KHA6-OTI/Ex1 or KHA6-OTI/Ex2 with Model SJ-b-N Proximity Sensor

Addendum Page 12

Each pair of I.S. wires must be protected by a shield that is grounded at the I.S. Ground. The shield must be extended as close to the terminals as possible. Installation shall be in accordance with the National Electrical Code ANSI/NFPA 70 and ANSI/ISA RP 12.06.01.

The total series inductance and shunt capacitance of shield wiring shall be restricted to the following maximum values:

- Maximum capacitance of each inductive sensor: 30nF
- Maximum inductance of each inductive sensor: 100µH

### System Parameters

<table>
<thead>
<tr>
<th>Control Relay</th>
<th>Terminal No.</th>
<th>L (mH)</th>
<th>C (µF)</th>
<th>Vop (V)</th>
<th>Ioc (mA)</th>
<th>Vmax (V)</th>
<th>Rmin (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3, 2-3, 4-6, 5-6</td>
<td>A + B</td>
<td>192</td>
<td>2.66</td>
<td>10.5</td>
<td>811</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C + E</td>
<td>671</td>
<td>7.9</td>
<td>10.5</td>
<td>811</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D, E, G</td>
<td>1000</td>
<td>23.3</td>
<td>10.5</td>
<td>811</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Revisions Control No. 1: March.2006

Revisions Control No. 1: March.2006