Series 3730
Electropneumatic Positioner
Type 3730-5

Configuration and operation over FOUNDATION™ fieldbus



Fig. 1 · Configuration and operation over FOUNDATION™ fieldbus

FOUNDATION™

Configuration Manual

KH 8384-5 EN

Firmware version **K 2.04/R 1.55**

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Note concerning this Configuration Manual

The rotary pushbutton on the positioner allows the Type 3730-5 Positioner to be operated and configured on site. In addition, the settings can be performed over the FOUNDATION fieldbus network or over the SAMSON SSP interface. The Mounting and Operating Instructions EB 8384-5 EN describe the mounting, start up and on-site operation as well as configuration over the SAMSON SSP interface using the TROVIS-VIEW software.

This Manual (KH 8384-5 EN) describes the basic principles and parameters for operation and configuration using FOUNDATION™ fieldbus.

Note: *Information on the* ***EXPERTplus*** *diagnostics is included in the Operating Instructions EB 8389 EN.*

Contents Page

1	**Introduction**	6
2	**Principle of operation**	7
2.1	Application type	8
2.2	Additional equipment	9
2.2.1	Configuration using TROVIS-VIEW software	10
2.2.2	Configuration using the NI-FBUS™ Configurator	10
2.3	Communication	10
3	FOUNDATION™ fieldbus block model	11
4	**Initialization and zero calibration of the positioner**	12
5	**Resetting the positioner**	13
6	**Status classification and condensed state**	14
7	FOUNDATION™ fieldbus parameters	16
7.1	Resource Block (RES)	16
7.2	Transducer Blocks	17
7.2.1	Advanced Positioner Transducer Block (AO TRD)	17
7.3	Function blocks	20
7.3.1	Analog Output Function Block	20
7.3.2	Proportional Integral Derivative Function Block	22
7.3.3	Discrete Output Function Block (DO1 + DO2)	24
7.3.4	Discrete Input Function Block (DI1 + DI2)	26
7.3.5	Input Selector Function Block	28
7.3.6	Multiple Analog Output Function Block	29
7.3.7	Multiple Analog Output Function Block	30
7.4	Other parameters	31
7.4.1	Stale counter	31
7.4.2	Link objects	31
7.4.3	LAS functionality	31
7.5	Parameter lists	32
7.5.1	Resource Block (RES)	33
7.5.2	Advanced Positioner Transducer Block (AO TRD)	45
7.5.3	Analog Output Function Block	88
7.5.4	Proportional Integral Derivative Function Block	96
7.5.5	Discrete Output Function Block	111
7.5.6	Discrete Input Function Block (DI1 + DI2)	117
7.5.7	Input Selector Function Block	122
7.5.8	Multiple Analog Input Function Block	126
7.5.9	Multiple Analog Output Function Block	129

Revisions of positioner firmware in comparison to previous versions	
Previous	New
Communication K 1.11	**K 1.21**
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 state 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 set whether an inactivated internal solenoid valve generates an AO block error, resulting in a block alarm.
SOLENOID_SELECT parameter	The SOLENOID_SELECT parameter in firmware K 1.21 and higher allows to 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
	K 1.22
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 is set to OFF.
FINAL_VALUE parameter	The output value is scaled with FINAL_VALUE_ RANGE in firmware K 1.22 and higher, and not as previously 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.
	K 1.23
	Internal modifications

Revisions of positioner firmware in comparison to previous versions	
Previous	New
	K 1.24
BUS_ADDRESS parameter	The bus address has the default setting of 248.
Device type	In the delivery state, the device is configured as a basic device.
	K 1.25
	Internal modifications
	K 2.01
Additional function blocks	– 2x DO (Discrete Output) – 1x IS (Input Selector) – 1x MAI (Multiple Analog Input) – 1x MAO (Multiple Analog Output)
New functions	In the DO Function Block (Discrete Output), the following new functions are implemented: – Discrete analysis of on/off valves – Start partial stroke test (PST) – Start and reset the data logger – Reset diagnosis – Stop diagnosis – Move to fail-safe position – Lock local operation
Action on fault detection	If the AO Transducer Block is in O/S mode and the condensed state changes to "Maintenance alarm", the following actions can be started: – Hold last value – Move valve to fail-safe position – Move to a predefined fault state value
	K 2.02
Partial stroke test (PST)	Configuration of the partial stroke test over the FF parameters is no longer possible. Configuration using the TROVIS-VIEW software is still possible.
	K 2.03
Partial stroke test (PST)	Configuration of the partial stroke test over the FF parameters as well as using the TROVIS-VIEW software is now possible. The partial stroke test can be started by the binary input BE2.
	K 2.04
Partial stroke test (PST)	Internal modifications

1 Introduction

This section is based upon:

- Fieldbus FOUNDATION™ Specification "Function Block Application Process Part 1 – 3" Revision 1.7 (FF-890 to FF-892)
- Fieldbus FOUNDATION™ Specification "Positioner Transducer Block" Revision 3.0 (FF-906)

Type 3730-5 Positioner

The microprocessor-controlled positioner compares the reference variable cyclically transmitted over the FOUNDATION™ fieldbus network to the travel or opening angle of the control valve and issues a corresponding output signal pressure.

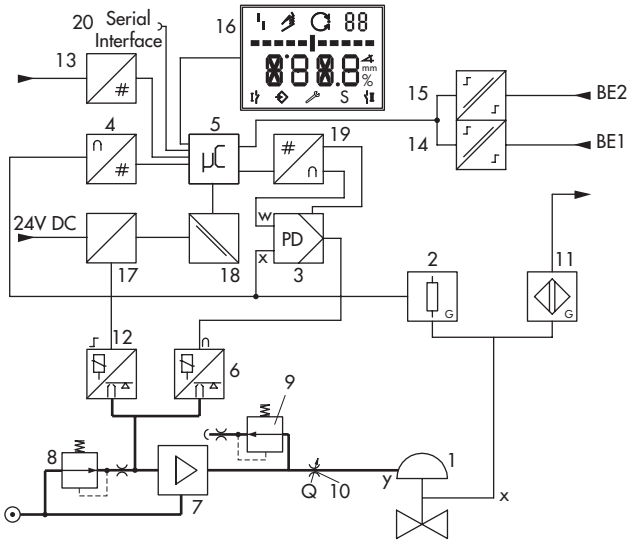
Special features:

- Link Master Capability
- Easy attachment to common linear actuators over SAMSON direct attachment interface, over NAMUR rib or to control valves with rod-type yokes acc. to IEC 60534-6 or to rotary actuators according to VDI/VDE 3845
- Any desired mounting position of the positioner
- Simple one-knob, menu-driven operation
- Automatic start-up
- LCD easy to read in any mounting position due to selectable reading direction
- Integrated EXPERTplus diagnostics suitable for throttling and on/off valves and with additional partial stroke test for valves in safety-instrumented systems
- Classified status alarms acc. to NAMUR Recommendation NE 107
- Control parameters can be changed online
- Automatic monitoring of zero point
- Calibrated travel sensor without gears susceptible to wear
- Permanent storage of all parameters in non-volatile EEPROM (protection against power failure)
- Adjustable output pressure limitation
- Adjustable tight-closing function
- Binary input for DC voltage signals
- Certified according to IEC 61508/SIL

2 Principle of operation

The electropneumatic positioner is attached to pneumatic control valves. It is used to assign the valve 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 volume restriction Q. 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 housing 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.

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



1 Control valve
2 Travel sensor
3 PD controller
4 A/D converter
5 Microcontroller
6 i/p module
7 Pneumatic 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 BE1 (passive)
15* Binary input BE2 (active)
16 LCD
17* Solenoid valve control
18 Galvanic isolation
19 D/A converter
20 Serial interface (SSP)
* Option

Fig. 2 · Functional diagram

As a standard feature, the positioner comes with a binary input used to signalize process information over the FOUNDATION™ fieldbus network.

The extended EXPERTplus diagnostics are integrated into the positioner. They provide information on the positioner and generate diagnostic and status messages, which allow faults to be pinpointed quickly.

2.1 Application type

Two application types for the valve are available: **Control valve** and **Open/Close (on/off) valve**. The manual mode (MAN) and the automatic mode (AUTO) can be selected with both application types.

Depending on the application type that has been selected, the positioner behaves differently in the automatic mode (AUTO):

Control over FOUNDATION™ fieldbus is performed over the AO Function Block (control valve) and over the DO1 Function Block (on/off valve). The application type can be set in the Resource Block over the SELECT_DO_1 parameter or at the positioner using Code 49 - h0.

	Control valve	Open/Close valve
AUTO	The positioner follows the reference variable continuously. The valve position (current position) appears in % on the display.	Discrete analysis of the reference variable. The valve position (current position) in % and **O/C** (Open/Close) appear in alternating sequence on the display.
MAN	The positioner follows the reference variable entered over local operation.	

Note:

- *Depending on the application type, certain diagnostic functions cannot be performed or analyzed. Refer to EB 8389 EN on EXPERTplus valve diagnostics.*
- *In manual mode, an on/off valve can be moved past 100 % of the nominal range (with the closed position for ATO) or below 0 % of the nominal range (with the closed position for ATC).*

2.2 Additional equipment

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, regardless 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).

Inductive limit switch

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

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).

Binary inputs

Binary input BE1 (14):
The positioner has a standard binary input for DC voltage signals, which allows process information to be exchanged over the FOUNDATION™ fieldbus network.

Binary input BE2 (15):
This binary input is optional. It is an active input which connects a floating contact which is powered by the positioner. The switching state of the binary input can be indicated over the FOUNDATION™ fieldbus network.

Note: *The binary inputs are configured in the DI Function Blocks.*

2.2.1 Configuration using TROVIS-VIEW software

The positioner can be configured using the 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.

The Mounting and Operating Instructions EB 8384-5 EN contain a description on how to configure and operate the positioner over TROVIS-VIEW.

2.2.2 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 can be linked using the NI-FBUS™ Configurator.

2.3 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.*

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3 FOUNDATION™ fieldbus block model

FOUNDATION™ fieldbus assigns all the functions and data of a device to 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:

- **Resource Block (RES)**
  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.

- **Function blocks**
  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 following function blocks are implemented in the Type 3730-5:
  – 1x Proportional Integral Derivative Function Block (PID); execution time 20 ms
  – 1x Analog Output Function Block (AO); execution time 30 ms
  – 2x Discrete Input Function Blocks (DI); execution time 20 ms
  – 2x Discrete Output Function Blocks (DO); execution time 30 ms
  – 1x Multiple Analog Input Function Block (MAI); execution time 50 ms
  – 1x Multiple Analog Output Function Block (MAO); execution time 50 ms
  – 1x Input Selector Function Block (IS); execution time 30 ms

- **Transducer Blocks (TRD)**
  Each AI or AO Function Block has a Transducer Block which contains all data and device-specific parameters to link the device to the process value (sensor or final control element).
  The following Transducer Blocks (corresponding to the Function Blocks) are implemented:
  – 1x Advanced Positioner Transducer Block (AO TRD)
  – 2x Discrete Input Transducer Blocks (DI TRD)
  – 2x Discrete Output Transducer Blocks (DO TRD)
  – 1x Multiple Analog Input Transducer Block (MAI TRD)
  – 1x Multiple Analog Output Transducer Block (MAO TRD)

4 Initialization and zero calibration of the positioner

Both an initialization and a zero calibration can be started over the XD_COMMAND parameter of the AO Transducer Block. The relevant parameters for a MAX/NOM initialization and the diagnostic functions of EXPERTplus are listed below (also refer to EB 8389 EN):

- APPLICATION_TYPE_OC_CONTROL (type of application)
- INIT_METHOD (initialization method)
- TRANS_PIN_POS (pin position)
- RATED_TRAVEL (required rated travel for NOM initialization)
- PRESSURE_LIMIT (setting of pressure limit)
- SELECT_EMERGENCY_MODE (setting when the travel sensor is defective)
- DEVICE_CHARACTERISTIC (settings for actuator and other accessories)
  - MODEL (actuator with or without spring return)
  - BOOSTER (pneumatic volume booster)
  - STUFFING_BOX (packing to seal the plug stem)
  - XD_COMMAND ("Start Initialization")
  - XD_COMMAND_STATE (initialization status)

Note: *Read the corresponding section on starting up the positioner in the Mounting and Operating Instructions EB 8384-5 EN.*

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5 Resetting the positioner

The start-up and diagnostic data (in Code 36 Std) can be reset over the XD_COMMAND (41) parameter of the AO Transducer Block.

The resetting of the device data and the wiring of the function blocks to the values stipulated in the FOUNDATION™ fieldbus specification are performed using the DEFAULTS value in the RESTART (16) parameter of the Resource Block (RES).

A warm start of the positioner is performed using the PROCESSOR value in the RESTART (16) parameter of the Resource Block (RES).

The entire diagnostic data as well as the individual messages and histograms are reset over the RESET_STATUS_MESSAGE_DIAG (147) parameter of the AO Transducer Block.

6 Status classification and condensed state

All status alarms are classified in the positioner to report an error that has occurred. The status classification can be changed over the following FOUNDATION™ fieldbus parameters in the AO Transducer Block (AO TRD):

- 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 bis 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 the RES Block). Besides the CONDENSED_STATE parameter, the condensed state can be issued to the discrete output OUT_D of the DI Function Blocks (DI1 + DI2).

Possible condensed states include:

0	OK	
1	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.
2	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.
3	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.
7	Function check	Test or calibration procedures are being performed. The positioner is temporarily unable to perform its control task until this procedure is completed.

In addition to the condensed state, 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)

parameters in the AO Transducer Block (AO TRD) with another status for block errors. The following classifications are possible:

- No message
- Device needs maintenance soon
- Device needs maintenance now

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

7 FOUNDATION™ fieldbus 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.

7.1 Resource Block (RES)

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 that affect the behavior of all other blocks of the device.

Refer to page 33 for the list of parameters.

Note: *All time specifications in the Resource Block are specified in the unit of 1/32 ms according to the FOUNDATION™ fieldbus Specification Version 1.7.*
In the Device Description Library supplied by Fieldbus FOUNDATION *upon which the device description of Type 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.*

7.2 Transducer Blocks

Transducer Blocks link the function blocks to the input and output variables of a field device. For example, the DI Function Blocks are linked to the physical binary inputs, an internal solenoid valve, the current valve position or the condensed state of the positioner. This link to the various Transducer Blocks is made over the CHANNEL parameter of the individual function blocks. The table below shows how CHANNEL is assigned to the function blocks:

CHANNEL	Function Block
1	DI1
2	DI2
3	AO
4	MAI
5	MAO
6	DO1
7	DO2

The Transducer Blocks DI TRD, DO TRD, MAI TRD and MAO TRD are implemented according to the FOUNDATION™ fieldbus specification and do not contain any manufacturer-specific parameters.

7.2.1 Advanced Positioner Transducer Block (AO TRD)

The Advanced Positioner Transducer Block (AO TRD) contains 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.

Action on fault detection

The action on fault detection for the "Maintenance alarm" state in the condensed state can be configured in the XD_FSTATE_OPT parameter as follows:

- Hold last value
- Move to fail-safe position
- Move to fault state value XD_FSTATE_VAL

The action on fault detection to transfer to O/S mode can be configured in the XD_OOS_OPT parameter as follows:

- Hold last value

- Move to fail-safe position
- Move to fault state value XD_FSTATE_VAL

The AO Transducer Block (AO TRD) can still set an output error in the AO Function Block. For this purpose, the following events to activate an output error can be configured in the ALARM_OPTIONS parameter:

- No (never)
- Local Override (when the AO TRD is in the LOCAL OVERRIDE mode, i.e. the positioner is set locally in the SAFE mode or an internal solenid valve is activated)
- MAN (when the AO TRD is in MAN mode)
- Block alarm (when the AO TRD has a MAINTENANCE NOW block error)
- AO TRD fault state (when the action on fault detection is active)
- AO O/S set fault state (when the AO Function Block in the O/S mode, the valve is moved to the FSTATE_VAL of the AO Function Block)

Parameter description (Fig. 3)

Control valve	
FINAL_VALUE	Reference variable of upstream AO Function Block (control valve)
FINAL_POS_VALUE	Valve position after decharacterization
WORKING_SP	Reference variable after scaling, characterization, end position function (corresponds to the reference variable of the control algorithm)
WORKING_POS	Actual valve position
READBACK_SELECT	Select parameter which is issued to READBACK of AO Function Block.
On/off valve	
FINAL_VALUE_D	Discrete reference variable of upstream DO Function Block
FINAL_POS_VALUE_D	Discrete valve position after taking the direction of action into account
WORKING_SP_D	Reference variable after taking the direction of action into account (corresponds to the reference variable of the control algorithm)
WORKING_POS_D	Actual discrete valve position

Refer to page 45 for the list of parameters

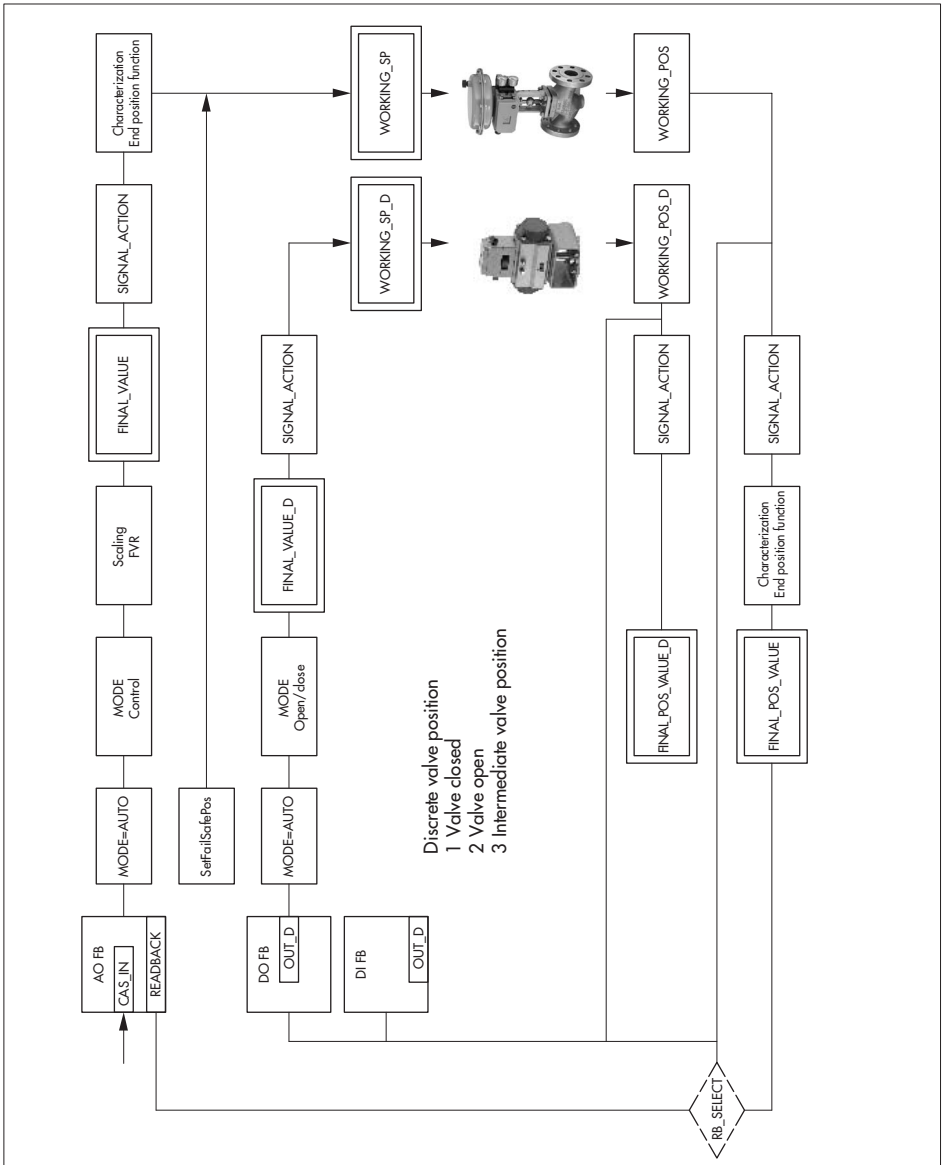


Fig. 3 · Advanced Positioner Transducer Block (AO TRD)

7.3 Function blocks

7.3.1 Analog Output Function Block

The AO Function Block processes an analog signal from an upstream block (e.g. PID Function Block) to an output value that can be used for the downstream Transducer Block (e.g. valve positioner). It contains scaling functions and ramp functions as well as other functions. The generated output value OUT is forwarded over CHANNEL to the downstream Transducer Block.

The AO Function Block contains its set point SP depending on the mode (MODE_BLK)
- Manually entered SP (AUTO)
- Directly from an upstream function block (CAS_IN)
- Directly from a fieldbus host system (RCAS_IN)

An internal working process value PV is generated from SP, while taking into account:
- SP_HI_LIM (setpoint high limit)
- SP_LO_LIM (setpoint low limit)
- SP_RATE_DN (setpoint downward rate limit in AUTO mode)
- SP_RATE_UP (setpoint upward rate limit in AUTO mode)
- PV_SCALE (range of the process variable (PV) (start, end, unit and decimal point))

The output value OUT is generated, while taking into account:
- XD_SCALE (range of the OUT value (start, end, unit and decimal point))
- IO_OPTS (determines the input/output action of the AO TRD, e.g. action on fault detection)

Action on fault detection

Action on fault detection taken during a communication fault (BAD status)
- The last valid value is used by default.
- By selecting FAULT STATE TO VALUE in the IO_OPTS parameter, the valve moves to the fault state value FSTATE_VAL configured in the AO Function Block.
- FSTATE_TIME defines the length of time that the AO block will wait to activate the fault state.

Action on fault detection in OUT OF SERVICE (O/S) mode
- After the AO Function Block has moved to O/S mode, the last valid output value is kept by default.
- By selecting AO O/S set fault state in the ALARM_OPTIONS parameter of the AO TRD, the valve moves to the fault state value FSTATE_VAL configured in the AO Function Block.

- FSTATE_TIME defines the length of time that the AO block will wait to activate the fault state.

Refer to page 88 for list of parameters.

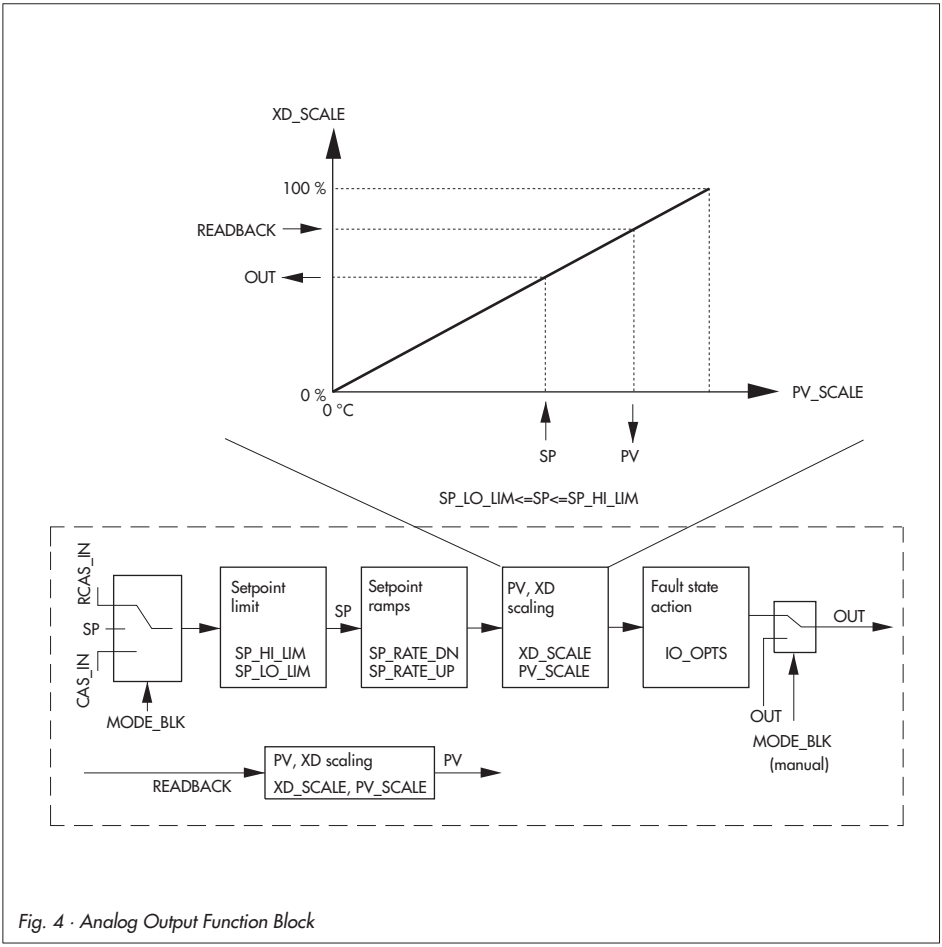


Fig. 4 · Analog Output Function Block

7.3.2 Proportional Integral Derivative 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 ouput value feedforwarding, cascade control and cascade controls with limitation in combination with another controller function block can be implemented.
The following options are available for data processing within the PID Function Block (PID controller): Signal scaling and limiting, mode control, feedforward control, override tracking, 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 working set point.

The block receives the process 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 output value is calculated from the set point SP and the process variable PV resulting from the system deviation.

The individual PID components are included in the calculation of the output variable as follows:

- Proportional component:
  The proportional component reacts immediately and directly when the set point SP or the process variable PV. The output 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 steady-state error signal.
- Integral component:
  The system deviation resulting from the calculation of the output variable using the proportional component is integrated over the integral component of the controller until it is negligible. The integral function corrects the output 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 output variable is calculated depending on the rate of change of the system deviation.

An output value OUT is generated from the calculated output variable corresponding to the OUT_SCALE, OUT_HI_LIM and OUT_LO_LIM parameters. This output value can be passed on to a downstream 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 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 96 for the list of parameters.

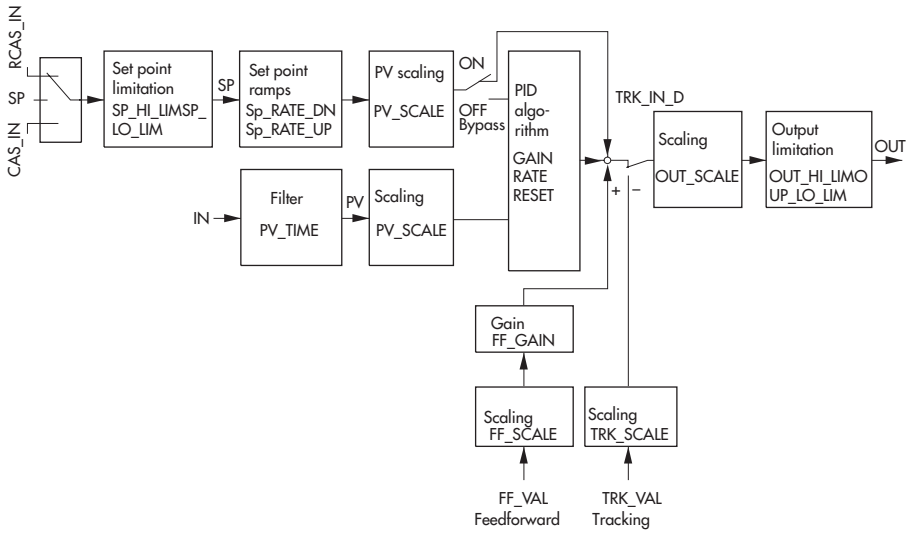


Fig. 5 · Proportional Integral Derivative Function Block

7.3.3 Discrete Output Function Block (DO1 + DO2)

The DO Function Block processes a discrete signal from an upstream function block and makes it available as a discrete reference variable OUT_D over the CHANNEL.

Both DO Function Blocks can be assigned to various applications over the SELECT_DO_1…2 parameter in the Resource Block. The following applications are supported:

- **Open/Close (on/off) application**
  The mode for discrete control of on/off valves is only supported by the DO1 Function Block. In it, the reference variable OUT_D = 0 applies to a closed valve and OUT_D = 1 to a fully open valve.
  The type of application is set over the APPLICATION_TYPE_OC_CONTROL parameter in AO TRD. If the mode is activated, 'O/C' appears on the positioner display when Code 0 is selected (*O/C* and the current valve position).
- **Start VST (valve stroke test)**
  This application is used to start a partial stroke test (PST) or a full stroke test (FST). The settings for this are made in AO TRD. Refer also to EB 8389 EN on EXPERTplus valve diagnostics.
- **Reset diagnosis**
  This command resets the data for the statistical information and tests (see also RESET_STATUS_MESSAGE_DIAG parameter of the AO TRD). The entered classification of the status messages and the logging are not reset.
- **Reset message logger**
  This command resets the logging (see also RESET_STATUS_MESSAGE_DIAG parameter of the AO TRD).
- **Set to fail-safe position**
  This command moves the valve to its mechanical fail-safe position (see also SET_FAIL_SAFE_POS parameter of the AO TRD). This state is indicated on the positioner display by a blinking 'S'.
- **Start data logger**
  This command starts or stops the positioner's data logger (see also START_STOP_ALL_FUNCTION parameter of the AO TRD). The reference variable OUT_D = 1 starts the data logger, whereas the reference variable OUT_D = 0 stops it. Refer also to EB 8389 EN on EXPERTplus valve diagnostics.

- **Set local op. write protection**
  This command locks the local operation of the positioner (see also LOCAL_ OP_ENA parameter of the RES Block). This state is indicated on the positioner display by a blinking 'FF' when Code 3 is selected.
- **Reset/stop diagnosis**
  This application is able to implement the following functions by issuing various values of the reference variable OUT_D:
  1 Reset diagnostics
  2 Reset logging
  3 Stop diagnostics
  4 Start/enable diagnostics

Refer to page 111 for the list of parameters.

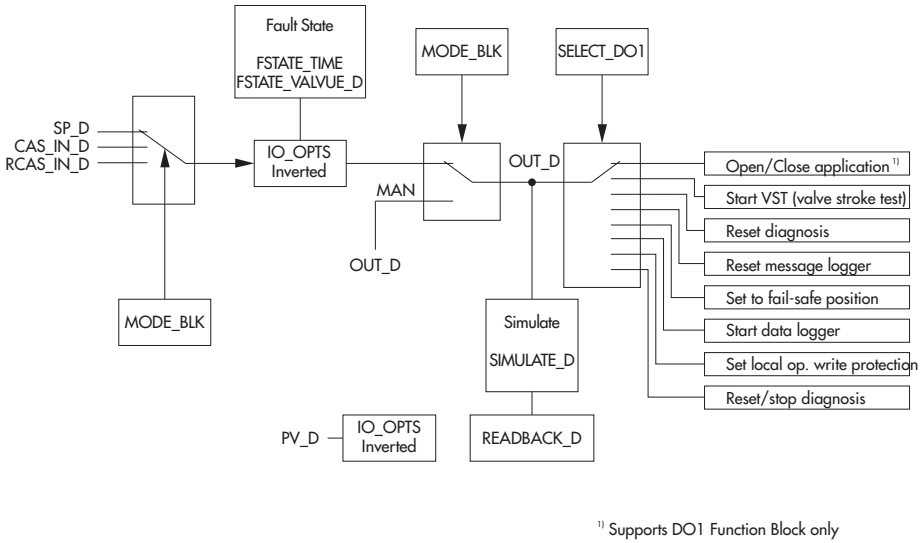


Fig. 6 · Discrete Output Function Block (DO1 + DO2)

7.3.4 Discrete Input Function Block (DI1 + DI2)

The DI Function Block processes single discrete signals and makes them available to other function blocks with the OUT_D parameter. The positioner has two DI Function Blocks which provide the application options described below. The type of application is set over the SELECT_DI_1…2 parameters of the RES Block.

- **5 – 30 VDC (DI1)**
  The positioner is fitted with a standard contact input to process binary voltage signals (terminals 87 and 88). The Discrete Input DI1 Function Block processes the contact state and makes it available over OUT_D.
- **Floating contact (DI2)**
  The positioner is optionally fitted with a binary input to process a floating contact (terminals 85 and 86). The Discrete Input DI2 Function Block processes the contact state and makes it available over OUT_D.
  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 included in the logging. In this case, either the option *Actively Open – Ext. Leak. Sens.* or *Actively Closed – Ext. Leak. Sens.* must be selected in the CONFIG_BINARY_INPUT2 parameter. Additionally, the switching state of the binary input is issued in the BINARY_INPUT2 parameter of the AO Transducer Block.
- **Int. solenoid valve (DI1, DI2)**
  In this setting, the current switching state of the optional internal solenoid valve is read out and made available over OUT_D. The value '0' corresponds to a de-energized solenoid valve (U < 15 V DC) and the value '1' to an energized solenoid valve (U > 19 V DC).
- **Discr. final valve position (DI1, DI2)**
  In this setting, the current discrete valve position is made available over OUT_D. The values are assigned as follows:
  0 Device not initialized
  1 Valve closed
  2 Valve open
  3 Valve in intermediate position
- **Condensed state (DI1, DI2)**
  In this setting, the current condensed state according to NAMUR Recommendation NE107 made available over OUT_D. The status messages are assigned to the discrete value as follows:

0 No message
1 Maintenance required
2 Maintenance demanded
3 Maintenance alarm
7 Function check

Refer to page 117 for the list of parameters.

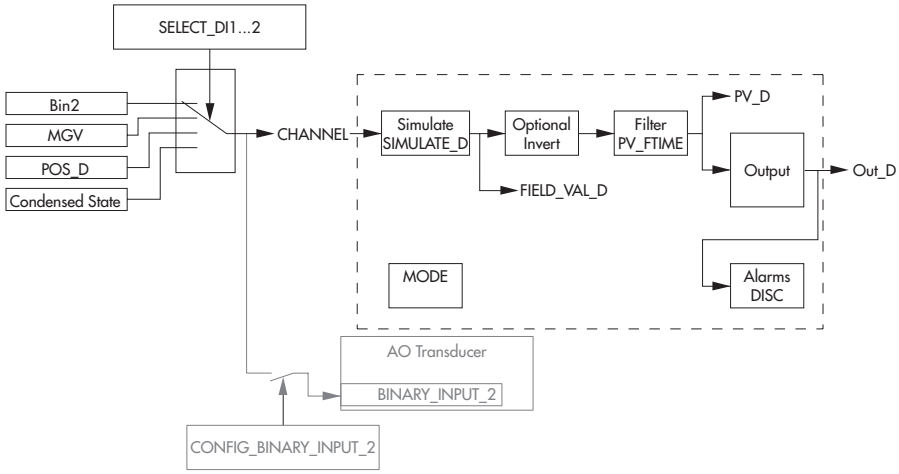


Fig. 7 · Discrete Input Function Block (DI1 + DI2)

7.3.5 Input Selector Function Block

The IS Function Block is used to generate an output signal from maximum four input signal values. The SELECT_TYPE parameter allows the selection criterion to be determined to select which one of the input values is to be placed at the output. The following possibilities are available:

- First value with GOOD status
- Minimum value
- Maximum value
- Middle value
- Average value

Refer to page 122 for list of parameters.

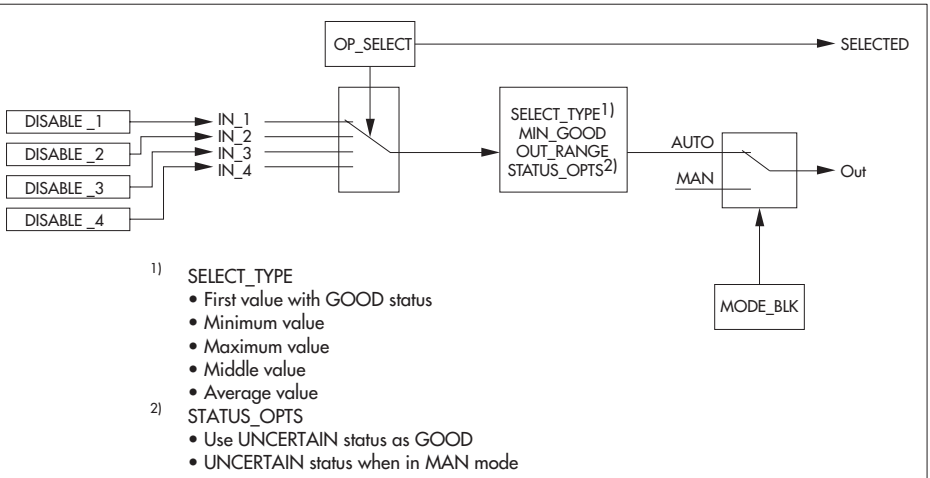


Fig.8 · Input Selector Function Block

7.3.6 Multiple Analog Output Function Block

The MAI Function Block makes analog measured variables of the positioner available to the other analog function blocks at its outputs. The following measured variables can be issued to the eight outputs:

- Current valve position (FINAL_POSITION_VALUE)
- Current temperature inside the positioner (INTERNAL_TEMP)
- Time until the next PST auto test (PST_AUTOSTART_READ)

The measured variables can be assigned to the individual outputs over the SELECT_MAI_OUT_1…8 parameters of the RES Block.

Refer to page 126 for the list of parameters.

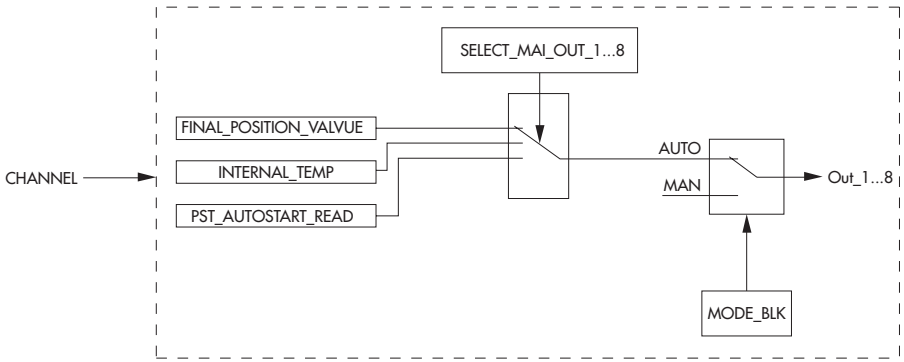


Fig. 9 · Multiple Analog Output Function Block

7.3.7 Multiple Analog Output Function Block

The MAO Function Block currently still has no function within the positioner. It will serve to support/use future diagnostic functions.

Refer to page 129 for the list of parameters.

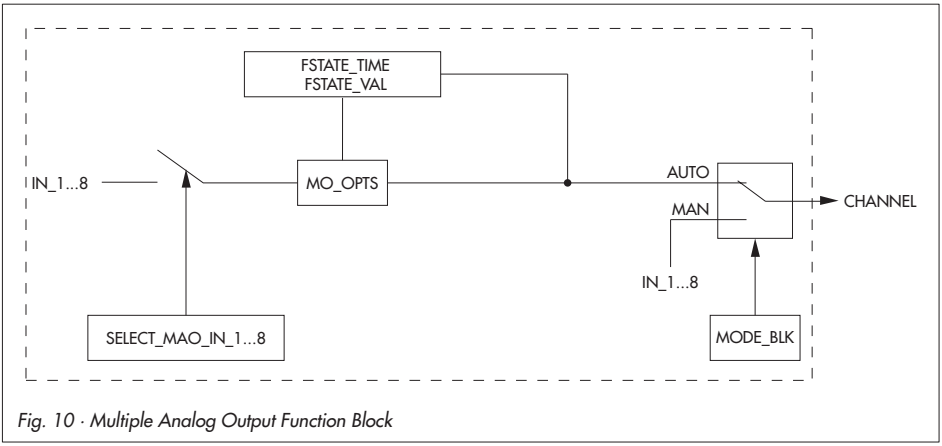


Fig. 10 · Multiple Analog Output Function Block

7.4 Other parameters

7.4.1 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 wired 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) respond(s) 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 good status 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.

7.4.2 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.

7.4.3 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:

- 2 schedules
- 2 subschedules
- 25 sequences per subschedule
- 25 elements per sequence

In the delivered state, the positioner is configured as a basic device.

7.5 Parameter lists

Legend

The parameter index is written in parentheses after the parameter description in the following tables.

Class of memory:	S	Static parameter
	D	Dynamic parameter
	N	Non-volatile parameter
Read/write capability: (access):	r	Read capability
	w	Write capability
Supported modes:	O	O/S (out of service) mode
	M	MAN mode
	A	AUTO mode
	CAS	Cascade mode
	RCAS	Remote cascade mode
	ALL	O/M/A/CAS/RCAS
	NA	Not analyzed
Other modes:	LO	Local override mode
	ROUT	Remote output mode

Note: *Values/settings in brackets [] are default settings.*

7.5.1 Resource Block (RES)

RES: ACK_OPTIONS (38)
Storage class: S · Read/write capability (r/w) · Supported modes: O/A

Determines whether an alarm is to be automatically acknowledged in the Resource Block.
- [UNDEFINED] · No selection
- DISC ALM · Write lock has been changed
- BLOCK ALM · Block alarm

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

RES: ALARM_SUM (37)
Storage class: S · Read/write capability (r/w) · Supported modes: O/A

Determines the current status of the process alarms in the Resource Block.
- DISC ALM · Write lock has been changed
- BLOCK ALM · Block alarm

Note: The process alarms can also be deactivated in this parameter group.

RES: ALERT_KEY (4)
Storage class: S · Read/write capability (r/w) · Supported modes: O/A

Used to specify the identification number of the plant section.
- 1 to 255, [0]

This information can be used by the fieldbus host system to group alerts and events.
Note: '0' is not a permissible value and will be rejected when transferring data to the device (error alarm).

RES: BLOCK_ALM (36)
Storage class: D · Read capability (r)

Indicates the current block state with details on all configuration, hardware or system problems in the block including details on the date and time of the alarm when the fault occurred.

RES: BLOCK_ERR (6)
Storage class: D · Read capability (r)

Active block error → Code 48 S2
- SIMULATE ACTIVE · Simulation jumper active, simulation possible
- OUT OF SERVICE · Block mode is out of service
- LOST STATIC DATA · Data in EEPROM lost
- DEVICE NEEDS MAINTENANCE SOON · Block alarm (BLOCK_ALM) in Resource Block is activated.

- DEVICE NEEDS MAINTENANCE NOW · Block alarm (BLOCK_ALM) in Resource Block is activated.

Note: The assignment of error or diagnostic messages to the desired function block is determined over the ERROR_OPTION parameters in the Transducer Block.

RES: **BUS_ADDRESS (55)**
Storage class: D · Read capability (r)

Bus address → Code 46
- 0 to 255, [248]

RES: **CLR_FSTATE (30)**
Storage class: D · Read/write capability (r/w) · Supported modes: O/A

Used to manually clear the fault state of the AO Function Block.

RES: **CONDENSED_STATE (58)**
Storage class: D · Read capability (r)

Reading of the current condensed state according to NAMUR Recommendation NE 107.

RES: **CONFIRM_TIME (33)**
Storage class: S · Read/write capability (r/w) · Supported modes: O/A

Confirmation time for alert report

Specifies the time the device waits for confirmation that an alert report was received before trying again.
- [640000 1/32 ms]

RES: **CYCLE_SEL (20)**
Storage class: S · Read/write capability (r/w) · Supported modes: O/A

Specifies the block execution method determined by the fieldbus host system.
- [SCHEDULED]
- BLOCK EXECUTION
- Manuf Specific - not analyzed

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

RES: **CYCLE_TYPE (19)**
Storage class: S · Read capability (r)

Indicates the block execution method supported by the device.
- SCHEDULED
- COMPLETION OF BLOCK EXECUTION

RES:	**DD_RESOURCE (9)** Storage class: S · Read capability (r)
	Specifies the resource that contains the Device Description file in the device. **Note:** If the device contains no Device Description, '0' is indicated.
RES:	**DD_REV (13)** Storage class: S · Read capability (r)
	Specifies the revision number of the Device Description file.
RES:	**DESCRIPTOR (46)** Storage class: S · Read/write capability (r/w) · Supported modes: O/A
	Any desired text to describe the application. The text is saved in the field device. • Max. 32 characters, [no text]
RES:	**DEV_REV (12)** Storage class: S · Read capability (r)
	Indicates the manufacturer's revision number for the device.
RES:	**DEV_TYPE (11)** Storage class: S · Read capability (r)
	Indicates the manufacturer's model number for the device in decimal format. • In this case, Type 3730-5
RES:	**DEVICE_CERTIFICATION (45)** Storage class: N · Read capability (r)
	Specifies whether explosion protection certification is available for Type 3730-5.
RES:	**DEVICE_PRODUCT_NUM (48)** Storage class: N · Read capability (r)
	Specifies the positioner's product number.
RES:	**DEVICE_SER_NUM (44)** Storage class: N · Read capability (r)
	Specifies the positioner's serial number.
RES:	**DEVICE_MESSAGE (47)** Storage class: N · Read/write capability (r/w) · Supported modes: O/A
	Any desired text. The text is saved in the field device. • Max. 32 characters, [no text]

RES: **FAULT_STATE (28)**
Storage class: N · Read capability (r)

Indicates the fault state of the Analog Output Function Block

RES: **FEATURES (17)**
Storage class: S · Read capability (r)

Specifies the additionally supported Resource Block options, see FEATURES_SEL.

RES: **FEATURES_SEL (18)**
Storage class: S · Read/write capability (r/w) · Supported modes: O/A

Enables selection of options supported by the positioner.

- REPORTS · Fieldbus host system needs to acknowledge receipt of an alert report.
- HARD W LOCK · Write lock switch hardware is evaluated
- FAULTSTATE · Fault state can be set (see SET_FSTATE /CLR_FSTATE).
- OUT READBACK · Current valve position issued in the PV parameter of the Analog Function Block (otherwise in SP parameter).

Note: If the AO Function Block should not move to the MAN mode when the forced venting/solenoid valve function is activated, deactivate this option.

RES: **FIRMWARE_REVISION (42)**
Storage class: N · Read capability (r)

Firmware version (communication/control)

RES: **FREE_SPACE (24) · This parameter is not supported**

RES: **FREE_TIME (25) · This parameter is not supported**

RES: **GRANT_DENY (14)**
Storage class: D · Read/write capability (r/w) · Supported modes: NA

RES: Grant or deny the fieldbus host system access to the field device.
Note: The parameter is not processed by Type 3730-5.

RES: **HARD_TYPES (15)**
Storage class: S · Read capability (r)

Indicates the types of input and output signal for the device.

- [SCALAR OUTPUT] · Scalable analog output variable
- SCALAR INPUT · Scalable analog input variable
- DISCRETE OUTPUT · Discrete output variable
- DISCRETE INPUT · Discrete input variable

RES:	**HW_REVISION (43)** Storage class: S · Read capability (r)
	Specifies the hardware revision number of the electronic/mechanical components.
RES:	**ITK_VER (41)** Storage class: S
	Specifies the version of the Interoperability Tester used on certifying the device as interoperable.
RES:	**LIM_NOTIFY (32)** Storage class: S · Read/write capability (r/w) · Supported modes: O/A
	Specifies the number of alert reports that the device can send without getting a confirmation. • 0 to [40]
RES:	**LOCAL_OP_ENA (56)** Storage class: N · Read/write capability (r/w) · Supported modes: O/A
	Locks/enables local operation.
RES:	**MANUFAC_ID (10)** Storage class: S · Read capability (r)
	Manufacturer's identification number. • [0 x 00E099] · SAMSON AG
RES:	**MAX_NOTIFY (31)** Storage class: S · Read capability (r)
	Specifies the maximum number of alert reports that the device can send without getting a confirmation. • [40]
RES:	**MEMORY_SIZE (22) · This parameter is not supported**
RES:	**MIN_CYCLE_T (21)** Storage class: S · Read capability (r)
	Indicates the shortest cycle interval that the device can perform. • [8000 1/32 ms]

RES: MODE_BLK (5)
Storage class: N · Read/write capability (r/w) · Supported modes: O/A

Operating mode of the Resource Block:
– Target Mode → Code 48 S0
– Actual Mode (read only) → Code 48 S1
– Permitted Mode
– Normal Mode (read only)

- AUTO · The execution of the function blocks (AO and PID) is enabled.
- O/S · The execution of the function blocks (AO and PID) is stopped. These blocks go out of service (O/S mode).

RES: NV_CYCLE_T (23)
Storage class: S · Read capability (r)

Specifies the minimum time interval in which device data are stored to the non-volatile memory.
Note: Non-volatile data are saved immediately after transmission.

RES: READING_DIRECTION (54)
Storage class: D · Read/write capability (r/w) · Supported modes: O/A

Reading direction → Code 2
Rotates the display reading by 180°.

- [PNEUM. CONNECTION RIGHT]
- PNEUM. CONNECTION LEFT

RES: RESTART (16)
Storage class: D · Read/write capability (r/w) · Supported modes: O/A

Enables the positioner to be reset in various ways:

- RUN · Normal operating state
- RESOURCE (**setting not supported!**)
- DEFAULTS · Device data and function block wiring are reset to the default settings listed in the FOUNDATION™ fieldbus specification.
- PROCESSOR · Warm start of device, processor restarted.

RES: RS_STATE (7)
Storage class: D · Read capability (r)

Indicates the current operating state of the Resource Block.

- ONLINE · Standard operating state; the function block is in AUTO mode.
- STANDBY · The Resource Block is in O/S mode.
- ONLINE LINKING · The configured links between the function blocks have not been established yet.

RES: **SELECT_USAGE_IO (57)**

Storage class: N · Read/write capability (r/w) · Supported mode: O

SELECT_DI_1 · Used to select the data to be processed in DI1 Function Block.

- [5-30 VDC] · State of the standard binary contact BE1 (terminals +87/–88)
  0 Input voltage Ue < 3 V DC
  1 Input voltage Ue > 5 V DC
- INT.SOL.VLVE · Switching state of the internal solenoid valve (MGV)
  0 Solenoid valve de-energized (U < 15 V DC)
  1 Solenoid valve energized (U > 19 V DC)
- DIS. F.VLVE.POS · Current valve position as discrete data
  0 Device not initialized
  1 Current valve position < x %
  2 Current valve position > x %
  3 Intermediate position
  Note: The limits for < x % or > x % are set in FINAL_POSITION_VALUE_LIMITS [0.5; 99.5]
- COND.STATE· Current condensed state
  0 OK
  1 Maintenance required
  2 Maintenance demanded
  3 Maintenance alarm
  7 Function check

SELECT_DI_2 · Used to select the data to be processed in DI2 Function Block.

- FI_CONTACT · State of the standard binary contact BE2 (terminals +85/–86)
  0 Floating contact open
  1 Floating contact closed
- INT.SOL.VLVE · Switching state of the internal solenoid valve (MGV)
  0 Solenoid valve de-energized (U < 15 V DC)
  1 Solenoid valve energized (U > 19 V DC)
- DIS.F.VLVE.POS · Current valve position as discrete data
  0 Device not initialized
  1 Current valve position < x %
  2 Current valve position > x %
  3 Intermediate position
  Note: The limits for < x % or > x % are set in FINAL_POSITION_VALUE_LIMITS [0.5; 99.5]
- COND.STATE · Current condensed state
  0 OK
  1 Maintenance required
  2 Maintenance demanded
  3 Maintenance alarm
  7 Function check
- [COND.STATE + VST] · Current condensed state and start the VST (valve stroke test). See setting in the VST_MODE parameter in AO TRD.

SELECT_DO_1 · Used to select the purpose of DO1 Function Block

- DO1 O/C · Open/Close (on/off) application
- [VST] · Start VST (valve stroke test). See setting in the VST_MODE parameter in AO TRD.
- RESET DIAG · Reset diagnosis (reset statistical information and tests, classification of status messages. The logging is not reset).
- RESET LOGGER · Reset logging
- F.-SAFE · Move valve to fail-safe position
- DLOG · Data logger (0 = start; 1 = stop)
- LOG WRITE PR · Lock/enable local operation (LOCAL_OP_ENA)
- DIAGNOSIS · Reset/stop diagnosis
  1 Reset diagnosis
  2 Reset logging
  3 Stop diagnosis
  4 Release/start diagnosis

SELECT_DO_2 · Used to select the purpose of DO2 Function Block

- VST · Start VST (valve stroke test). See setting in the VST_MODE parameter in AO TRD.
- RESET DIAG · Reset diagnosis (reset statistical information and tests, classification of status messages. The logging is not reset).
- RESET LOGGER · Reset logging
- [F.-SAFE] · Move valve to fail-safe position
- DLOG · Data logger (0 = start; 1 = stop)
- LOG WRITE PR · Lock/enable local operation (LOCAL_OP_ENA)
- DIAGNOSIS · Reset/stop diagnosis
  1 Reset diagnosis
  2 Reset logging
  3 Stop diagnosis
  4 Release/start diagnosis

SELECT_MAI_OUT_1 to SELECT_MAI_OUT_8 · Measured variables made available over the output OUT_1…OUT_8 of the MAI Function Block

- VALVE POS · Current valve position
- INTERNAL_TEMP · Current temperature inside the positioner
- PST_AUTOSTART_READ · Time until next PST Auto Test

Default settings:
[VALVE POS] for SELECT_MAI_OUT_1, SELECT_MAI_OUT_4, SELECT_MAI_OUT_7
[INTERNAL_TEMP] for SELECT_MAI_OUT_2, SELECT_MAI_OUT_5, SELECT_MAI_OUT_8
[NEXT_AUTOSTART_READ] for SELECT_MAI_OUT_3, SELECT_MAI_OUT_6

SELECT_MAO_IN_1 to SELECT_MAO_IN_8 · Signal processed over the input IN_1…IN_8 of of the MAI Function Block

- FLOW SENSOR
- P1 · Pressure p_1
- P2 · Pressure p_2
- PROC TEMP · Process temperature

Default settings:
[FLOW SENSOR] for SELECT_MAO_IN_1, SELECT_MAO_IN_5
[P1] for SELECT_MAO_IN_2, SELECT_MAO_IN_6
[P2] for SELECT_MAO_IN_3, SELECT_MAO_IN_7
[PROC TEMP] for SELECT_MAO_IN_4, SELECT_MAO_IN_8

RES: **SET_FSTATE (29)**
Storage class: D · Read/write capability (r/w) · Supported modes: O/A

Enables manual activation of the fault state of the AO Function Block.

RES: **SHED_RCAS (26)**
Storage class: S · Read/write capability (r/w) · Supported modes: O/A

Determines how long function blocks are to check that the connection between the fieldbus host system and the PID Function Block exists in RCAS mode.

When the time has elapsed, the PID Function Block switches from RCAS mode to the operating mode selected in the SHED_OPT parameter.

- [640000 ⅓₂ ms]

RES: **SHED_ROUT (27)**
Storage class: S · Read/write capability (r/w) · Supported modes: O/A

Determines how long function blocks are to check that the connection between the fieldbus host system and the PID Function Block exists in ROUT mode.

When the time has elapsed, the PID Function Block switches from ROUT mode to the operating mode selected in the SHED_OPT parameter.

- [640000 ⅓₂ ms]

RES: **ST_REV (1)**
Storage class: N · Read capability (r)

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.

RES: **STRATEGY (3)**
Storage class: S · Read/write capability (r/w) · Supported modes: O/A

Permits strategic grouping and thus faster processing of blocks.
- [0]

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.

RES: **TAG_DESC (2)**
Storage class: S · Read/write capability (r/w) · Supported modes: O/A

Assigns a unique description to each block for clear identification.
- Max. 32 characters, [no text]

RES: **TEST_RW (8)**
Storage class: D · Read/write capability (r/w) · Supported modes: O/A

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

RES: **TEXT_INPUT_1 (49) to TEXT_INPUT_5 (53)**
Storage class: N · Read/write capability (r/w) · Supported modes: O/A

Any text
- Max. 32 characters, [no text]

RES: **UPDATE_EVT (35)**
Storage class: D · Read capability (r)

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

RES: **WRITE_ALM (40)**
Storage class: D · Read/write capability (r/w) · Supported modes: O/A

Indicates the state of the write-lock alarm.
Note: The alarm is acivated when the WRITE_LOCK parameter is unlocked.

RES: **WRITE_LOCK (34)**
Storage class: S · Read/write capability (r/w) · Supported modes: O/A

Indicates the state of the write-lock alarm → Code 47
- LOCKED
- NOT LOCKED

Note: The write-lock can be activated by setting Code 47 to ON: device data can only be read over FOUNDATION™ fieldbus communication, but not overwritten.
The write-lock can be deactivated by setting Code 47 to OFF: device data can be overwritten over FOUNDATION™ fieldbus communication.

RES: **WRITE_PRI (39)**

Storage class: S · Read/write capability (r/w) · Supported modes: O/A

Used to set the priority for the WRITE_ALM parameter.

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

Parameter index: Resource Block (RES)

Index	Parameter
0	–
1	ST_REV
2	TAG_DESC
3	STRATEGY
4	ALERT_KEY
5	MODE_BLK
6	BLOCK_ERR
7	RS_STATE
8	TEST_RW
9	DD_RESOURCE
10	MANUFAC_ID
11	DEV_TYPE
12	DEV_REV
13	DD_REV
14	GRANT_DENY
15	HARD_TYPES
16	RESTART
17	FEATURES
18	FEATURES_SEL
19	CYCLE_TYPE
20	CYCLE_SEL
21	MIN_CYCLE_T
22	MEMORY_SIZE
23	NV_CYCLE_T
24	FREE_SPACE
25	FREE_TIME
26	SHED_RCAS
27	SHED_ROUT
28	FAULT_STATE
29	SET_FSTATE

Index	Parameter
30	CLR_FSTATE
31	MAX_NOTIFY
32	LIM_NOTIFY
33	CONFIRM_TIME
34	WRITE_LOCK
35	UPDATE_EVT
36	BLOCK_ALM
37	ALARM_SUM
38	ACK_OPTIONS
39	WRITE_PRI
40	WRITE_ALM
41	ITK_VER
42	FIRMWARE_REVISION
43	HW_REVISION
44	DEVICE_SER_NUM
45	DEVICE_CERTIFICATION
46	DESCRIPTOR
47	DEVICE_MESSAGE
48	DEVICE_PRODUCT_NUM
49	TEXT_INPUT_1
50	TEXT_INPUT_2
51	TEXT_INPUT_3
52	TEXT_INPUT_4
53	TEXT_INPUT_5
54	READING_DIRECTION
55	BUS_ADDRESS
56	LOCAL_OP_ENA
57	SELECT_USAGED_IO
58	CONDENSED_STATE

7.5.2 Advanced Positioner Transducer Block (AO TRD)

AO TRD: ACT_FAIL_ACTION (45)
Storage class: S · Read/write capability (r/w)

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

- Air to open (in 0 % position)
- Air to close (in 100 % position)

AO TRD: ACT_MAN_ID (46)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Specifies the actuator manufacturer's identification number.
Clearly identifies the manufacturer of the actuator used with the positioner.

AO TRD: ACT_MODEL_NUM (47)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

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

AO TRD: ACT_SN (48)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

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

AO TRD: ADVANCED_PV_BASIC (0) · This parameter is not supported

AO TRD: ALARM_OPTIONS (109)
Storage class: S · Read/write capability (r/w)

Alarm setting to activate an output error in AO Function Block

- No (never) · No alarm set
- Local Override · Alarm set when AO TRD is in LOCAL OVERRIDE mode, i.e. the device is set locally in SAFE mode or the internal solenoid valve has been activated.
- MAN · Alarm set when AO TRD is in MAN mode.
- Block Alarm · Alarm set when AO TRD has the block error MAINTENANCE NOW.
- AO TRD fault state · Alarm set when the fault state is active.
- AO O/S set fault state · Alarm set when AO Function Block is in O/S mode. The valve moves to FSTATE_VAL of the AO Function Block.

AO TRD: ALERT_KEY (4)
Storage class: S · Read/write capability (r/w)

Used to specify the identification number of the plant section.
- 1 to 255, [0]

This information can be used by the fieldbus host system to group alerts and events.
Note: '0' is not a permissible value and will be rejected when transferring data to the device (error alarm).

AO TRD: ANALYSIS_OPEN_CLOSE (160)
Storage class: D · Read capability (r)

Statistical information – Open/close (on/off)
Shows the reference analysis and the last two test analyses (refer to EB 8389 EN on EXPERTplus valve diagnostics)
- TIME_STAMP_RISING/FALLING
- BREAK_AWAY_TIME_RISING/FALLING
- TRANSIT_TIME_RISING/FALLING
- VALVE_END_POSITION_RISING/FALLING

AO TRD: APPLICATION_TYPE_OC_CONTROL (157)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Type of application for the valve.
- Control Valve
- Open/Close (on/off) Valve

AO TRD: AUTOMATIC_TEST_STATUS (210)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Status of the test in progress
- Drive signal diagram steady-state (test d1)
- Drive signal diagram hysteresis (test d2)
- Static characteristic (test d3)
- Partial stroke test – PST (test d4)

AO TRD: BINARY_FUNCTION (123) · This parameter is not supported

AO TRD: BINARY_FUNCTION_STATUS (124) · This parameter is not supported

AO TRD: BINARY_INPUT_2 (121)
Storage class: D · Read capability (r)

Indicates the state of DI2 Function Block
The value of the output depends on CONFIG_BINARY_INPUT2.

AO TRD: BLOCK_ALM (8)

Storage class: D · Read/write capability (r/w)

Indicates the current block state with details on all configuration, hardware or system problems in the block including details on the date and time of the alarm when the fault occurred.

AO TRD: BLOCK_ERR (6)

Storage class: D · Read capability (r)

Active block error → Code 48 S2

- SIMULATE ACTIVE
- OUT OF SERVICE
- LOST STATIC DATA · Data lost in EEPROM
- DEVICE NEEDS MAINTENANCE SOON · Maintenance required soon. This alarm activates a block alarm (BLOCK_ALM) of the AO TRD Block.
- DEVICE NEEDS MAINTENANCE NOW · Maintenance required immediately. This alarm activates a block alarm (BLOCK_ALM) of the AO TRD Block.

Note: The error and diagnostic messages are assigned to the required block over the ERROR_OPTION parameters in the Transducer Block.

AO TRD: BLOCKING_POSITION (137)

Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Blocking position → Code 35

Distance up to CLOSED position (0 % position)

Note: Only required for SUB initialization mode.

AO TRD: CHARACTERIZATION (91)

Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Characterization selection → Code 20

- 1 Linear
- 2 Equal percentage
- 3 Equal percentage reverse
- 4 SAMSON butterfly linear
- 5 SAMSON butterfly equal percentage
- 6 VETEC rotary linear
- 7 VETEC rotary equal percentage
- 8 Segmented ball valve linear
- 9 Segmented ball valve percentage
- 10 User defined
  Definition over AO TRD (CUSTOM_CURVE_XY_FLOAT (63))

AO TRD: CLOSED_POS_DEADBAND (61)
Storage class: S · Read/write capability (r/w)

Zero point limit [%] → Code 48 d5

AO TRD: CLOSED_POS_SHIFT (62)
Storage class: N · Read capability (r)

Indicates a shift of the end position.

AO TRD: CLOSING_DIRECTION (134)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Closing direction → Code 34
Direction in which the lever for travel pick-up turns to allow the control valve to reach the CLOSED position (0 % position).
Note: Only required for SUB initialization mode.

AO TRD: COLLECTION_DIRECTORY (13) · This parameter is not supported

AO TRD: CONFIG_BINARY_INPUT_2 (120)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Sets the logic state of DI2.
- [NOT EVALUATED]
- ACTIVELY OPEN
- ACTIVELY CLOSED
- ACTIVELY OPEN – LEAKAGE SENSOR
- ACTIVELY CLOSED – LEAKAGE SENSOR

Note: The parameter is processed by the BINARY_INPUT2 parameter. The parameter settings do not depend on DI2 Transducer Block.

AO TRD: COUNTER_INIT_START (151)
Storage class: D · Read capability (r)

Specifies the number of initialization cycles that have been performed since the last reset → Code 48 d4

AO TRD: CUSTOM_CURVE_DESCRIPTION (63) · This parameter is not supported

AO TRD: CUSTOM_CURVE_XY (64) · This parameter is not supported

AO TRD: CUSTOM_CURVE_XY_FLOAT (65)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Used to enter the user-defined characteristic.

AO TRD: CYCLE_CNTR (38)
Storage class: D · Read capability (r)

Indicates the number of measured cycles since the counter was last reset.

AO TRD: CYCLE_CNTR_LIM (76)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Used to enter the maximum limit for the cycle counter (selected over Stuffing box > Others)

AO TRD: CYCLE_COUNTER_DEADBAND (66) · This parameter is not supported

AO TRD: DEVIATION_DEADBAND (21)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Specifies tolerance deadband in relation to the operating range→ Code 19
- 0.1 to 10.0 %, [5.0 %]

AO TRD: DEVIATION_MAX (115)
Storage class: D · Read capability (r)

Specifies the positioner's maximum system deviation that has occurred.

AO TRD: DEVIATION_MIN (114)
Storage class: D · Read capability (r)

Specifies the positioner's minimum system deviation that has occurred.

AO TRD: DEVIATION_TIME (22)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Delay time (reset criterion for running closed loop monitoring)
- 1 to 240 s, [10 s]

When the entered DEVIATION_TIME is exceeded and the system deviation is not within the entered DEVIATION_DEADBAND, a closed loop error is reported.

Note: The value in DEVIATION_TIME is determined from the minimum transit time during initialization.

AO TRD: DEVIATION_VALUE (23)
Storage class: D · Read capability (r)

System deviation e → Code 39

AO TRD: DEVICE_CHARACTERISTIC (125)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Reflects positioner-specific data.

- MODEL · Actuator model
- ATTACHMENT · Actuator attachment
- BOOSTER
- ACTUATOR_SIZE
- SIGNAL_PRESSURE_LOWER_VALUE
- SIGNAL_PRESSURE_UPPER_VALUE
- SUPPLY_PRESSURE
- FLOW_DIRECTION1
- STUFFING_BOX
- CYCLE_CNTR_LIM1
- SEALING_EDGE · Leakage class of the valve
- PRESSURE_BALANCING
- FLOW_CHARACTERISTIC
- NOM_DIAMETER
- NOM_DIAMETER_DN
- KVS_VALUE
- KVS_UNIT
- SEAT_DIAM_VALVE
- LENGTH_UNITS
- PRESSURE_UNIT

AO TRD: DEVICE_INIT_STATE (132)
Storage class: D · Read capability (r)

Indicates whether the device has been initialized.

AO TRD: DEVICE_STATUS_INIT (133)
Storage class: D · Read capability (r)

Indicates the status of initialization in progress.

AO TRD: DIAG_LEVEL (145)
Storage class: D · Read capability (r)

Indicates the currently installed version of diagnostics: EXPERTplus

AO TRD: DIAG_REFLAUF_INFO (211)
Storage class: S · Read capability (r)

Indicates the status of the reference tests in progress.

AO TRD: DIAG_RESET_AFTER_TIME (155)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Indicates the time until the next reset of the diagnosis.

AO TRD: DIAG_RESET_AFTER_TIMEOUT (156)
Storage class: S · Read capability (r)

Indicates the remaining time until the next reset of the diagnosis.

AO TRD: DIAGR_END_POS_TREND_X_EPT (208)
Storage class: D · Read capability (r)

Statistical information – Trend of the travel end position – Lower end position
Characteristic of the lower end position

AO TRD: DIAGR_END_POS_TREND_X_REF (209)
Storage class: D · Read capability (r)

Statistical information – Trend of the travel end position – Lower end position
Reference characteristic of the lower end position

AO TRD: DIAGR_STAT_KENNL_VENTILST1 (229) to DIAGR_STAT_KENNL_VENTILST4 (232)
Storage class: D · Read capability (r)

Tests – Static characteristic
Measured values – Valve position x of the characteristic

AO TRD: DIAGR_STAT_KENNL_W1 (233) to DIAGR_STAT_KENNL_W4 (236)
Storage class: D · Read capability (r)

Tests – Static characteristic
Measured values – Reference variable w of the characteristic

AO TRD: DIAGR_STELL_X_HYST_TEST_REF (224)
Storage class: D · Read capability (r)

Tests – Drive signal diagram hysteresis (test d2)
Measured values – Valve position x of the reference characteristic

AO TRD: DIAGR_STELL_X_HYST_TEST_WH (226)
Storage class: D · Read capability (r)

Tests – Drive signal diagram hysteresis (test d2)
Measured values – Valve position x of the characteristic of the last performed test

AO TRD: DIAGR_STELL_X_STAT_TEST_REF (217)
Storage class: D · Read capability (r)

Tests – Drive signal diagram steady-state (test d1)
Measured values – Valve position x of the reference characteristic

AO TRD: DIAGR_STELL_X_STAT_TEST_WH (219)
Storage class: D · Read capability (r)

Tests – Drive signal diagram steady-state (test d1)
Measured values – Valve position x of the characteristic of the last performed test

AO TRD: DIAGR_STELL_Y_HYST_TEST_REF (223)
Storage class: D · Read capability (r)

Tests – Drive signal diagram hysteresis (test d2)
Measured values – Drive signal y of the reference characteristic

AO TRD: DIAGR_STELL_Y_HYST_TEST_WH (225)
Storage class: D · Read capability (r)

Tests – Drive signal diagram hysteresis (test d2)
Measured values – Drive signal y of the characteristic of the last performed test

AO TRD: DIAGR_STELL_Y_HYSTERESE_WH (200)
Storage class: D · Read capability (r)

Statistical information – Drive signal diagram hysteresis
Average values of changes in drive signal Δy, long-term monitoring

AO TRD: DIAGR_STELL_Y_STAT_KURZ (192)
Storage class: D · Read capability (r)

Statistical information – Drive signal diagram steady-state
Measured values of the drive signal characteristic, short-term monitoring

AO TRD: DIAGR_STELL_Y_STAT_LONG (191)
Storage class: D · Read capability (r)

Statistical information – Drive signal diagram steady-state
Measured values of the drive signal characteristic, long-term monitoring

AO TRD: DIAGR_STELL_Y_STAT_SHORT (193)
Storage class: D · Read capability (r)

Statistical information – Drive signal diagram steady-state
Display of last 10 measured values of the drive signal y (belonging to DIAGR_VALVE_POS_STAT_SHORT)

AO TRD: DIAGR_STELL_Y_STAT_TEST_REF (216)
Storage class: D · Read capability (r)

Tests – Drive signal diagram steady-state (test d1)
Measured values – Drive signal y of the reference characteristic

AO TRD: DIAGR_STELL_Y_STAT_TEST_WH (218)
Storage class: D · Read capability (r)

Tests – Drive signal diagram steady-state (test d1)
Measured values – Drive signal y of the characteristic of the last performed test

AO TRD: DIAGR_VALVE_POS_STAT_SHORT (194)
Storage class: D · Read capability (r)

Statistical information – Drive signal diagram steady-state
Display of last 10 measured values of the valve position x (belonging to DIAGR_STELL_Y_STAT_SHORT)

AO TRD: DL_CONFIG_R (161)
Storage class: D · Read capability (r)

Statistical information – Data logger
Reading of:

- DL_TESTINFORMATION · Status of test
- DL_MEASURING_PERIOD · Measurement duration (100 ∗ scan rate)
- DL_MAX_PRETRIGGER_TIME · Maximum adjustable pretrigger time
- DL_INTERNAL_SOLENOID_VALVE · Indicates whether an internal solenoid valve is installed
- DL_PROGRESS · Progress

AO TRD: DL_CONFIG_WR (162)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Statistical information – Data logger
Setting of:

- DL_DATA_LOGGER_SELECT · Permanent or automatically triggered data logger
- DL_START_TRIGGER_CONFIGURATION · Start condition for trigger
- DL_SAMPLE_RATE · Scan rate
- DL_START_VALUE · Trigger value
- DL_TRIGGERBAND · Trigger band
- DL_TRIGGER_EDGE · Trigger edge
- DL_PRETRIGGER_TIME · Recording time before triggering event
- DL_TRIGGER_VIA_CONDENSED_STATE · Condensed state used to trigger data logger

AO TRD: DL_HISTOGR_E_1 (175) to DL_HISTOGR_E_4 (178)
Storage class: D · Read capability (r)

Statistical information – Data logger
Measured values of setpoint deviation e

AO TRD: DL_HISTOGR_E_LONG (186)
Storage class: D · Read capability (r)

Statistical information – Data logger
Measured values of time t

AO TRD: DL_HISTOGR_E_SCAN_RATE (188)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Statistical information – Setpoint deviation histogram, short-term
Scan rate to record the setpoint deviation

AO TRD: DL_HISTOGR_E_SHORT (187)
Storage class: D · Read capability (r)

Statistical information – Setpoint deviation histogram, short-term
Readings of measured values and average value

AO TRD: DL_HISTOGR_TIME_1 (163) to DL_HISTOGR_TIME_4 (166)
Storage class: D · Read capability (r)

Statistical information – Data logger
Measured values of time t

AO TRD: DL_HISTOGR_VENTILST_1 (167) to DL_HISTOGR_VENTILST_4 (170)
Storage class: D · Read capability (r)

Statistical information – Data logger
Measured values of valve position x

AO TRD: DL_HISTOGR_W_1 (171) to DL_HISTOGR_W_4 (174)
Storage class: D · Read capability (r)

Statistical information – Data logger
Measured values of reference variable w

AO TRD: DL_HISTOGR_Y_1 (179) to DL_HISTOGR_Y_4 (182)
Storage class: D · Read capability (r)

Statistical information – Data logger
Measured values of drive signal y

AO TRD: DL_HISTOGR_Z_LONG (189)
Storage class: D · Read capability (r)

Statistical information – Cycle counter histogram, long-term monitoring
Readings of measured values, average value, number of measurement values and dynamic stress factor

AO TRD: DL_HISTOGR_Z_SHORT (190)
Storage class: D · Read capability (r)

Statistical information – Cycle counter histogram, short-term monitoring
Readings of measured values and average value

AO TRD: ELAPSED_HOURS_METER (149)
Storage class: D · Read capability (r)

Indicates the hours the device has been in operation.

- ELAPSED_HOURS_TOTAL · Total hours the device has been switched on
- ELAPSED_HOURS_IN_CLOSED_LOOP · Device in closed loop
- ELAPSED_HOURS_SWITCHED_ON_SINCE_INIT · Hours the device has been switched on since last initialization
- ELAPSED_HOURS_IN_CLOSED_LOOP_SINCE_INIT · Hours in closed loop control since last initialization

AO TRD: END_POS_TREND_REF_DRIVE_SIG (206)
Storage class: D · Read capability (r)

Statistical information – Trend of the travel end position – Lower end position
Readings of last 30 lower end positions, drive signal y

AO TRD: END_POS_TREND_REF_DRIVE_SIG_REF (203)
Storage class: D · Read capability (r)

Statistical information – Trend of the travel end position – Lower end position
Reference value of the lower end position, drive signal y

AO TRD: END_POS_TREND_REF_TIME (205)
Storage class: D · Read capability (r)

Statistical information – Trend of the travel end position – Lower end position
Readings of last 30 lower end positions, time stamp

AO TRD: END_POS_TREND_REF_TIME_REF (202)
Storage class: D · Read capability (r)

Statistical information – Trend of the travel end position – Lower end position
Reference value of the lower end position, time stamp

AO TRD: END_POS_TREND_REF_VALUES (204)
Storage class: D · Read capability (r)

Statistical information – Trend of the travel end position – Lower end position
Readings of last 30 lower end positions, valve position x

AO TRD: END_POS_TREND_REF_VALUES_REF (201)
Storage class: D · Read capability (r)

Statistical information – Trend of the travel end position – Lower end position
Reference value of the lower end position, valve position x

AO TRD: ERROR_OPTION_DATA_FAILURE (103)
Storage class: S · Read/write capability (r/w)

Indicates the masking of data errors.

AO TRD: ERROR_OPTION_ENH_DIAGNOSTIC_1 (104) to
ERROR_OPTION_ENH_DIAGNOSTIC_5 (108)
Storage class: S · Read/write capability (r/w)

Specifies the masking of status or error alarms in the diagnostics.

AO TRD: ERROR_OPTION_HW_FAILURE (102)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Specifies the masking of hardware errors.

AO TRD: ERROR_OPTION_INIT_FAILURE (100)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Specifies the masking of initialization errors.

AO TRD: ERROR_OPTION_OPERATION_FAILURE (101)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Specifies the masking of operational errors.

AO TRD: EVENT_LOGGING_1 (152)
EVENT_LOGGING_2 (153)
Storage class: D · Read capability (r)

EVENT_LOGGING_1: Indicates event logs 0 – 14 with the time they were recorded.
EVENT_LOGGING_2: Indicates event logs 15 – 29 with the time they were recorded.

AO TRD: FINAL_POSITION_VALUE (18)
Storage class: D · Read capability (r)

Indicates the current valve position after taking the decharacterization into account.

AO TRD: FINAL_POSITION_VALUE_D (33)
Storage class: D · Read capability (r)

Indicates the discrete valve position after taking the direction of action into account.

AO TRD: FINAL_POSITION_VALUE_LIMITS (144)
Storage class: S · Read/write capability (r/w)

Indicates the limit of valve position (FINAL_POSITION_VALUE)
- FINAL_POSITION_VALUE_LIMITS
- FINAL_POSITION_VALUE_HIGH_LIMIT
- FINAL_POSITION_VALUE_LOW_LIMIT

This variable is sent to the AO Transducer Block directly from the valve.

AO TRD: FINAL_VALUE (14)
Storage class: N · Read/write capability (r/w) · Supported modes: O/M

Output value TRD

FINAL_VALUE contains the output value received from the upstream AO Function Block.
- Scaling over FINAL_VALUE_RANGE

AO TRD: FINAL_VALUE_CUTOFF_HI (16)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Setpoint cutoff increase (final position w >) → Code 15
- 50 to 100 %, [100 %]

If the reference value exceeds the entered value, the valve is moved to the final position that corresponds to 100 % of the output value. This causes the actuator to either be vented completely or fully filled with air (depending on the fail-safe action).

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

NOTICE
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 event that this creates excessive positioning forces, this function must be deactivated.

AO TRD: FINAL_VALUE_CUTOFF_HI_ON (136)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Enable setpoint cutoff increase → Code 15

AO TRD: FINAL_VALUE_CUTOFF_LO (17)

Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Setpoint cutoff decrease (final position w <) → Code 14

- –2.5 to 100.0 %, [1.0 %]

If the reference value falls below the entered value, the valve is moved to the final position that corresponds to 0 % of the output value. This causes the actuator to either be vented completely or fully filled with air (depending on the fail-safe action).

Note: The function is deactivated by entering 0 %.

NOTICE

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 event that this creates excessive positioning forces, this function must be deactivated.

AO TRD: FINAL_VALUE_CUTOFF_LO_ON (135)

Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Enables setpoint cutoff decrease → Code 14

AO TRD: FINAL_VALUE_D (32)

Storage class: N · Read/write capability (r/w) · Supported modes: O/M

Specifies the discrete reference varaible of the upstream DO1 Function Block.

AO TRD: FINAL_VALUE_RANGE (15)

Storage class: S · Read/write capability (r/w) · Supported mode: O

Sets the travel range/angle of rotation.

- FINAL VALUE RANGE EU_100 · Travel/angle range end → Code 9
- FINAL VALUE RANGE EU_0 · Travel/angle range start → Code 8
- FINAL VALUE RANGE UNITS_INDEX · Unit
- FINAL VALUE RANGE DECIMAL · Decimal point

Note: FINAL_VALUE is sent to the AO Transducer Block directly from an upstream AO Function Block.

The operating range FINAL_VALUE_RANGE is compared to 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 to 100 %.

AO TRD: FLOAT_STR (297) · This parameter is not supported

AO TRD: FRICTION (68)
Storage class: N · Read capability (r)

Indicates the friction in percent.

AO TRD: FRICTION_LIMITS (301)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Specifies the upper and lower friction limits.
- FRICTION_LIMIT_UP, 0 to 1000 % [200 %]
- FRICTION_LIMIT_DOWN, 0 to 1000 % [50 %]

AO TRD: FRICTION_UNITS (67) · This parameter is not supported

AO TRD: FST_BREAKOUT_TIME (86)
Storage class: S · Read capability (r)

Indicates the breakaway time determined during the last full stroke test (FST).

AO TRD: FST_BREAKOUT_TIMEOUT (87)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Cancelation conditions of the full stroke test (FST): Maximum breakaway time
- 0.0 … 25000.0 s, [7.5 s]

AO TRD: FST_COMPLETION_TIMEOUT (90)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Cancelation conditions of the full stroke test (FST): Maximum test duration (user-defined)
- 0.0 … 25000.0 s, [30.0 s]

AO TRD: FST_DIAGR_E1 (289) to FST_DIAGR_E4 (292)
Storage class: D · Read capability (r)

Statistical information – Data logger: Measured values of setpoint deviation e

AO TRD: FST_DIAGR_TIME1 (277) to FST_DIAGR_TIME4 (280)
Storage class: D · Read capability (r)

Tests – Full stroke test (FST): Measured values of time t

AO TRD: FST_DIAGR_W1 (285) to FST_DIAGR_W4 (288)
Storage class: D · Read capability (r)

Statistical information – Data logger: Measured values of reference variable w

AO TRD: FST_DIAGR_X1 (281) to
FST_DIAGR_X4 (284)
Storage class: D · Read capability (r)

Statistical information – Data logger: Measured values of valve position x

AO TRD: FST_DIAGR_Y1 (293) bis
FST_DIAGR_Y4 (296)
Storage class: D · Read capability (r)

Statistical information – Data logger: Measured values of drive signal y

AO TRD: FST_DISPLAY (270)
Storage class: D · Read capability (r)

Information on the full stroke test (FST)

- FST_PROGRESS_FLAG · Current progress
- FST_STATUS_PST · Status (successful/not successful)
- FST_NUMBERS_OF_TESTS · Number of partial stroke tests (PST) performed
- FST_SETTINGS_MIN_SCAN_RATE · Recommended minimum scan rate
- FST_SETTINGS_DURATION_TEST · Expected test duration

AO TRD: FST_MEAS_DATA1 (271)
FST_MEAS_DATA2 (272)
FST_MEAS_DATA3 (273)
Storage class: D · Read capability (r)

Data analysis of the full stroke test (FST)
FST_MEAS_DATA1 (271) = Current test
FST_MEAS_DATA2 (272) = First saved analysis
FST_MEAS_DATA3 (273) = Second saved analysis

- FST_TIME_STAMP · Time stamp for this test
- FST_OVERSHOOT_RISING · Overshoot (rising)
- FST_DEAD_TIME_RISING · Dead time (rising)
- FST_T63_RISING · T63 (rising)
- FST_T98_RISING · T98 (rising)
- FST_RISE_TI_RISING · Rise time (rising)
- FST_SETTL_TI_RISING · Settling time (rising)
- FST_OVERSHOOT_FALLING · Overshoot (falling)
- FST_DEAD_TI_FALLING · Dead time (falling)
- FST_T68_FALLING · T63 (falling)

- FST_T98_FALLING · T98 (falling)
- FST_RISE_T_FALLING · Rise time (falling)
- FST_SETTL_T_FALLING · Settling time (falling)

AO TRD: FST_RAMP_RATE (88) · This parameter is not supported

AO TRD: FST_SETTINGS (269)
Storage class: D · Read/write capability (r/w) · Supported modes: O/M/A

Settings of the full stroke test (FST)
- FST_TOL_LIMIT_RESPONSE · Tolerance limit for step start/end values
- FST_ACTIV_RAMP_FUNCTION · Activation of ramp function
- FST_RAMP_TIME_RISING · Ramp time(rising)
- FST_RAMP_TIME_FALLING · Ramp time (falling)
- FST_SETTLING_TIME · Settling time before test start
- FST_SCAN_RATE · Scan rate

AO TRD: FST_STRK_TRAV_TIMEOUT (89)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Cancelation condition of full stroke test (FST): Time allowed until step end value
- 0.0 … 25000.0 s, [15.0 s]

AO TRD: FST_TEST_INFO (302)
Storage class: D · Read capability (r)

Current status of full stroke test (FST)

AO TRD: FST_TEST_STAT1 (274) to FST_TEST_STAT3 (276)
Storage class: D · Read capability (r)

Status of full stroke test (FST)
FST_TEST_STAT1 (274) = Current test
FST_TEST_STAT2 (275) = First status saved
FST_TEST_STAT3 (276) = Second status saved
- FST_NO_TEST_AVAILABLE · No test exists
- FST_MAX_TIME_EXCEEDED · Max. test time exceeded
- FST_TEST_MANUA_CANCEL · Test manually cancelled
- FST_OUT_OF_MEMORY · Measured data storage out of memory
- FST_ABO_INT_SOL_VALVE · Aborted by internal solenoid valve/forced venting

- FST_PRESSURE_FRICTION · Aborted due to supply pressure/friction
- FST_CURRENT_TOO_LOW · Test aborted – current too low

AO TRD: HIS_TEMPERATURE (148)
Storage class: D · Read capability (r)

Reading in hours (per hour or fraction thereof)
- HIS_T_ZEIT_MIN_TEMPERATURE · Operating hours counter: Lowest temperature inside the positioner
- HIS_T_ZEIT_MAX_TEMPERATURE · Operating hours counter: Highest temperature inside the positioner
- TEMP_PERIOD_TIME_LOW · Temperature period below –40 °C (–40 °F)
- TEMP_PERIOD_TIME_HIGH · Temperature period above +80 °C (+176 °F)

AO TRD: HISTOGR_X_LONG (183)
Storage class: D · Read capability (r)

Statistical information – Travel histogram, long-term
Measured values, average value, number of measurement values and observation period

AO TRD: HISTOGR_X_SCAN_RATE (185)
Storage class: D · Read/write capability (r/w) · Supported modes: O/M/A

Statistical information – Travel histogram, short-term
Measured values and average value

AO TRD: HISTOGR_X_SHORT (184)
Storage class: D · Read capability (r)

Statistical information – Travel histogram, short-term
Scan rate for recording the valve position

AO TRD: HYST_SHORT_DIFF_Y (198)
Storage class: D · Read capability (r)

Statistical information – Drive signal diagram - Hysteresis test
Last 10 measured values of the changes in drive signal (Δy) (belonging to HYST_VALVE_POS)

AO TRD: HYST_VALVE_POS (199)
Storage class: D · Read capability (r)

Statistical information – Drive signal diagram - Hysteresis test
Last 10 measured values of the valve position x (belonging to HYST_SHORT_DIFF_Y)

AO TRD: HYSTERESIS (69) · This parameter is not supported

AO TRD: IDENT_OPTIONS (118)
Storage class: D · Read capability (r)

Indicates which optional components (additional equipment) are installed.
1 Internal solenoid valve
2 Binary input 1
3 Binary input 2
4 Inductive limit switch
5 Leakage sensor
6 External position sensor

AO TRD: INIT_METHOD (128)
Storage class: S · Read/write capability (r/w)

Indicates the selected initialization mode → Code 6
0 MAX maximum range
1 NOM nominal range
2 MAN manually adjusted range
3 SUB substitute calibration
4 Zero calibration

AO TRD: INIT_WITH_REF_TEST (129)
Storage class: S · Read/write capability (r/w)

Plotting of reference tests for diagnostics when the positioner is initialized
- Yes
- [No]

AO TRD: INTERNAL_TEMP (96)
Storage class: D · Read capability (r)

Indicates the current temperature inside the positioner.

AO TRD: INTERNAL_TEMP_MAX (98)
Storage class: D · Read capability (r)

Indicates the highest temperature recorded inside the positioner.

AO TRD: INTERNAL_TEMP_MIN (97)
Storage class: D · Read capability (r)

Indicates the lowest temperature recorded inside the positioner.

AO TRD: INTERNAL_TEMP_UNITS (99)

Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Specifies the unit for the temperature inside the positioner.

- [°C]
- °F

AO TRD: KP_STEP (140)

Storage class: S · Read/write capability (r/w)

Specifies proportional gain factor KP (step) → Code 17

Note: This parameter can only be read over the FOUNDATION fieldbus network. The value is measured during initialization.

AO TRD: LIMIT_TIME_TRAVEL_ANALYSIS (159)

Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Statistical information – Open/Close
Travel limit for the difference between the reference value and the currently recorded value.

It determines at which value a message is to be generated.

- 0.0 … 100.0 %, [0.3 %]

AO TRD: LIMIT_VALUE_TIME_ANALYSIS (158)

Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Statistical information – Open/Close
Time limit for the difference between the reference value and the currently recorded value.

It determines the time to wait before value a message is to be generated.

- 0.0 … 30.0 s, [0.6 s]

AO TRD: LOGGING_MGV (116)

Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Logging of the internal solenoid valve active (error control)

- [Yes]
- No

AO TRD: LS_ALARM_INFORMATION (306)

Storage class: D · Read capability (r)

Leakage sensor: Alarm information

AO TRD: LS_ALARM_LIMIT_1 (307) to LS_ALARM_LIMIT_3 (309)
Storage class: S · Read/write capability (r/w)

Leakage sensor
LS_ALARM_LIMIT_1 (307) = First alarm limit in dB
LS_ALARM_LIMIT_2 (308) = Second alarm limit in dB
LS_ALARM_LIMIT_3 (309) = Third alarm limit in dB

AO TRD: LS_ALARM_RELEASE (304)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Leakage sensor: Alarm release
- No alarm release
- Average level at tight-closing
- [Average of current/last tight-closing]
- Moving average short-term histogram
- Moving average long-term histogram

AO TRD: LS_LEAKAGE_LEVEL (303)
Storage class: D · Read capability (r)

Leakage sensor: Sensor level in dB

AO TRD: LS_SELECT_ALARM_LIMITS (305)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Leakage sensor: Alarm limits
- [Factory setting (reference test)]
- Alarm limit of repetition test
- User-defined alarm limit

AO TRD: LS_TEST_INFORMATION (310)
Storage class: D · Read capability (r)

Leakage sensor: Test status

AO TRD: MIN_CLEARANCE_NEW_LOGGING_MGV (117)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Specifies the minimum amount of time until the internal solenoid valve is logged again (error control)

AO TRD: MODE_BLK (5)

Storage class: S · Read/write capability (r/w)

Operating mode:
– Target Mode → Code 48 t0
– Actual Mode (read only) → Code 48 t1
– Permitted Mode
– Normal Mode (read only)

- AUTO · A positioning value is calculated from the output value from the AO Function Block and the control valve is positioned accordingly.
- O/S · The output value from the AO Function Block is not used. The control valve is moved to its mechanical fail-safe position entered in ACT_FAIL_ACTION. The mode is also changed to O/S when the forced venting function is activated.
- MAN · The positioning value (FINAL_VALUE) can be entered manually (positioner display: ↻ and ✋)
- LO · If the device is locally set to the MAN mode, the AO Transducer Block is set to LO.

AO TRD: NO_OF_ZERO_POINT_ADJ (150)

Storage class: D · Read capability (r)

Specifies the number of zero calibrations performed since the last initialization
→ Code 48 d3

AO TRD: OPTI_SUB_INIT (131)

Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Optimization of the limits of the SUB initialization.

- ON
- [OFF]

AO TRD: POS_ALERT_HI (24)

Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

User-defined high limit which sets the high limit bit in WORKING_ POS when the value is exceeded.

- [100 %]

AO TRD: POS_ALERT_LO (25)

Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

User-defined low limit which sets the low limit bit in WORKING_ POS when the value falls below the limit.

- [0 %]

AO TRD: POS_DEADBAND (70) · This parameter is not supported

AO TRD: POS_FEATURES (44)
Storage class: D · Read capability (r)

Parameter groups supported by AO Transducer Block.

AO TRD: POSITIONER_MODEL (122)
Storage class: D · Read capability (r)

Indicates the positioner model.

AO TRD: PRESSURE_LIMIT (138)
Storage class: S · Read/write capability (r/w)

Pressure limit → Code 16
- [OFF]
- 3.7 bar
- 2.4 bar
- 1.4 bar

AO TRD: PROTOKOLL_BSZ_START (154)
Storage class: D · Read capability (r)

Indicates the time since the positioner was first taken into operation (operating hours counter).

AO TRD: PST_AUTOSTART_READ (238)
Storage class: D · Read/write capability (r/w) · Supported modes: O/M/A

Indicates the time until the next automatic partial stroke test (Auto PST)

AO TRD: PST_BREAKOUT_TIME (77)
Storage class: N · Read capability (r)

Indicates the breakaway time recorded during the last partial stroke test (PST).

AO TRD: PST_BREAKOUT_TIMEOUT (78)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Cancelation condition of the partial stroke test (PST): Max. breakaway time

AO TRD: PST_CANCEL_COND (241)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Cancelation conditions of the partial stroke test (PST)
- PST_ACT_X_CONTROL · Activation of x cancelation condition
- PST_X_CONTROL_VALUE · x control value
- PST_ACT_DELTA_Y_MONI · Activation of Δy cancelation condition
- PST_DELTA_Y_MONI_VAL · Δy monitoring value
- PST_TOL_BAND_CONTROL · Activation of PST tolerance band control
- PST_TOL_BAND · PST tolerance band

AO TRD: PST_COMPLETION_TIMEOUT (85)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Cancelation condition of the partial stroke test (PST): Max. test duration (user-defined)

AO TRD: PST_DIAGR_E1 (261) to PST_DIAGR_E4 (264)
Storage class: D · Read capability (r)

Statistical information – Data logger: Measured values of setpoint deviation e

AO TRD: PST_DIAGR_TIME1 (249) to PST_DIAGR_TIME4 (252)
Storage class: D · Read capability (r)

Tests – Partial stroke test (PST): Measured values of time t

AO TRD: PST_DIAGR_W1 (257) to PST_DIAGR_W4 (260)
Storage class: D · Read capability (r)

Statistical information – Data logger: Measured values of reference variable w

AO TRD: PST_DIAGR_X1 (253) to PST_DIAGR_X4 (256)
Storage class: D · Read capability (r)

Statistical information – Data logger: Measured values of valve position x

AO TRD: PST_DIAGR_Y1 (265) to PST_DIAGR_Y4 (268)
Storage class: D · Read capability (r)

Statistical information – Data logger: Measured values of drive signal y

AO TRD: PST_DISPLAY (242)
Storage class: D · Read capability (r)

Indicates information on the partial stroke test (PST)

- PST_PROGRESS_FLAG · Progress of PST
- PST_MIN_VALUE_Y_CONTROL · Repetition value of Δy monitoring
- PST_DELTA_Y_MONI_REF_VAL · Reference value of Δy monitoring
- PST_STATUS_PST · Status (successful/not successful)
- PST_NUMBERS_OF_TESTS · Number of partial stroke tests (PST) performed
- PST_RECOMMENDED_SCAN_RATE · Recommended minimum scan rate
- PST_DURATION_OF_TEST · Expected test duration
- PST_TESTMODE_ACTUAL · Current PST mode

AO TRD: PST_INITIAL_START_TIME (79) · This parameter is not supported

AO TRD: PST_INTERVAL (80)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Specifies the time until the partial stroke test automatically starts (PST_TESTMODE_TARGET must be set to 'PST Auto')

AO TRD: PST_MEAS_DATA1 (243) to PST_MEAS_DATA3 (245)
Storage class: D · Read capability (r)

Data analysis of partial stroke test (PST)
PST_MEAS_DATA1 (271) = Current test
PST_MEAS_DATA2 (272) = First data analysis saved
PST_MEAS_DATA3 (273) = Second data analysis saved

- PST_TIME_STAMP · Time stamp for this test
- PST_OVERSHOOT_RISING · Overshoot (rising)
- PST_DEAD_TIME_RISING · Dead time (rising)
- PST_T63_RISING · T63 (rising)
- PST_T98_RISING · T98 (rising)
- PST_RISE_TI_RISING · Rise time (rising)
- PST_SETTL_TI_RISING · Settling time (rising)
- PST_OVERSHOOT_FALLING · Overshoot (falling)
- PST_DEAD_TI_FALLING · Dead time (falling)
- PST_T68_FALLING · T63 (falling)
- PST_T98_FALLING · T98 (falling)
- PST_RISE_T_FALLING · Rise time (falling)
- PST_SETTL_T_FALLING · Settling time (falling)
- PST_DELTA_Y · Δy monitoring (repetition value)

AO TRD: PST_OPTIONS (81) · This parameter is not supported

AO TRD: PST_RAMP_RATE (82) · This parameter is not supported

AO TRD: PST_SETTINGS (240)
Storage class: D · Read/write capability (r/w) · Supported modes: O/M/A

Settings of the partial stroke test (PST)

- PST_STEP_START · Start value to perform step response
- PST_STEP_END · End value to perform step response
- PST_LIMIT_STEP_RESPONSE · Tolerance limit for step start/end values
- PST_ACTIVATION_RAMP_FUNCTION · Activation of ramp function

- PST_RAMP_TIME_RISING · Ramp time (rising)
- PST_RAMP_TIME_FALLING · Ramp time (falling)
- PST_SETTLING_TIME_BEFORE_TEST · Settling time before test start
- PST_SCAN_RATE · Scan rate
- PST_STEP_RESPONSE · Number of steps

AO TRD: PST_STRK_TRAV (83)
Storage class: S · Read capability (r)

Step height during partial stroke test (PST)

AO TRD: PST_STRK_TRAV_TIMEOUT (84)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Cancelation condition of partial stroke test (PST): Permitted time until step end value

AO TRD: PST_TEST_INFO (239)
Storage class: D · Read capability (r)

Current status of partial stroke test (PST)

AO TRD: PST_TEST_STAT1 (246) to PST_TEST_STAT3 (248)
Storage class: D · Read capability (r)

Status of the partial stroke test (PST)
PST_TEST_STAT1 (246) = Current test
PST_TEST_STAT2 (247) = First status saved
PST_TEST_STAT3 (248) = Second status saved

- PST_TEST_START · Test start
- PST_NO_TEST_AVAILABLE · No test exists
- PST_X_CANCEL · x cancelation
- PST_Y_CANCEL · Δy cancelation
- PST_TOL_BAND_EXCEEDED · Tolerance band exceeded
- PST_MAX_TIME_EXCEEDED · Max. test time exceeded
- PST_TEST_MANUA_CANCEL · Test manually cancelled
- PST_OUT_OF_MEMORY · Measured data storage out of memory
- PST_ABO_INT_SOL_VALVE · Aborted by internal solenoid valve/forced venting
- PST_PRESSURE_FRICTION · Aborted due to supply pressure/friction
- PST_W_STEP_TOO_HIGH · Reference variable difference – Step start too high
- PST_ABORT_REF_CHANGED · Test aborted – reference variable too high
- PST_CURRENT_TOO_LOW · Test aborted – current too low

AO TRD: PST_TESTMODE_TARGET (237)
Storage class: D · Read/write capability (r/w) · Supported modes: O/M/A

Required test mode of the partial stroke test (PST)
- [PST Man]
- PST Auto

AO TRD: RATED_TRAVEL (26)
Storage class: S · Read/write capability (r/w)

Rated travel → Code 5
- 0 to 255.9 mm, [15.0 mm]

Note: The unit [mm] or [degrees] depends on the VALVE_TYPE parameter.

AO TRD: READBACK_SELECT (40)
Storage class: S · Read/write capability (r/w)

Select current or working valve position for the READBACK parameter
- [FINAL_POSITION_VALUE]
- WORKING_POS

AO TRD: REFLAUF_VOLLST (212)
Storage class: D · Read capability (r)

All reference tests performed.

AO TRD: RESET_STATUS_MESSAGE_DIAG (147)
Storage class: D · Read/write capability (r/w)

Select commands for reset
- Individual error messages
- Trends, histograms, test diagrams
- PST/FST parameters and measured values
- Logging
- All recorded diagnostic data (except for reference graphs and logging)

AO TRD: SELECT_EMERGENCY_MODE (139)
Storage class: S · Read/write capability (r/w)

Action upon failure/defect of the travel sensor
- Open loop control using saved characteristic
- Move valve to predefined fault state position

AO TRD: SELECT_OPTIONS (119)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Read/change the installed options that are not automatically recognized (IDENT_LIMIT_SWITCHES, IDENT_EXT_LEAKAGE_SENSOR, IDENT LEAKAGE DETECTION, IDENT_EXT_POS_SENSOR)

AO TRD: SET_FAIL_SAFE_POS (126)
Storage class: S · Read/write capability (r/w)

Set fail-safe position
- NOT ACTIVE
- SET FAIL-SAFE POSITION
- CLEAR FAIL-SAFE POSITION

Note: The fail-safe position is indicated on the positioner display by a blinking 'S'.

AO TRD: SIGNAL_ACTION (39)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Direction of action of the reference variable w to the travel/angle x → Code 7

AO TRD: SIMULATION_ENABLE (111)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Enables simulation of status messages.

AO TRD: SIMULATION_MESSAGE (110)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Used to select the status message to be simulated.
Note: Simulation must be enabled before use -> SIMULATION_ENABLE.

AO TRD: ST_REV (1)
Storage class: S · Read capability (r)

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

AO TRD: START_STOP_ALL_FUNCTION (146)
Storage class: D · Read/write capability (r/w)

Execute/stop various EXPERTplus tests
- Reference tests (d1, d2)

- Data logger
- Tests (d1 to d6 and d9)

AO TRD: STAT_KENNL_R (227)
Storage class: D · Read capability (r)

Tests – Static characteristic: reading
- STAT_KENNL_R_TEST_INFO · Current status of the test
- STAT_KENNL_R_STEP_HEIGTH · Step height
- STAT_KENNL_R_MIN_DEAD_BAND · Smallest dead band measured
- STAT_KENNL_R_AVERAGE_DEAD_BAND · Average dead band measured
- STAT_KENNL_R_MAX_DEAD_BAND · Largest dead band measured
- STAT_KENNL_R_PROGRESS_FLAG · Current progress of the test

AO TRD: STAT_KENNL_W (228)
Storage class: S · Read/write capability (r/w)

Tests – Static characteristic: setting
- STAT_KENNL_W_START_VALUE · Start value of valve position x
- STAT_KENNL_W_END_VALUE · End value of valve position x
- STAT_KENNL_W_DELAY_TIME · Delay time after step
- STAT_KENNL_W_TURN_BACK_VALUES · Number of measured values which have been recorded until turn back

AO TRD: STOP_HI (27)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Travel/angle upper limit → Code 11
- 50 … 120 %, [100 %]

Note: The characteristic is not adapted. The tight-closing function has priority.

AO TRD: STOP_HI_POS_ON (143)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Enable travel/angle upper limit → Code 11
- [ON]
- OFF

AO TRD: STOP_LO (28)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Travel/angle lower limit → Code 10
- 0.0 … 49.9 %, [0.0 %]

Note: The characteristic is not adapted. The tight-closing function has priority.

AO TRD: STOP_LO_POS_ON (142)

Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Enable travel/angle lower limit → Code 10

- ON
- [OFF]

AO TRD: STRATEGY (3)

Storage class: S · Read/write capability (r/w)

Permits strategic grouping and thus faster processing of blocks.

- [0]

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 Transducer Block.

AO TRD: STROKE_TIME_CLOS_LIM (92)

Storage class: S · Read/write capability (r/w)

Required transit time CLOSED → Code 22

Time required by the valve to move through the operating range until the valve closes.

AO TRD: STROKE_TIME_CLOSED (71)

Storage class: S · Read capability (r)

Minimum transit time CLOSED → Code 41

Time [s] required by the system (positioner, actuator and valve) to move through the rated travel/angle in direction to close the valve (0 % position).

The value is measured during initialization.

AO TRD: STROKE_TIME_OPEN (72)

Storage class: S · Read capability (r)

Minimum transit time OPEN → Code 40

Time [s] required by the system (positioner, actuator and valve) to move through the rated travel/angle in direction to open the valve (100 % position).

The value is measured during initialization.

AO TRD: STROKE_TIME_OPEN_LIM (93)

Storage class: S · Read/write capability (r/w)

Required transit time OPEN → Code 21

Time required by the valve to move through the operating range until the valve opens.

AO TRD: SUB_MOD_INIT (130)
Storage class: D · Read capability (r)

Indicates whether the initialization was performed in SUB mode (subsitition calibration).

AO TRD: TAG_DESC (2)
Storage class: S · Read/write capability (r/w)

Assigns a unique description to each block for clear identification
- Max. 32 characters, [no text]

AO TRD: THRESHOLD_END_POS_RECORDING (207)
Storage class: D · Read/write capability (r/w)

Statistical information – Trend of the travel end position – Lower end position
Threshold to record data

AO TRD: TRANS_PIN_POS (127)
Storage class: S · Read/write capability (r/w)

Pin position → Code 4

AO TRD: TRANSDUCER_DIRECTORY (9) · This parameter is not supported

AO TRD: TRANSDUCER_STATE (112)
Storage class: D · Read capability (r)

State of the Transducer Block → Code 48 t2
1 See operating mode
2 Solenoid valve active · Forced venting active
3 Lower travel limit active
4 Upper travel limit active
5 End position < active · Tight-closing of valve
6 End position > active · Maximum open position of valve
7 Fail-safe position active
8 Normal operation

AO TRD: TRANSDUCER_TYPE (10)
Storage class: D · Read capability (r)

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

AO TRD: TRANSDUCER_TYPE_VER (11)
Storage class: D · Read capability (r)

Transducer Block for positioner according to Specification FF-906

AO TRD: TRAVEL_ACCUM (29)
Storage class: D · Read capability (r)

Total valve travel: totaled double valve travel. → Code 23

AO TRD: TRAVEL_ACCUM_DEADBAND (73) · This parameter is not supported

AO TRD: TRAVEL_ACCUM_LIM (94) · This parameter is not supported

AO TRD: TRAVEL_ACCUM_UNITS (95) · This parameter is not supported

AO TRD: TRAVEL_UNITS (30)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Unit of valve strokes according to Table TN-016
- [%] or [°], in the event of a device is not initialized

AO TRD: TRIP_TIMEOUT (74) · This parameter is not supported

AO TRD: TV_STEP (141)
Storage class: S · Read/write capability (r/w)

Derivative-action time TV (step) → Code 18
Note: This parameter can only be read over FOUNDATION fieldbus. The value is recorded during initialization.

AO TRD: UNS_CHAR_STRUCTURE (300) · This parameter is not supported

AO TRD: UNS_INT_STRUCTURE (298) · This parameter is not supported

AO TRD: UNS_SHORT_STRUCTURE (299) · This parameter is not supported

AO TRD: UPDATE_EVT (7)
Storage class: D · Read/write capability (r/w)

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

AO TRD: VALVE_MAN_ID (49)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Clear identification of the manufacturer of the valve that the positioner is mounted on.

AO TRD: VALVE_MODEL_NUM (50)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Indicates the model number of the valve that the positioner is mounted on.

AO TRD: VALVE_SN (51)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Indicates the serial number of the valve that the positioner is mounted on.

AO TRD: VALVE_TYPE (52)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Type of valve
- -/- · undefiniert (treated like a globe valve)
- [LINEAR] · (control valves with straight moving plug, e.g. globe valves)
- ROTARY · (control valves with rotating closure members)
- OTHER · (treated like a globe valve)

Note: The Type 3730-5 differentiates merely between linear and rotary valves, "UNINITIALIZED" and "OTHER" are treated like a globe valve.

AO TRD: VST_COMMAND (56)
Storage class: D · Read/write capability (r/w) · Supported modes: O/M/A

Start/abort the partial stroke test (PST)/full stroke test (FST)

AO TRD: VST_DETAILED_RESULT (60) · This parameter is not supported

AO TRD: VST_MODE (57)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Select VST (valve stroke test) to be performed
- Deactivated
- [PST (partial stroke test)]
- FST (full stroke test)

AO TRD: VST_PAUSE (58)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Specifies waiting time after the first step until the second step starts.
- 0.1 … 240.0 s, [2.0 s]

AO TRD: VST_RESULT (59)
Storage class: N · Read capability (r)

Indicates that the result of the last PST/FST (successful/not successful).

AO TRD: WORKING_POS (19)
Storage class: D · Read capability (r)

Actual valve position in %

AO TRD: WORKING_POS_D (34)
Storage class: D · Read capability (r)

Actual discrete valve position

AO TRD: WORKING_SP (20)
Storage class: N · Read capability (r)

Reference variable after scaling, characterization and the end position function
Corresponds to the reference variable of the control algorithm for the AO Function Block in the closed-loop mode.

AO TRD: WORKING_SP_D (35)
Storage class: N · Read capability (r)

Discrete reference variable after taking the direction of action into account
Corresponds to the reference variable of the control algorithm for the DO Function Block in Open/Close mode.

AO TRD: XD_CAL_DATE (54)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Indicates the time when the last calibration was performed.

AO TRD: XD_CAL_LOC (53)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Indicates the location where the last calibration was performed.

AO TRD: XD_CAL_WHO (55)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Indicates the person who performed the last calibration.

AO TRD: XD_COMMAND (41)
Storage class: D · Read/write capability (r/w)

Parameters to start device-specific procedures
1 No test, normal operation
2 Start with default values
3 Start initialization
4 Abort initialization
5 Start zero point adjustment

6 Abort zero point adjustment
7 Search device

AO TRD: XD_COMMAND_FLAGS (75) · This parameter is not supported

AO TRD: XD_COMMAND_STATE (42)
Storage class: D · Read capability (r)

Status of initialization.

AO TRD: XD_ERROR (12)
Storage class: D · Read capability (r)

Errors listed in the Transducer Block
- NONE (0) · No error
- UNSPECIFIED ERROR · Unspecified (device not initialized, initialization or zero calibration in progress or total valve travel exceeded)
- GENERAL ERROR · General device error
- CALIBRATION ERROR · Zero point, internal control loop, or initialization error, reference test canceled → Code 81
- CONFIGURATION ERROR · Parameter or characteristic faulty
- ELECTRONICS FAILURE · i/p converter (Code 64), hardware (Code 65), bus connection
- MECHANICAL FAILURE
- DATA INTEGRITY ERROR · Check sum error
- ALGORITHM ERROR · Dynamic values outside of the range

AO TRD: XD_ERROR_EXT (113)
Storage class: D · Read capability (r)

Extended errors listed in the Transducer Block
1 xd_error_ext_1
- Device not initialized
- Int. solenoid valve active
- Tot. valve travel limit exc.
- Control loop → Code 57
- Zero point → Code 58
- Autocorrection → Code 59
- Fatal error → Code 60
- Extented diagnosis → Code 79
- x > range → Code 50
- Delta x < range → Code 51
- Attachment → Code 52
- Init. time exceeded → Code 53

- Init./int. solenoid valve → Code 54
- Travel time too short → Code 55
- Pin position/safety switch → Code 56
- Test or calibration running

2 xd_error_ext_2

- x-signal → Code 62
- i/p-converter → Code 64
- Hardware → Code 65
- Control parameter → Code 68
- Poti parameter → Code 69
- Adjustment parameter → Code 70
- General parameter → Code 71
- Internal device error 1 → Code 73
- No emergency mode → Code 76
- Program load error → Code 77
- Options parameter → Code 78
- Info parameter → Code 75
- Data memory → Code 66
- Control calculation → Code 67
- Reference test aborted → Code 81

3 xd_error_ext_3

- Reset comm. controller
- Attachment unit disturbed
- Bin 2 deactivated
- Reset appl. controller
- FF parameter
- Mode unequal AUTO
- Temperature exceeding

14 Air supply
15 Actuator spring
16 Shifting working range
17 Friction
18 Leakage pneumatic
19 Limit working range
20 Inner leakage
21 External leakage
22 Observing end position
23 Connection positioner valve

24 Working range
25 Temperature error
26 PST/FST status
27 Open/close status

AO TRD: XD_FSTATE_OPT (37)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Action on detection of an error in AO Transducer Block
- [Hold last value]
- Fail-safe position
- Fault state value (XD_FSTATE_VAL)

AO TRD: XD_FSTATE_VAL (31)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Fault state value to which the valve moves when the AO Transducer Block is in the O/S mode and the action on fault detection has been selected in the XD_OOS_OPTS parameter.
- 0 … 100 %, [0 %]

AO TRD: XD_FSTATE_VAL_D (36)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Discrete fault state value to which the valve moves when the AO Transducer Block is in the O/S mode and the action on fault detection has been selected in the XD_OOS_OPTS parameter.
- [0], 1
- 0 - 0 %
- 1 - 100 %

AO TRD: XD_OOS_OPTS (43)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Action when the AO Transducer Block is in the O/S mode
- [Hold last value]
- Fail-safe position
- Fault state value (XD_FSTATE_VAL)

AO TRD: Y_HYST_MIN_TIME_DISTANCE (195)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Statistical information – Drive signal diagram - Hysteresis test
Time before test d5 is repeated
- 0 … 24 h, [1 h]

AO TRD: Y_HYST_TEST_INFO (221)
Storage class: D · Read capability (r)

Tests – Drive signal diagram hysteresis (test d2): Test status

AO TRD: Y_HYST_TEST_PROGRESS (222)
Storage class: D · Read capability (r)

Tests – Drive signal diagram hysteresis (test d2): Progress of test in %

AO TRD: Y_HYST_TESTINFO (197)
Storage class: D · Read capability (r)

Statistical information – Drive signal diagram - Hysteresis test (test d5): Test status

AO TRD: Y_HYST_TIME_STAMP (220)
Storage class: D · Read capability (r)

Tests – Drive signal diagram hysteresis (test d2): Time stamp of recorded reference values

AO TRD: Y_HYST_TOLERANCE_BAND (196)
Storage class: D · Read/write capability (r/w) · Supported modes: O/M/A

Statistical information – Drive signal diagram - Hysteresis test
Tolerance band of test d5 (the test is aborted if the value leaves the tolerance band)

AO TRD: Y_STAT_TEST_INFO (214)
Storage class: D · Read capability (r)

Tests – Drive signal diagram steady-state (test d1)
Current test status

AO TRD: Y_STAT_TEST_PROGRESS (215)
Storage class: D · Read capability (r)

Tests – Drive signal diagram steady-state (test d1)
Current test progress

AO TRD: Y_STAT_TEST_TIME_STAMP (213)
Storage class: D · Read capability (r)

Tests – Drive signal diagram steady-state (test d1)
Time stamp of recorded reference values

Parameter index: AO Transducer Block

Index	Parameter
0	ADVANCED_PV_BASIC
1	ST_REV
2	TAG_DESC
3	STRATEGY
4	ALERT_KEY
5	MODE_BLK
6	BLOCK_ERR
7	UPDATE_EVT
8	BLOCK_ALM
9	TRANSDUCER_DIRECTORY
10	TRANSDUCER_TYPE
11	TRANSDUCER_TYPE_VER
12	XD_ERROR
13	COLLECTION_DIRECTORY
14	FINAL_VALUE
15	FINAL_VALUE_RANGE
16	FINAL_VALUE_CUTOFF_HI
17	FINAL_VALUE_CUTOFF_LO
18	FINAL_POSITION_VALUE
19	WORKING_POS
20	WORKING_SP
21	DEVIATION_DEADBAND
22	DEVIATION_TIME
23	DEVIATION_VALUE
24	POS_ALERT_HI
25	POS_ALERT_LO
26	RATED_TRAVEL
27	STOP_HI
28	STOP_LO
29	TRAVEL_ACCUM
30	TRAVEL_UNITS

Index	Parameter
31	XD_FSTATE_VAL
32	FINAL_VALUE_D
33	FINAL_POSITION_VALUE_D
34	WORKING_POS_D
35	WORKING_SP_D
36	XD_FSTATE_VAL_D
37	XD_FSTATE_OPT
38	CYCLE_CNTR
39	SIGNAL_ACTION
40	READBACK_SELECT
41	XD_COMMAND
42	XD_COMMAND_STATE
43	XD_OOS_OPTS
44	POS_FEATURES
45	ACT_FAIL_ACTION
46	ACT_MAN_ID
47	ACT_MODEL_NUM
48	ACT_SN
49	VALVE_MAN_ID
50	VALVE_MODEL_NUM
51	VALVE_SN
52	VALVE_TYPE
53	XD_CAL_LOC
54	XD_CAL_DATE
55	XD_CAL_WHO
56	VST_COMMAND
57	VST_MODE
58	VST_PAUSE
59	VST_RESULT
60	VST_DETAILED_RESULT
61	CLOSED_POS_DEADBAND

Index	Parameter
62	CLOSED_POS_SHIFT
63	CUSTOM_CURVE_DESCRIPTION
64	CUSTOM_CURVE_XY
65	CUSTOM_CURVE_XY_FLOAT
66	CYCLE_COUNTER_DEADBAND
67	FRICTION_UNITS
68	FRICTION
69	HYSTERESIS
70	POS_DEADBAND
71	STROKE_TIME_CLOSED
72	STROKE_TIME_OPEN
73	TRAVEL_ACCUM_DEADBAND
74	TRIP_TIMEOUT
75	XD_COMMAND_FLAGS
76	CYCLE_CNTR_LIM
77	PST_BREAKOUT_TIME
78	PST_BREAKOUT_TIMEOUT
79	PST_INITIAL_START_TIME
80	PST_INTERVAL
81	PST_OPTIONS
82	PST_RAMP_RATE
83	PST_STRK_TRAV
84	PST_STRK_TRAV_TIMEOUT
85	PST_COMPLETION_TIMEOUT
86	FST_BREAKOUT_TIME
87	FST_BREAKOUT_TIMEOUT
88	FST_RAMP_RATE
89	FST_STRK_TRAV_TIMEOUT
90	FST_COMPLETION_TIMEOUT
91	CHARACTERIZATION
92	STROKE_TIME_CLOS_LIM
93	STROKE_TIME_OPEN_LIM

Index	Parameter
94	TRAVEL_ACCUM_LIM
95	TRAVEL_ACCUM_UNITS
96	INTERNAL_TEMP
97	INTERNAL_TEMP_MIN
98	INTERNAL_TEMP_MAX
99	INTERNAL_TEMP_UNITS
100	ERROR_OPTION_INIT_FAILURE
101	ERROR_OPTION_OPERATION_FAILURE
102	ERROR_OPTION_HW_FAILURE
103	ERROR_OPTION_DATA_FAILURE
104	ERROR_OPTION_ENH_DIAGNOSTIC_1
105	ERROR_OPTION_ENH_DIAGNOSTIC_2
106	ERROR_OPTION_ENH_DIAGNOSTIC_3
107	ERROR_OPTION_ENH_DIAGNOSTIC_4
108	ERROR_OPTION_ENH_DIAGNOSTIC_5
109	ALARM_OPTIONS
110	SIMULATION_MESSAGE
111	SIMULATION_ENABLE
112	TRANSDUCER_STATE
113	XD_ERROR_EXT
114	DEVIATION_MIN
115	DEVIATION_MAX
116	LOGGING_MGV
117	MIN_CLEARANCE_NEW_LOGGING_MGV
118	IDENT_OPTIONS
119	SELECT_OPTIONS
120	CONFIG_BINARY_INPUT_2
121	BINARY_INPUT_2
122	POSITIONER_MODEL
123	BINARY_FUNCTION
124	BINARY_FUNCTION_STATUS
125	DEVICE_CHARACTERISTIC

Index	Parameter
126	SET_FAIL_SAFE_POS
127	TRANS_PIN_POS
128	INIT_METHOD
129	INIT_WITH_REF_TEST
130	SUB_MOD_INIT
131	OPTI_SUB_INIT
132	DEVICE_INIT_STATE
133	DEVICE_STATUS_INIT
134	CLOSING_DIRECTION
135	FINAL_VALUE_CUTOFF_LO_ON
136	FINAL_VALUE_CUTOFF_HI_ON
137	BLOCKING_POSITION
138	PRESSURE_LIMIT
139	SELECT_EMERGENCY_MODE
140	KP_STEP
141	TV_STEP
142	STOP_LO_POS_ON
143	STOP_HI_POS_ON
144	FINAL_POSITION_VALUE_LIMITS
145	DIAG_LEVEL
146	START_STOP_ALL_FUNCTION
147	RESET_STATUS_MESSAGE_DIAG
148	HIS_TEMPERATURE
149	ELAPSED_HOURS_METER
150	NO_OF_ZERO_POINT_ADJ
151	COUNTER_INIT_START
152	EVENT_LOGGING_1
153	EVENT_LOGGING_2
154	PROTOKOLL_BSZ_START
155	DIAG_RESET_AFTER_TIME
156	DIAG_RESET_AFTER_TIMEOUT
157	APPLICATION_TYPE_OC_CONTROL

Index	Parameter
158	LIMIT_VALUE_TIME_ANALYSIS
159	LIMIT_TIME_TRAVEL_ANALYSIS
160	ANALYSIS_OPEN_CLOSE
161	DL_CONFIG_R
162	DL_CONFIG_WR
163	DL_HISTOGR_TIME_1
164	DL_HISTOGR_TIME_2
165	DL_HISTOGR_TIME_3
166	DL_HISTOGR_TIME_4
167	DL_HISTOGR_VENTILST_1
168	DL_HISTOGR_VENTILST_2
169	DL_HISTOGR_VENTILST_3
170	DL_HISTOGR_VENTILST_4
171	DL_HISTOGR_W_1
172	DL_HISTOGR_W_2
173	DL_HISTOGR_W_3
174	DL_HISTOGR_W_4
175	DL_HISTOGR_E_1
176	DL_HISTOGR_E_2
177	DL_HISTOGR_E_3
178	DL_HISTOGR_E_4
179	DL_HISTOGR_Y_1
180	DL_HISTOGR_Y_2
181	DL_HISTOGR_Y_3
182	DL_HISTOGR_Y_4
183	HISTOGR_X_LONG
184	HISTOGR_X_SHORT
185	HISTOGR_X_SCAN_RATE
186	DL_HISTOGR_E_LONG
187	DL_HISTOGR_E_SHORT
188	DL_HISTOGR_E_SCAN_RATE
189	DL_HISTOGR_Z_LONG

Index	Parameter
190	DL_HISTOGR_Z_SHORT
191	DIAGR_STELL_Y_STAT_LONG
192	DIAGR_STELL_Y_STAT_KURZ
193	DIAGR_STELL_Y_STAT_SHORT
194	DIAGR_VALVE_POS_STAT_SHORT
195	Y_HYST_MIN_TIME_DISTANCE
196	Y_HYST_TOLERANCE_BAND
197	Y_HYST_TESTINFO
198	HYST_SHORT_DIFF_Y
199	HYST_VALVE_POS
200	DIAGR_STELL_Y_HYSTERESE_WH
201	END_POS_TREND_REF_VALUES_REF
202	END_POS_TREND_REF_TIME_REF
203	END_POS_TREND_REF_DRIVE_SIG_REF
204	END_POS_TREND_REF_VALUES
205	END_POS_TREND_REF_TIME
206	END_POS_TREND_REF_DRIVE_SIG
207	THRESHOLD_END_POS_RECORDING
208	DIAGR_END_POS_TREND_X_EPT
209	DIAGR_END_POS_TREND_X_REF
210	AUTOMATIC_TEST_STATUS
211	DIAG_REFLAUF_INFO
212	REFLAUF_VOLLST
213	Y_STAT_TEST_TIME_STAMP
214	Y_STAT_TEST_INFO
215	Y_STAT_TEST_PROGRESS
216	DIAGR_STELL_Y_STAT_TEST_REF
217	DIAGR_STELL_X_STAT_TEST_REF
218	DIAGR_STELL_Y_STAT_TEST_WH
219	DIAGR_STELL_X_STAT_TEST_WH
220	Y_HYST_TIME_STAMP
221	Y_HYST_TEST_INFO

Index	Parameter
222	Y_HYST_TEST_PROGRESS
223	DIAGR_STELL_Y_HYST_TEST_REF
224	DIAGR_STELL_X_HYST_TEST_REF
225	DIAGR_STELL_Y_HYST_TEST_WH
226	DIAGR_STELL_X_HYST_TEST_WH
227	STAT_KENNL_R
228	STAT_KENNL_W
229	DIAGR_STAT_KENNL_VENTILST1
230	DIAGR_STAT_KENNL_VENTILST2
231	DIAGR_STAT_KENNL_VENTILST3
232	DIAGR_STAT_KENNL_VENTILST4
233	DIAGR_STAT_KENNL_W1
234	DIAGR_STAT_KENNL_W2
235	DIAGR_STAT_KENNL_W3
236	DIAGR_STAT_KENNL_W4
237	PST_TESTMODE_TARGET
238	PST_AUTOSTART_READ
239	PST_TEST_INFO
240	PST_SETTINGS
241	PST_CANCEL_COND
242	PST_DISPLAY
243	PST_MEAS_DATA1
244	PST_MEAS_DATA2
245	PST_MEAS_DATA3
246	PST_TEST_STAT1
247	PST_TEST_STAT2
248	PST_TEST_STAT3
249	PST_DIAGR_TIME1
250	PST_DIAGR_TIME2
251	PST_DIAGR_TIME3
252	PST_DIAGR_TIME4
253	PST_DIAGR_X1

Index	Parameter
254	PST_DIAGR_X2
255	PST_DIAGR_X3
256	PST_DIAGR_X4
257	PST_DIAGR_W1
258	PST_DIAGR_W2
259	PST_DIAGR_W3
260	PST_DIAGR_W4
261	PST_DIAGR_E1
262	PST_DIAGR_E2
263	PST_DIAGR_E3
264	PST_DIAGR_E4
265	PST_DIAGR_Y1
266	PST_DIAGR_Y2
267	PST_DIAGR_Y3
268	PST_DIAGR_Y4
269	FST_SETTINGS
270	FST_DISPLAY
271	FST_MEAS_DATA1
272	FST_MEAS_DATA2
273	FST_MEAS_DATA3
274	FST_TEST_STAT1
275	FST_TEST_STAT2
276	FST_TEST_STAT3
277	FST_DIAGR_TIME1
278	FST_DIAGR_TIME2
279	FST_DIAGR_TIME3
280	FST_DIAGR_TIME4
281	FST_DIAGR_X1
282	FST_DIAGR_X2
283	FST_DIAGR_X3
284	FST_DIAGR_X4
285	FST_DIAGR_W1

Index	Parameter
286	FST_DIAGR_W2
287	FST_DIAGR_W3
288	FST_DIAGR_W4
289	FST_DIAGR_E1
290	FST_DIAGR_E2
291	FST_DIAGR_E3
292	FST_DIAGR_E4
293	FST_DIAGR_Y1
294	FST_DIAGR_Y2
295	FST_DIAGR_Y3
296	FST_DIAGR_Y4
297	FLOAT_STR
298	UNS_INT_STRUCTURE
299	UNS_SHORT_STRUCTURE
300	UNS_CHAR_STRUCTURE
301	FRICTION_LIMITS
302	FST_TEST_INFO
303	LS_LEAKAGE_LEVEL
304	LS_ALARM_RELEASE
305	LS_SELECT_ALARM_LIMITS
306	LS_ALARM_INFORMATION
307	LS_ALARM_LIMIT_1
308	LS_ALARM_LIMIT_2
309	LS_ALARM_LIMIT_3
310	LS_TEST_INFORMATION

7.5.3 Analog Output Function Block

AO: ALERT_KEY (4)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Used to specify the identification number of the plant section.
- 1 to 255, [0]

This information can be used by the fieldbus host system to group alerts and events.
Note: '0' is not a permissible value and will be rejected when transferring data to the device (error alarm).

AO: BKCAL_OUT (25)
Storage class: D · Read capability (r)

Analog output value for upstream function block (value and status)
BKCAL_OUT is required by the BKCAL_IN parameter of the upstream function block for cascade control. This value provides windup protection in the upstream function block and a bumpless transfer on mode changes.

AO: BLOCK_ALM (30)
Storage class: D · Read capability (r)

Indicates the current block state with details on all configuration, hardware or system problems in the block including date and time stamp.

AO: BLOCK_ERR (6)
Storage class: D · Read capability (r)

Active block error → Code 48 A8
- OUT OF SERVICE
- CONFIGURATION_ERROR · A configuration error exists in the block.
- INPUT FAILURE PV · Position feedback has bad status, e.g. because the Transducer Block is in O/S mode.
- OUTPUT FAILURE · OUT cannot be issued, e.g. because the Transducer Block is not initialized or is in LO mode.

AO: CAS_IN (17)
Storage class: N · Read/write capability (r/w) · Supported modes: ALL

Analog set point from an upstream function block (value and status)
→ Code 48 A2/A3

AO: CHANNEL (22)

Storage class: S · Read/write capability (r/w) · Supported mode: O

Assignment between the output of the AO Function Block and the logical hardware channels (Transducer Block)

- [3]

Note: In order to be able to put the AO Function Block into operation, CHANNEL must be set to '3' so that it can be assigned to the AO Transducer Block.

AO: FSTATE_TIME (23)

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Fault state time [s]

The length of time that the AO Function Block will wait to set fault state after the recognition of an error of the valid set point.

- [0]

Note: The fault state is activated when the fault still exists after the time interval has elapsed. The fault state of the AO Function Block is set in the IO_OPTS parameter of this block.

AO: FSTATE_VAL (24)

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Fault state value

Determines the value for the AO Function Block when the fault state is activated.

- Value and range of PV_SCALE ±10 %, [0]

Note: This value is used when the option FAULT STATE TO VALUE is set in the IO_OPTS parameter.

AO: GRANT_DENY (13) · This parameter is not supported

AO: IO_OPTS (14)

Storage class: S · Read/write capability (r/w) · Supported mode: O

Used to select how the input/output is processed in the AO Function Block

- SP-PV TRACK IN MAN · SP tracks PV in MAN mode (Actual Mode)
- SP-PV TRACK IN LO · SP tracks PV in LO mode (Actual Mode)
- SP TRACK RETAINED TARGET · SP 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.
- INCREASE TO CLOSE · The output value to the Transducer Block is inverted (corresponds to direction of action).

- FAULT STATE TO VALUE · FSTATE_VAL is used as the set point when the fault state is activated (see FSTATE_VAL, FSTATE_TIME).
- USE FAULT STATE VALUE ON RESTART · FSTATE_VAL is used for the set point until there is a valid value on restarting the device.
- TARGET TO MAN IF FAULT STATE ACTIVATED · On activating 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.
- USE PV FOR BKCAL_OUT · 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.

AO: MODE_BLK (5)

Storage class: N · Read/write capability (r/w) · Supported modes: ALL

Type of mode
– Target Mode → Code 48 A0
– Actual Mode (read only) → Code 48 A1
– Permitted Mode
– Normal Mode (read only)

- O/S · The AO algorithm of the block is not executed. The last value is issued at OUT or the determined value when the Fault State is activated.
- MAN · The user can directly enter the output value of the AO Block.
- AUTO · The set point entered by the user is used over the SP parameter on implementation of the AO Block.
- CAS · The AO Function Block receives the set point directly from an upstream function block over the CAS_IN parameter to calculate the output value internally. The AO Block is implemented.
- RCAS · The AO Function Block receives the set point directly from the host system over the RCAS_IN parameter to calculate the output value internally. The AO Block is implemented.

AO: OUT (9)

Storage class: N · Read/write capability (r/w) · Supported modes: M/O

Output value of the AO Function Block (value, limit and status) → Code 48 A6/7

- Range of OUT_SCALE ±10 %; unit from XD_SCALE parameter group

Note: The output value OUT can be entered manually if the MAN mode is selected in MODE_BLK.

AO: **PV (7)**
Storage class: D · Read capability (r)

Process variable of the function block (value and status)
- Unit from XD_SCALE parameter group

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).

AO: **PV_SCALE (11)**
Storage class: S · Read/write capability (r/w) · Supported modes: O

Range of the process variable (PV) (start, end, unit and decimal point)
- 0 to 100 %

AO: **RCAS_IN (26)**
Storage class: N · Read/write capability (r/w) · Supported modes: ALL

Analog reference variable for internal calculation of the output value (value and status)
RCAS_IN is provided by the fieldbus host system.
Note: This parameter is only active in the RCAS mode.

AO: **RCAS_OUT (28)**
Storage class: D · Read capability (r)

Analog reference variable after ramping (value and status)
RCAS_OUT is provided by 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.

AO: **READBACK (16)**
Storage class: D · Read capability (r)

Current valve position determined from FINAL_POSITION_VALUE parameter of the associated Transducer Block.
- Unit from XD_SCALE parameter group

AO: **SHED_OPT (27)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Determines what action is to be taken when the monitoring time is exceeded (see SHED_RCAS parameter in the Resource Block)
The connection between the fieldbus host system and the AO Function Block in RCAS mode is checked: When the monitoring time has elapsed, the AO Function 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.

- [UNINITIALIZED] · Not initialized
- NORMAL SHED_NORMAL RETURN · On failure of remote connection, change to next possible mode until RCAS mode is restored.
- NORMAL SHED_NO RETURN · On failure of remote connection, change to next possible mode. The block remains in this mode.
- SHED TO AUTO_NORMAL RETURN · On failure of remote connection, change to AUTO mode until RCAS mode is restored.
- SHED TO AUTO_NO RETURN · On failure of remote connection, change to AUTO mode. No attempt is made to restore the mode and the block remains in AUTO mode.
- SHED TO MANUAL_NORMAL RETURN · On failure of remote connection, change to MAN mode until RCAS mode is restored.
- SHED TO MANUAL_NO RETURN · On failure of remote connection, change to MAN mode. No attempt is made to restore the mode and the block remains in MAN mode.
- SHED TO RETAINED TARGET_NORMAL RETURN · On failure of remote connection, the block attempts to attain the retained target mode until RCAS mode is restored.
- SHED TO RETAINED TARGET_NO RETURN · On failure of remote connection, the block sets the target mode to the retained target mode.

Note: This parameter is only active in RCAS mode in the AO Function Block. The AO Function Block cannot be set to the RCAS mode when the value is set to Uninitialized.

AO: SIMULATE (10)

Storage class: D · Read/write capability (r/w) · Supported modes: ALL

Simulation of process variable PV of the function block (value and status) → Code 48 F3

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 Simulate Activate is set in the BLOCK_ERR parameter of the Resource Block.

AO: SP (8)

Storage class: N · Read/write capability (r/w) · Supported modes: O/M/A

Reference variable w in AUTO mode → Code 48 A4/5

- Value and range from PV_SCALE ±10 %; unit from PV_SCALE

AO: **SP_HI_LIM (20)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Upper limit of the reference variable
- Value and range from PV_SCALE ±10 %, [100 %]

Note: This value must be adapted correspondingly if the scale end setting is changed in PV_SCALE parameter.

AO: **SP_LO_LIM (21)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Lower limit of the reference variable
- Value and range from PV_SCALE ±10 %, [0 %]

Note: This value must be adapted correspondingly if the scale end setting is changed in PV_SCALE parameter.

AO: **SP_RATE_DN (18)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Ramp rate for falling changes of the reference variable in AUTO mode.
- [3402823466 x 10^{38}]

Note: The reference variable is used immediately when the ramp rate is set to '0'.
The rate limit is active for output blocks in AUTO and CAS modes.

AO: **SP_RATE_UP (19)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Ramp rate for rising changes of the reference variable in AUTO mode.
- [3402823466 x 10^{38}]

Note: The reference variable is used immediately when the ramp rate is set to '0'.
The rate limit is active for output blocks in AUTO and CAS modes.

AO: **ST_REV (1)**
Storage class: N · Read capability (r)

Revision state of static data (AO Function Block)

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

AO: **STATUS_OPTS (15)**
Storage class: S · Read/write capability (r/w) · Supported mode: O

Selection of status options available to determine the handling and processing of the status.
- [UNINITIALIZED] · Not initialized
- PROPAGATE FAULT BACKWARD · Status of the transducer is passed on to the upstream block over the status of BKCAL_OUT.

AO: STRATEGY (3)
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Grouping to allow faster processing of blocks
- [0]

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.

AO: TAG_DESC (2)
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Assigns a unique description to each block for clear identification.
- Max. 32 characters, [no text]

AO: UPDATE_EVT (29)
Storage class: D · Read capability (r)

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

AO: XD_SCALE (12)
Storage class: S · Read/write capability (r/w) · Supported modes: O

Range of the output value OUT (start, end, unit and decimal point)
- 0.0 to 100.0 %; specified in [%], [mm] or [degrees]

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 %.

Parameter index: AO Function Block

Index	Parameter
0	–
1	ST_REV
2	TAG_DESC
3	STRATEGY
4	ALERT_KEY
5	MODE_BLK
6	BLOCK_ERR
7	PV
8	SP
9	OUT
10	SIMULATE
11	PV_SCALE
12	XD_SCALE
13	GRANT_DENY
14	IO_OPTS
15	STATUS_OPTS

Index	Parameter
16	READBACK
17	CAS_IN
18	SP_RATE_DN
19	SP_RATE_UP
20	SP_HI_LIM
21	SP_LO_LIM
22	CHANNEL
23	FSTATE_TIME
24	FSTATE_VAL
25	BKCAL_OUT
26	RCAS_IN
27	SHED_OPT
28	RCAS_OUT
29	UPDATE_EVT
30	BLOCK_ALM

7.5.4 Proportional Integral Derivative Function Block

PID: **ACK_OPTIONS (46)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Determines whether an alarm is to be automatically acknowledged in the PID Function Block
- [UNDEFINED] · No selection
- HI_HI_ALM · High high alarm
- HI_ALM · High alarm
- LO_LO_ALM · Low low alarm
- LO_ALM · Low alarm
- DV_HI_ALM · Deviation high alarm
- DV_LO_ALM · Deviation low alarm
- BLOCK ALM · Block alarm

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

PID: **ALARM_HYS (47)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Hysteresis for high and low alarms
- 0 to 50 %, [0.5 %]

The alarm conditions remain active until the measured value leaves the hysteresis. 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.

PID: **ALARM_SUM (45)**
Storage class: S/D · Read/write capability (r/w) · Supported modes: ALL

Determines the current status of the process alarms in the PID Function Block
- HI_HI_ALM · High high alarm
- HI_ALM · High alarm
- LO_LO_ALM · Low low alarm
- LO_ALM · Low low
- DV_HI_ALM · Deviation high alarm
- DV_LO_ALM · Deviation low alarm
- BLOCK ALM · Block alarm

Note: The process alarms can also be deactivated in this parameter group.

PID: **ALERT_KEY (4)**

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Used to specify the identification number of the plant section.

- 1 to 255, [0]

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

Note: '0' is not a permissible value and will be rejected when transferring data to the device (alarm).

PID: **BAL_TIME (25)**

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Balance time of the integral term

Used to specify the time constant at which the integral term will move to obtain balance (calculated output value > OUT_HI_LIM or < OUT_LO_LIM)

- [0]

Note: Balance is immediately obtained when the value '0' is set.

PID: **BKCAL_HYS (30)**

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Hysteresis value for output value range limits OUT_HI_LIM and OUT_LO_LIM

- 0 to 50 %, [0.5 %]

If the calculated output value violates the limits defined for the range, this limit violation is indicated in the OUT parameter and passed on to the following function blocks.

The limit violation status remains active until the value of the calculated output value does not exceed or fall below the hysteresis value.

PID: **BKCAL_IN (27)**

Storage class: N · Read/write capability (r/w) · Supported modes: ALL

Analog input (value and status)

BKCAL_IN is used by the BKCAL_OUT parameter of a downstream function block for a cascade control. This value provides a bumpless transfer on mode changes by backward output tracking.

PID: **BKCAL_OUT (31)**

Storage class: D · Read capability (r)

Analog output (value and status)

BKCAL_OUT is used by the BKCAL_IN parameter of a upstream function block for a cascade control. This value provides windup protection in the upstream block and a bumpless transfer on mode changes.

PID: **BLOCK_ALM (44)**
Storage class: D · Read/write capability (r/w) · Supported modes: ALL

Indicates the current block state with details on all configuration, hardware or system problems in the block including details on the date and time of the alarm when the fault occurred.

PID: **BLOCK_ERR (6)**
Storage class: D · Read capability (r)

Active block error → Code 48 P8
- OUT OF SERVICE · The block is in the O/S mode.
- CONFIGURATION ERROR · A configuration error exists in the block.

PID: **BYPASS (17)**
Storage class: S · Read/write capability (r/w) · Supported modes: M/O

Used to activate or deactivate the calculation of the output value by the PID control algorithm.
- UNINITIALIZED · Same as ON
- [OFF] · Bypass deactivated: The output value determined by the PID control algorithm is issued over the OUT parameter.
- ON · BYPASS activated: The value of the reference variable SP is issued directly over the OUT parameter.

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).

PID: **CAS_IN (18)**
Storage class: N · Read/write capability (r/w) · Supported modes: ALL

Analog reference variable (value and status) → Code 48 P2/3
CAS_IN is passed on from the upstream function block.

PID: **CONTROL_OPTS (13)**
Storage class: S · Read/write capability (r/w) · Supported modes: O

Allows selection of controller options available to determine the automation strategy.
- [NONE]
- BYPASS ENABLE · Enable BYPASS parameter
- DIRECT ACTING · Direct action
- TRACK ENABLE · Enable tracking
- TRACK IN MANUAL · Tracking in MAN mode
- PV FOR BKCAL_OUT · Value and status of PV parameter used for BKCAL_OUT parameter
- NO OUT LIMITS IN MANUAL · No output limits in MAN mode

PID: **DV_HI_ALM (64)**
Storage class: D · Read/write capability (r/w) · Supported modes: ALL

Deviation high alarm (DV_HI_LIM) including details of time of alarm (date and time stamp) as well as the value that activated the alarm.
Note: An active block alarm can also be acknowledged manually in this parameter group.

PID: **DV_HI_LIM (57)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Limit for deviation high alarm
- [3402823466 x 10^{38}]

If the controlled variable exceeds the reference variable by this value, the DV_HI_ALM is issued.

PID: **DV_HI_PRI (56)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Determines the action to be taken when the value for the deviation high alarm is exceeded (DV_HI_LIM).
- [0] · The limit for deviation high alarm is not processed.
- 1 · Alarm is not broadcast to fieldbus host system.
- 2 · Reserved for block alarms
- 3 to 7 · Deviation high alarm is issued to notify the operator with the corresponding priority (3 = low, 7 = high).
- 8 to 15 · Deviation high alarm is issued as a critical alarm with the corresponding priority (8 = low, 15 = high).

PID: **DV_LO_ALM (65)**
Storage class: D · Read capability (r)

Deviation low alarm (DV_LO_LIM) including details of time of alarm (date and time stamp) as well as the value that activated the alarm.
Note: An active block alarm can also be acknowledged manually in this parameter group.

PID: **DV_LO_LIM (59)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Limit for deviation low alarm
- [–3402823466 x 10^{38}]

If the controlled variable exceeds the reference variable by this value, the DV_LO_ALM is issued.

PID: **DV_LO_PRI (58)**

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Determines the action to be taken when the value for the deviation low alarm is exceeded (DV_LO_LIM)

- [0] · The limit for deviation low alarm is not processed.
- 1 · Alarm is not broadcast to fieldbus host system.
- 2 · Reserved for block alarms
- 3 to 7 · Deviation low alarm is issued to notify the operator with the corresponding priority (3 = low, 7 = high).
- 8 to 15 · Deviation low alarm is issued as a critical alarm with the corresponding priority (8 = low, 15 = high).

PID: **FF_GAIN (42)**

Storage class: S · Read/write capability (r/w) · Supported modes: M/O

Gain of the feedforward input

- [0]

Note: The gain is multiplied by the feedforward input (FF_VAL) before it is added to the OUT value.

PID: **FF_SCALE (41)**

Storage class: S · Read/write capability (r/w) · Supported modes: M/O

Measuring range of feedforward input FF_VAL (upper and lower limits, unit and decimal point)

- [0 to 100 %]

PID: **FF_VAL (40)**

Storage class: N · Read/write capability (r/w) · Supported modes: ALL

Feedforward input (value and status)

- Range and unit from FF_SCALE

Note: The feedforward input is multiplied by the gain (FF_GAIN) before it is added to the OUT value.

PID: **GAIN (23)**

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Proportional gain (factor)

- [1.0]

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.

PID: **GRANT_DENY (12)** · **This parameter is not supported**

PID: **HI_ALM (61)**
Storage class: D · Read capability (r)

Indicates high alarm status (HI_LIM) including details of time of alarm (date and time stamp) as well as the value that activated the alarm.
- Unit from PV_SCALE

PID: **HI_HI_ALM (60)**
Storage class: D · Read/write capability (r/w)

Indicates high high alarm status (HI_HI_LIM) including details of time of alarm (date and time stamp) as well as the value that activated the alarm.
- Unit from PV_SCALE

Note: The active alarm can also be acknowledged manually in this parameter group.

PID: **HI_HI_LIM (49)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Limit for high high alarm (HI_HI_ALM)
- Range and unit from PV_SCALE, [3402823466 x 10^{38}]

If the PV value exceeds this limit, the HI_HI_ALM alarm is issued.

PID: **HI_HI_PRI (48)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Determines the action to be taken when the value for the high high alarm is exceeded (HI_HI_LIM).
- [0] · The limit for high high alarm is not processed.
- 1 · Alarm is not broadcast to fieldbus host system.
- 2 · Reserved for block alarms
- 3 to 7 · High high alarm is issued to notify the operator with the corresponding priority (3 = low, 7 = high).
- 8 to 15 · High high alarm is issued as a critical alarm with the corresponding priority (8 = low, 15 = high).

PID: **HI_LIM (51)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Limit for high alarm (HI_ALM)
- Range and unit from PV_SCALE, [3402823466 x 10^{38}]

If the PV value exceeds this limit, the HI_ALM alarm is issued.

PID: **HI_PRI (50)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Determines the action to be taken when the value for the high alarm is exceeded (HI_LIM).
- [0] · The limit for high alarm is not processed.
- 1 · Alarm is not broadcast to fieldbus host system.
- 2 · Reserved for block alarms
- 3 to 7 · High alarm is issued to notify the operator with the corresponding priority (3 = low, 7 = high).
- 8 to 15 · High alarm is issued as a critical alarm with the corresponding priority (8 = low, 15 = high).

PID: **IN (15)**
Storage class: N · Read/write capability (r/w) · Supported modes: ALL

Analog controlled variable x (value and status)

PID: **LO_ALM (62)**
Storage class: D · Read capability (r)

Indicates low alarm status (LO_LIM) including details of time of alarm (date and time stamp) as well as the value that activated the alarm.
- Unit from PV_SCALE

PID: **LO_LIM (53)**
Storage class: S · Read/write capability (r/w)

Limit for low alarm (LO_ALM)
- Range and unit from PV_SCALE, [–3402823466 x 10^{38}]

If the PV value exceeds this limit, the LO_ALM alarm is issued.

PID: **LO_LO_ALM (63)**
Storage class: D · Read capability (r)

Indicates low low alarm status (LO_LO_LIM) including details of time of alarm (date and time stamp) as well as the value that activated the alarm.
- Unit from PV_SCALE

Note: The active alarm can also be acknowledged manually in this parameter group.

PID: **LO_LO_LIM (55)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Limit for low low alarm (LO_LO_ALM)
- Range and unit from PV_SCALE, [–3402823466 x 10^{38}]

If the PV value exceeds this limit, the LO_LO_ALM alarm is issued.

PID: **LO_LO_PRI (54)**

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Determines the action to be taken when the value for the low low alarm is exceeded (LO_LO_LIM).

- [0] · The limit for low low alarm is not processed.
- 1 · Alarm is not broadcast to fieldbus host system.
- 2 · Reserved for block alarms
- 3 to 7 · Low low alarm is issued to notify the operator with the corresponding priority (3 = low, 7 = high).
- 8 to 15 · Low low alarm is issued as a critical alarm with the corresponding priority (8 = low, 15 = high).

PID: **LO_PRI (52)**

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Determines the action to be taken when the value for the low alarm is exceeded (LO_LIM).

- [0] · The limit for low alarm is not processed.
- 1 · Alarm is not broadcast to fieldbus host system.
- 2 · Reserved for block alarms
- 3 to 7 · Low alarm is issued to notify the operator with the corresponding priority (3 = low, 7 = high).
- 8 to 15 · Low alarm is issued as a critical alarm with the corresponding priority (8 = low, 15 = high).

PID: **MODE_BLK (5)**

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Type of mode
– Target Mode → Code 48 P0
– Actual Mode (read only) → Code 48 P1
– Permitted Mode
– Normal Mode (read only)

- O/S · 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.
- MAN · The output value of the block can directly be entered by the user over the OUT parameter.
- AUTO · The set point determined by the user is used to implement the AO Function Block over the SP parameter.
- CAS · The AO Function Block receives the reference variable directly from an upstream function block over the CAS_IN parameter for internal calculation of the output value. The AO Block is implemented.

- RCAS · The AO Function Block receives the reference variable directly from the fieldbus host system for internal calculation of the output value. The AO Block is implemented.
- ROUT · The PID Function Block receives the output value directly from the fieldbus host system over the ROUT_IN parameter. The output value is issued again over OUT without the internal PID algorithm being implemented.

PID: **OUT (9)**
Storage class: N · Read/write capability (r/w) · Supported modes: O/M

Output value of AO Function Block (value, limit and status) → Code 48 P6/7
- Range from OUT_SCALE ±10 %, unit from XD_SCALE

Note: If the MAN mode is selected in the MODE_BLK parameter, the output value OUT can be entered manually.

PID: **OUT_HI_LIM (28)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Upper limit of the analog output value (OUT)
- Range from OUT_SCALE ±10 %, unit from OUT_SCALE, [100]

PID: **OUT_LO_LIM (29)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Lower limit of the analog output value (OUT)
- Range from OUT_SCALE ±10 %, unit from OUT_SCALE, [0]

PID: **OUT_SCALE (11)**
Storage class: S · Read/write capability (r/w) · Supported modes: O

Definition of the range for the output value (OUT) (start, end, unit and decimal point)
- [0 to 100 %]

PID: **PV (7)**
Storage class: D · Read capability (r)

Process variable to implement the block (value and status)
- Unit from PV_SCALE

PID: **PV_FTIME (16)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Used to enter the filter time constant (in seconds) of the first-order digital filter.
- [0]

This time is needed to allow a 63 % change of the controlled variable at the input IN to become effective in the value of PV.

PID: **PV_SCALE (10)**
Storage class: S · Read/write capability (r/w) · Supported modes: O

Definition of the range for the process variable PV (start, end, unit and decimal point)
- [0 to 100 %]

PID: **RATE (26)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Specifies the time constant (in seconds) for the differential function.
- [0]

PID: **RCAS_IN (32)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Analog reference variable for internal calculation of the output value (value and status). RCAS_IN is provided by the fieldbus host system .
Note: This parameter is only active in the RCAS mode.

PID: **RCAS_OUT (35)**
Storage class: D · Read capability (r)

Analog reference variable (value and status) after ramping.
This RCAS_OUT 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.

PID: **RESET (24)**
Storage class: S · Read/write capability (r/w)

Specifies the time constant for the integral-action function.
- [3402823466 x 10^{38}] (maximum value possible)

Note: The initial value or 0 deactivates the integral-action function.

PID: **ROUT_IN (33)**
Storage class: N · Read/write capability (r/w) · Supported modes: ALL

Output value (value and status)
ROUT_IN is provided by the fieldbus host system.
Note: This parameter is only active in the ROUT mode.

PID: **ROUT_OUT (36)**
Storage class: D · Read capability (r)

Analog reference variable (value and status) that has been written by the ROUT_IN parameter.

ROUT_OUT is provided by the fieldbus host system 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.

PID: **SHED_OPT (34)**

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

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 Function Block in RCAS or ROUT mode is being checked.

When the time has elapsed, the PID Function 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.

- [UNINITIALIZED] · Not initialized
- NORMAL SHED_NORMAL RETURN · On failure of remote connection, change to next possible mode until RCAS or ROUT mode is restored.
- NORMAL SHED_NO RETURN · On failure of remote connection, change to next possible mode the block remains in this mode.
- SHED TO AUTO_NORMAL RETURN · On failure of remote connection, change to AUTO mode until RCAS or ROUT mode is restored.
- SHED TO AUTO_NO RETURN · On failure of remote connection, change to AUTO mode. No attempt is made to restore the mode and the block remains in AUTO mode.
- SHED TO MANUAL_NORMAL RETURN · On failure of remote connection, change to MAN mode until RCAS or ROUT mode is restored.
- SHED TO MANUAL_NO RETURN · On failure of remote connection, change to MAN mode. No attempt is made to restore the mode and the block remains in MAN mode.
- SHED TO RETAINED TARGET_ NORMAL RETURN · On failure of remote connection, the block attempts to attain the retained target mode until RCAS or ROUT mode is restored.
- SHED TO RETAINED TARGET_NO RETURN · On failure of remote connection, the block sets the target mode to the retained target mode.

Note: This parameter is only active in RCAS or ROUT mode in the PID Function Block. The PID Block cannot be set to the RCAS or ROUT mode when the value is set to UNINITIALIZED.

PID: **SP (8)**

Storage class: N · Read/write capability (r/w) · Supported modes: O/M/A

Reference variable w in AUTO mode (value and status) → Code 48 P4/5

- Range and value from PV_SCALE ±10 %

PID: **SP_HI_LIM (21)**

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Upper limit of the reference variable.

- Range and value from PV_SCALE ±10 %, [100]

Note: This value must be adapted correspondingly if the scale end setting is changed in PV_SCALE parameter.

PID: **SP_LO_LIM (22)**

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Lower limit of the reference variable.

- Range and value from PV_SCALE ±10 %, [0]

Note: This value must be adapted correspondingly if the scale end setting is changed in PV_SCALE parameter.

PID: **SP_RATE_DN (19)**

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Used to enter the ramp rate for downward changes of the reference variable in AUTO mode.

- [3402823466 x 10^{38}]

Note: The set point is used immediately when the ramp rate is set to '0'. The rate limit is active for output blocks in the AUTO mode.

PID: **SP_RATE_UP (20)**

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Used to enter the ramp rate for upward changes of the reference variable in AUTO mode.

[3402823466 x 10^{38}]

Note: The set point is used immediately when the ramp rate is set to '0'. The rate limit is active for output blocks in the AUTO mode.

PID: **ST_REV (1)**

Storage class: S · Read capability (r)

Indicates the revision number of static data (PID)

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

PID: **STATUS_OPTS (14)**

Storage class: S · Read/write capability (r/w) · Supported modes: O

Status options available to determine the handling and processing of the status:

- [UNINITIALIZED] · Not initialized
- IFS IF BAD IN · Activate IFS substate of downstream AO Function Block if the input value (IN) changes status to BAD.
- IFS IF BAD CAS_IN · Activate IFS substate if the external reference variable (CAS_IN) changes status to BAD.

- USE UNCERTAIN AS GOOD · The status UNCERTAIN is used as GOOD.
- TARGET IN MANUAL IF BAD IN · Reverts to MAN mode if the input value changes status to BAD.

PID: **STRATEGY (3)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Permits strategic grouping and thus faster processing of blocks.
- [0]

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.

PID: **TAG_DESC (2)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Assigns a unique description to each block for clear identification.
- Max. 32 characters, [no text]

PID: **TRK_IN_D (38)**
Storage class: N · Read/write capability (r/w) · Supported modes: ALL

Discrete input (value and status) which activates the external output tracking.
On activating tracking, the block changes to LO mode. The output value at OUT adopts the value defined over the input TRK_VAL.

PID: **TRK_SCALE (37)**
Storage class: S · Read/write capability (r/w) · Supported modes: O/M

Definition of range for external tracking value (TRK_VAL) (start, end, unit and decimal point)
- [0 to 100 %]

PID: **TRK_VAL (39)**
Storage class: N · Read/write capability (r/w) · Supported modes: ALL

Analog input (value and status) for external tracking function
TRK_VAL is read from another function block.

PID: **UPDATE_EVT (43)**
Storage class: D · Read capability (r)

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

Parameter index: PID Function Block

Index	Parameter
0	–
1	ST_REV
2	TAG_DESC
3	STRATEGY
4	ALERT_KEY
5	MODE_BLK
6	BLOCK_ERR
7	PV
8	SP
9	OUT
10	PV_SCALE
11	OUT_SCALE
12	GRANT_DENY
13	CONTROL_OPTS
14	STATUS_OPTS
15	IN
16	PV_FTIME
17	BYPASS
18	CAS_IN
19	SP_RATE_DN
20	SP_RATE_UP
21	SP_HI_LIM
22	SP_LO_LIM
23	GAIN
24	RESET
25	BAL_TIME
26	RATE
27	BKCAL_IN
28	OUT_HI_LIM

Index	Parameter
29	OUT_LO_LIM
30	BKCAL_HYS
31	BKCAL_OUT
32	RCAS_IN
33	ROUT_IN
34	SHED_OPT
35	RCAS_OUT
36	ROUT_OUT
37	TRK_SCALE
38	TRK_IN_D
39	TRK_VAL
40	FF_VAL
41	FF_SCALE
42	FF_GAIN
43	UPDATE_EVT
44	BLOCK_ALM
45	ALARM_SUM
46	ACK_OPTIONS
47	ALARM_HYS
48	HI_HI_PRI
49	HI_HI_LIM
50	HI_PRI
51	HI_LIM
52	LO_PRI
53	LO_LIM
54	LO_LO_PRI
55	LO_LO_LIM
56	DV_HI_PRI
57	DV_HI_LIM

Index	Parameter
58	DV_LO_PRI
59	DV_LO_LIM
60	HI_HI_ALM
61	HI_ALM
62	LO_ALM
63	LO_LO_ALM
64	DV_HI_ALM
65	DV_LO_ALM

7.5.5 Discrete Output Function Block

DO: ALERT_KEY (4)
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Used to specify the identification number of the plant section.
- 1 to 255, [0]

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

Note: '0' is not a permissible value and will be rejected when transferring data to the device (error alarm).

DO: BKCAL_OUT_D (21)
Storage class: D · Read capability (r)

Discrete output value for upstream function block (value and status)

BKCAL_OUT_D is required by the BKCAL_IN parameter of the upstream function block for cascade control. This value provides windup protection in the upstream function block and a bumpless transfer on mode changes.

DO: BLOCK_ALM (26)
Storage class: D · Read capability (r)

Indicates the current block state with details on all configuration, hardware or system problems in the block including date and time stamp.

DO: BLOCK_ERR (6)
Storage class: D · Read capability (r)

Active block error → Code 48 A8
- OUT OF SERVICE
- CONFIGURATION_ERROR

DO: CAS_IN_D (17)
Storage class: N · Read/write capability (r/w) · Supported modes: ALL

Discrete set point from an upstream function block (value and status)

DO: CHANNEL (18)
Storage class: S · Read/write capability (r/w) · Supported mode: O

Assignment between the output of the DO Function Block and the logical hardware channels (Transducer Block)
- [6] in DO1 Function Block and [7] in DO2 Function Block

Note: In order to be able to put the DO1 Function Block into operation, CHANNEL must be set to '6' so that it can be assigned to the DO1 TRD. In order to be able to put the DO2 Function Block into operation, CHANNEL must be set to '7' so that it can be assigned to the DO2 TRD.

DO: FSTATE_TIME (19)
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Fault state time [s]

The length of time that the DO Function Block will wait to set fault state after the recognition of an error of the valid set point.

- [0]

Note: The fault state is activated when the fault still exists after the time interval has elapsed. The fault state of the DO Function Block is set in the IO_OPTS parameter of this block.

DO: FSTATE_VAL_D (20)
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Fault state value

Determines the value for the DO Function Block when the fault state is activated.

- Value and range of PV_SCALE ±10 %, [0]

Note: This value is used when the option FAULT STATE TO VALUE is set in the IO_OPTS parameter.

DO: GRANT_DENY (13) · This parameter is not supported

DO: IO_OPTS (14)
Storage class: S · Read/write capability (r/w) · Supported mode: O

Used to select how the input/output is processed in the DO Function Block

- INVERTIERT · Inversion of SP_D
- SP-PV TRACK IN MAN · SP tracks PV in MAN mode (Actual Mode)
- SP-PV TRACK IN LO · SP tracks PV in LO mode (Actual Mode)
- SP TRACK RETAINED TARGET · SP 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.
- FAULT STATE TO VALUE · FSTATE_VAL is used as the set point when the fault state is activated (see FSTATE_VAL, FSTATE_TIME).
- USE FAULT STATE VALUE ON RESTART · FSTATE_VAL is used for the set point until there is a valid value on restarting the device.
- TARGET TO MAN IF FAULT STATE ACTIVATED · On activating 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.
- USE PV FOR BKCAL_OUT · The process variable PV_D is used instead of the working set point in BKCAL_OUT.

DO: **MODE_BLK (5)**
Storage class: N · Read/write capability (r/w) · Supported modes: ALL

Type of mode of DO Function Block
– Target Mode
– Actual Mode (read only)
– Permitted Mode
– Normal Mode (read only)

- AUTO · The set point entered by the user is used over the SP_D parameter on implementation of the DO Block
- MAN · The user can directly enter the discrete output of the DO Function Block over OUT_D parameter.
- CAS · The DO Function Block receives the discrete set point directly from an upstream function block over the CAS_IN_D parameter to calculate the output value internally. The DO Function Block is implemented.
- RCAS · The DO Function Block receives the set point directly from the host system over the RCAS_IN_D parameter to calculate the output value internally. The DO Block is implemented.
- O/S · The DO Function Block is not executed. The last value or the value determined upon fault detection is issued at the OUT_D parameter.

DO: **OUT_D (9)**
Storage class: N · Read/write capability (r/w) · Supported modes: O/M

Output value of the DO Function Block (value, limit and status)

- Range of OUT_SCALE ±10 %; unit from XD_SCALE parameter group

Note: The output value OUT can be entered manually if the MAN mode is selected in MODE_BLK.

DO: **PV_D (7)**
Storage class: D · Read capability (r)

Discrete process variable of the function block (value and status)

DO: **PV_STATE (11)**
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Status of the PV_D and SP_D parameters

DO: **RCAS_IN_D (22)**
Storage class: N · Read/write capability (r/w) · Supported modes: ALL

Discrete reference variable for internal calculation of the output value (value and status)
RCAS_IN is provided by the fieldbus host system.
Note: This parameter is only active in the RCAS mode.

DO: RCAS_OUT_D (24)

Storage class: D · Read capability (r)

Discrete reference variable after ramping (value and status)

RCAS_OUT_D is provided by 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.

DO: READBACK_D (16)

Storage class: D · Read capability (r)

Current discrete valve position

- 0: 0 %
- 1: 100 %
- 2: Intermediate position (0.5 % < x < 99.5 %)

DO: SHED_OPT (23)

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Determines what action is to be taken when the monitoring time is exceeded (see SHED_RCAS parameter in the Resource Block)

The connection between the fieldbus host system and the DO Function Block in RCAS mode is checked: When the monitoring time has elapsed, the DO Function 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.

- [UNINITIALIZED] · Not initialized
- NORMAL SHED_NORMAL RETURN · On failure of remote connection, change to next possible mode until RCAS mode is restored.
- NORMAL SHED_NO RETURN · On failure of remote connection, change to next possible mode. The block remains in this mode.
- SHED TO AUTO_NORMAL RETURN · On failure of remote connection, change to AUTO mode until RCAS mode is restored.
- SHED TO AUTO_NO RETURN · On failure of remote connection, change to AUTO mode. No attempt is made to restore the mode and the block remains in AUTO mode.
- SHED TO MANUAL_NORMAL RETURN · On failure of remote connection, change to MAN mode until RCAS mode is restored.
- SHED TO MANUAL_NO RETURN · On failure of remote connection, change to MAN mode. No attempt is made to restore the mode and the block remains in MAN mode.
- SHED TO RETAINED TARGET_NORMAL RETURN · On failure of remote connection, the block attempts to attain the retained target mode until RCAS mode is restored.

- SHED TO RETAINED TARGET_NO RETURN · On failure of remote connection, the block sets the target mode to the retained target mode.
- **Note:** This parameter is only active in RCAS mode in the DO Function Block. The DO Function Block cannot be set to the RCAS mode when the value is set to Uninitialized.

DO: SIMULATE_D (10)

Storage class: D · Read/write capability (r/w) · Supported modes: ALL

Simulation of process variable PV of the block (value and status)

Note: During the simulation, the OUT_D 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 Simulate Activate is set in the BLOCK_ERR parameter of the Resource Block.

DO: SP_D (8)

Storage class: N · Read/write capability (r/w) · Supported modes: O/M/A

Discrete set point (reference variable) in AUTO mode

DO: ST_REV (1)

Storage class: N · Read capability (r)

Revision state of static data

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

DO: STATUS_OPTS (15)

Storage class: S · Read/write capability (r/w) · Supported mode: O

Selection of status options available to determine the handling and processing of the status.

- Use UNCERTAIN status as GOOD: If the status of the input value IN_x is INCERTAIN, the status of OUT is set to GOOD.
- UNCERTAIN when in MAN mode: If the mode is MAN (ACTUAL_MODE), the status of OUT is set to UNCERTAIN.

DO: STRATEGY (3)

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Permits strategic grouping and thus faster processing of blocks.

- [0]

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 DO Function Block.

DO:	**TAG_DESC (2)** Storage class: S · Read/write capability (r/w) · Supported modes: ALL
	Assigns a unique description to each block for clear identification. • Max. 32 characters, [no text]
DO:	**UPDATE_EVT (25)** Storage class: D · Read capability (r)
	Indicates that static data were changed, including date and time stamp.
DO:	**XD_STATE (12)** Storage class: S · Read/write capability (r/w) · Supported modes: ALL
	Status of the OUT_D and READBACK_D parameters

Parameter index: DO1 Function Block and DO2 Function Block

Index	Parameter
0	–
1	ST_REV
2	TAG_DESC
3	STRATEGY
4	ALERT_KEY
5	MODE_BLK
6	BLOCK_ERR
7	PV_D
8	SP_D
9	OUT_D
10	SIMULATE_D
11	PV_STATE
12	XD_STATE
13	GRANT_DENY

Index	Parameter
14	IO_OPTS
15	STATUS_OPTS
16	READBACK_D
17	CAS_IN_D
18	CHANNEL
19	FSTATE_TIME
20	FSTATE_VAL_D
21	BKCAL_OUT_D
22	RCAS_IN_D
23	SHED_OPT
24	RCAS_OUT_D
25	UPDATE_EVT
26	BLOCK_ALM

7.5.6 Discrete Input Function Block (DI1 + DI2)

DI: ACK_OPTIONS (21)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Determines whether an alarm is to be automatically acknowledged, i.e. without intervention of the fieldbus host system.
- [UNDEFINED] · No selection
- BLOCK ALM · Block alarm
- DISC ALM · Write lock has been changed

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

DI: ALARM_SUM (20)
Storage class: S/D · Read/write capability (r/w) · Supported modes: O/M/A

Determines the current status of the process alarms in the DI Function Block
- BLOCK ALM · Block alarm
- DISC ALM · Write lock has been changed

Note: The process alarms can also be deactivated in this parameter group.

DI: ALERT_KEY (4)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Used to specify the identification number of the plant section.
- 1 to 255, [0]

This information can be used by the fieldbus host system to group alerts and events.
Note: '0' is not a permissible value and will be rejected when transferring data to the device (error alarm).

DI: BLOCK_ALM (19)
Storage class: D · Read capability (r)

Indicates the current block state with details on all configuration, hardware or system problems in the block including date and time stamp.

DI: BLOCK_ERR (6)
Storage class: D · Read capability (r)

Active block error → Code 48 I6 for DI1, Code 48 L6 for DI2
- OUT OF SERVICE
- CONFIGURATION_ERROR

DI: CHANNEL (15)

Storage class: S · Read/write capability (r/w) · Supported modes: O

Assignment between the output of the DI Function Block and the logical hardware channels (Transducer Block)

- [1] in DI1 Function Block and [2] in DI2 Function Block

Note: In order to be able to put the DI1 Function Block into operation, CHANNEL must be set to '1' so that it can be assigned to the DI1 TRD. In order to be able to put the DI2 Function Block into operation, CHANNEL must be set to '2' so that it can be assigned to the DI2 TRD.

DI: DISC_ALM (24)

Storage class: D · Read capability (r)

Indicates the status of the discrete alarm including details on the time of the alarm (time and date stamp) and on the value which activated the alarm.

The value entered in DISC_LIM is exceeded.

Note: An active block alarm can also be acknowledged manually in this parameter group.

DI: DISC_LIM (23)

Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Limit for discrete alarm

- [0], 1

DI: DISC_PRI (22)

Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Determines the action to be taken when the value entered in DISC_LIM is reached.

- [0] · The limit violation is not processed.
- 1 · Alarm is not broadcast to fieldbus host system
- 2 · Reserved for block alarms
- 3 to 7 · Limit alarm is issued to notify the operator with the corresponding priority (3 = low, 7 = high).
- 8 to 15 · Limit alarm is issued as a critical alarm with the corresponding priority (8 = low, 15 = high).

DI: FIELD_VAL_D (17)

Storage class: N · Read capability (r)

Discrete input variable of the DI Function Block (value and status)
→ Code 48 I2/3 for DI1, Code 48 L2/3 for DI2

DI: GRANT_DENY (12) · This parameter is not supported

DI: IO_OPTS (13)
Storage class: S · Read/write capability (r/w) · Supported modes: O

Used to select how the input/output is processed in the DI Function Block.
- INVERT · Used to logically invert the value of FIELD_VAL_D before it is stored as OUT_D.

DI: MODE_BLK (5)
Storage class: N · Read/write capability (r/w) · Supported modes: O/M/A

Types of mode
– Target Mode → Code 48 t4 for DI1, Code 48 t7 for DI2
– Actual Mode (read only)→ Code 48 t5 for DI1, Code 48 t8 for DI2
– Permitted Mode
– Normal Mode (read only)
- O/S · The DI block is not implemented. The last value is issued at OUT_D.
- MAN · The user can directly enter the output value of the DI Function Block over OUT_D.
- AUTO · The binary input value FIELD_VAL_D is processed by the Function Block and issued as OUT_D.

DI: OUT_D (8)
Storage class: N · Read/write capability (r/w) · Supported modes: O/M

Discrete ouputt variable (value and status) → Code 48 I4/5 for DI1, Code 48 L4/5 for DI2

DI: PV_D (7)
Storage class: D · Read capability (r)

Indicates the discrete state used for the function block with status.
Note: The PV_D parameter is identical to the OUT_D in AUTO mode.

DI: PV_FTIME (16)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

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.
- [0]

DI: SIMULATE_D (9)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

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 positioner (Code 48 F3) as well as in the Function Block.

DI: STATUS_OPTS (14)
Storage class: S · Read/write capability (r/w) · Supported modes: O

Status options to determine the handling and processing of the status.
- [UNINITIALIZED] · Not initialized
- PROPAGATE FAIL FWD · Fault state is passed on to the downstream function block.

DI: STRATEGY (3)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Permits strategic grouping and thus faster processing of blocks.
- [0]

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.

DI: ST_REV (1)
Storage class: N · Read capability (r)

Indicates the revision number of static data (DI).
Note: The revision state is incremented by one each time a static parameter in the block is written.

DI: TAG_DESC (2)
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Assigns a unique description to each block for clear identification.
- Max. 32 characters, [no text]

DI: UPDATE_EVT (18)
Storage class: D · Read capability (r)

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

Parameter index: DI1 Function Block and DI2 Function Block

Index	Parameter
0	–
1	ST_REV
2	TAG_DESC
3	STRATEGY
4	ALERT_KEY
5	MODE_BLK
6	BLOCK_ERR
7	PV_D
8	OUT_D
9	SIMULATE_D
10	–
11	–
12	GRANT_DENY

Index	Parameter
13	IO_OPTS
14	STATUS_OPTS
15	CHANNEL
16	PV_FTIME
17	FIELD_VAL_D
18	UPDATE_EVT
19	BLOCK_ALM
20	ALARM_SUM
21	ACK_OPTIONS
22	DISC_PRI
23	DISC_LIM
24	DISC_ALM

7.5.7 Input Selector Function Block

IS: **ALERT_KEY (4)**
Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Used to specify the identification number of the plant section.
- 1 to 255, [0]

This information can be used by the fieldbus host system to group alerts and events.
Note: '0' is not a permissible value and will be rejected when transferring data to the device (error alarm).

IS: **BLOCK_ALM (24)**
Storage class: D · Read capability (r)

Indicates the current block state with details on all configuration, hardware or system problems in the block including date and time stamp.

IS: **BLOCK_ERR (6)**
Storage class: D · Read capability (r)

Active block error
- OUT OF SERVICE
- CONFIGURATION_ERROR

IS: **DISABLE_1 (15) to DISABLE_4 (18)**
Read/write capability (r/w) · Supported modes: ALL

Enable/lock the input value IN_1 (IN_2, IN_3, IN_4) including status
- Enabled
- Locked

IS: **GRANT_DENY (9) · This parameter is not supported**

IS: **IN_1 (11) to IN_4 (14)**
Storage class: N · Read/write capability (r/w) · Supported modes: ALL

Analog input value IN_1 (IN_2, IN_3, IN_4) of the IS Function Block including status

IS: **MIN_GOOD (20)**
Read/write capability (r/w)

Minimum number of inputs with GOOD status. If the number of inputs with GOOD status is lower than the specified number, the status of OUT is set to BAD.
- 0 … 4, [0]

IS:	**MODE_BLK (5)** Storage class: N · Read/write capability (r/w) · Supported modes: O/M/A
	Betriebsart IS Function Block – Target Mode – Actual Mode (read only) – Permitted Mode – Normal Mode (read only) • AUTO · The analog input values selected from IN_1 to IN_4 are processed by the function block and issued as OUT. • MAN · The output values of the IS Function Block can be directly entered by the operator over the OUT parameter. • O/S · The IS Function Block is not executed. The last value is issued at the output OUT.
IS:	**OP_SELECT (22)** Read/write capability (r/w)
	Input used including status • 0 … 4, [0]
IS:	**OUT (7)** Storage class: N · Read/write capability (r/w) · Supported modes: O/M/A
	Analog output value OUT of the IS Function Block including status **Note:** If the MAN mode is selected in the MODE_BLK parameter, the output value OUT can be entered manually in this case.
IS:	**OUT_RANGE (8)** Storage class: S · Read/write capability (r/w) · Supported modes: O/M
	Scaling and unit of the analog output value OUT
IS:	**SELECT_TYPE (19)** Storage class: S · Read/write capability (r/w) · Supported modes: O/M
	Selection criterion of the input value IN_x to be selected • First value with GOOD status • Minimum value • Maximum value • Middle value • Average value
IS:	**SELECTED (21)** Read capability (r)
	Selected input including status

IS:	**ST_REV (1)** Storage class: N · Read capability (r)
	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.
IS:	**STATUS_OPTS (10)** Storage class: S · Read/write capability (r/w) · Supported modes: O
	Options for the status treatment • Use UNCERTAIN status as GOOD: If the status of the input value IN_x is UNCERTAIN, the status of OUT is set to GOOD. • UNCERTAIN when in MAN mode: If the mode is MAN (ACTUAL_MODE), the status of OUT is set to UNCERTAIN.
IS:	**STRATEGY (3)** Storage class: S · Read/write capability (r/w) · Supported modes: ALL
	Permits strategic grouping and thus faster processing of blocks. • [0] 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 IS Function Block.
IS:	**TAG_DESC (2)** Storage class: S · Read/write capability (r/w) · Supported modes: ALL
	Assigns a unique description to each block for clear identification. • Max. 32 characters, [no text]
IS:	**UPDATE_EVT (23)** Storage class: D · Read capability (r)
	Indicates that static data were changed, including date and time stamp.

Parameter index: IS Function Block

Index	Parameter
0	–
1	ST_REV
2	TAG_DESC
3	STRATEGY
4	ALERT_KEY
5	MODE_BLK
6	BLOCK_ERR
7	OUT
8	OUT_RANGE
9	GRANT_DENY
10	STATUS_OPTS
11	IN_1
12	IN_2

Index	Parameter
13	IN_3
14	IN_4
15	DISABLE_1
16	DISABLE_2
17	DISABLE_3
18	DISABLE_4
19	SELECT_TYPE
20	MIN_GOOD
21	SELECTED
22	OP_SELECT
23	UPDATE_EVT
24	BLOCK_ALM

7.5.8 Multiple Analog Input Function Block

MAI: ALERT_KEY (4)
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Used to specify the identification number of the plant section.
- 1 to 255, [0]

This information can be used by the fieldbus host system to group alerts and events.
Note: '0' is not a permissible value and will be rejected when transferring data to the device (error alarm).

MAI: BLOCK_ALM (17)
Storage class: D · Read capability (r)

Indicates the current block state with details on all configuration, hardware or system problems in the block including date and time stamp.

MAI: BLOCK_ERR (6)
Storage class: D · Read capability (r)

Active block error
- OUT OF SERVICE
- CONFIGURATION_ERROR

MAI: CHANNEL (7)
Storage class: S · Read/write capability (r/w) · Supported modes: O

Assignment between the output of the MAI Function Block and the logical hardware channels (Transducer Block)
- [4]

Note: In order to be able to put the MAI Function Block into operation, CHANNEL must be set to '4' so that it can be assigned to the MAI TRD.

MAI: MODE_BLK (5)
Storage class: N · Read/write capability (r/w) · Supported modes: O/M/A

Type of mode MAI Function Block
– Target Mode
– Actual Mode (read only)
– Permitted Mode
– Normal Mode (read only)
- AUTO · The analog input values selected from SELECT_MAI_ OUT_1 to SELECT_MAI_OUT_8 are processed by the function block and issued as OUT_1 to OUT_8.

- MAN · The output values of the MAI Function Block can be directly entered by the operator over the OUT_1 to OUT_8 parameters.
- O/S · The MAI Function Block is not executed. The last value is issued at the output OUT_1 to OUT_8.

MAI:	**OUT_1 (8) to OUT_8 (15)** Storage class: N · Read/write capability (r/w) · Supported modes: O/M
	Analog input value OUT_1 (OUT_2, OUT_3, OUT_4, OUT_5, OUT_6, OUT_7, OUT_8) of the MAI Function Block with status **Note:** If the MAN mode is selected in the MODE_BLK parameter, the output value OUT can be entered manually in this case.
MAI:	**ST_REV (1)** Storage class: N · Read capability (r)
	Revision state of static data **Note:** The revision state is incremented by one each time a static parameter in the block is written.
MAI:	**STRATEGY (3)** Storage class: S · Read/write capability (r/w) · Supported modes: ALL
	Grouping to allow faster processing of blocks • [0] 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 MAI Function Block.
MAI:	**TAG_DESC (2)** Storage class: S · Read/write capability (r/w) · Supported modes: ALL
	Assigns a unique description to each block for clear identification. • Max. 32 characters, [no text]
MAI:	**UPDATE_EVT (16)** Storage class: D · Read capability (r)
	Indicates that static data were changed, including date and time stamp.

Parameter index: MAI Function Block

Index	Parameter
0	–
1	ST_REV
2	TAG_DESC
3	STRATEGY
4	ALERT_KEY
5	MODE_BLK
6	BLOCK_ERR
7	CHANNEL
8	OUT_1
9	OUT_2

Index	Parameter
10	OUT_3
11	OUT_4
12	OUT_5
13	OUT_6
14	OUT_7
15	OUT_8
16	UPDATE_EVT
17	BLOCK_ALM

7.5.9 Multiple Analog Output Function Block

MAO: ALERT_KEY (4)
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Used to specify the identification number of the plant section.
- 1 to 255, [0]

This information can be used by the fieldbus host system to group alerts and events.
Note: '0' is not a permissible value and will be rejected when transferring data to the device (alarm).

MAO: BLOCK_ALM (28)
Storage class: D · Read capability (r)

Indicates the current block state with details on all configuration, hardware or system problems in the block including details on the date and time of the alarm when the fault occurred.

MAO: BLOCK_ERR (6)
Storage class: D · Read capability (r)

Active block error
- OUT OF SERVICE
- CONFIGURATION_ERROR

MAO: CHANNEL (7)
Storage class: S · Read/write capability (r/w) · Supported mode: O

Assignment between the output of the MAO Function Block and the logical hardware channels (Transducer Block)
- [5]

Note: In order to be able to put the MAO Function Block into operation, CHANNEL must be set to '5' so that it can be assigned to the MAO TRD.

MAO: FSTATE_STATUS (26)
Storage class: D · Read capability (r)

Indicates which input of the MAO Function Block is in the fault state (action on fault detection activated).

MAO: FSTATE_TIME (17)
Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Fault state time [s]
The length of time that the MAO Function Block will wait to activate the fault state after the recognition of an error of the valid set point.

• [0]

Note: The fault state is activated when the fault still exists after the time interval has elapsed. The fault state of the MAO Function Block is set in the MO_OPTS parameter of this block.

MAO: FSTATE_VAL1 (18) to FSTATE_VAL8 (25)

Storage class: S · Read/write capability (r/w) · Supported modes: ALL

Fault state value 1 to 8 for the inputs IN_1 to IN_8

Determines the value for the MAO Function Block when the fault state is activated.

• Value and range of PV_SCALE ±10 %, [0]

Note: This value is used when the option FAULT STATE TO VALUE is set in the MO_OPTS parameter.

MAO: IN_1 (8) to IN_8 (15)

Storage class: N · Read/write capability (r/w) · Supported modes: O/M

Analog input value IN of the MAO Function Block with status

MAO: MO_OPTS (16)

Storage class: S · Read/write capability (r/w) · Supported modes: O/M/A

Action of the inputs IN_1 to IN_8

• Use set point 1 … 8 on fault detection

• Use set point 1 … 8 after a restart

MAO: MODE_BLK (5)

Storage class: N · Read/write capability (r/w) · Supported modes: O/M/A

Function Block of MAI Function Block
– Target Mode
– Actual Mode (read only)
– Permitted Mode
– Normal Mode (read only)

• AUTO · The analog input values selected from SELECT_MAI_ OUT_1 to SELECT_MAI_OUT_8 are processed by the function block and issued as OUT_1 to OUT_8.

• MAN · The output values of the MAO Function Block can be directly entered by the operator over OUT_1 to OUT_8 parameters.

• O/S · The MAI algorithm of the block is not executed. The last value is issued at the output OUT_1 to OUT_8.

MAO:	**ST_REV (1)** Storage class: N · Read capability (r)
	Revision state of static data **Note:** The revision state is incremented by one each time a static parameter in the block is written.
MAO:	**STRATEGY (3)** Storage class: S · Read/write capability (r/w) · Supported modes: ALL
	Grouping to allow faster processing of blocks • [0] 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 MAO Function Block.
MAO:	**TAG_DESC (2)** Storage class: S · Read/write capability (r/w) · Supported modes: ALL
	Assigns a unique description to each block for clear identification. • Max. 32 characters, [no text]
MAO:	**UPDATE_EVT (27)** Storage class: D · Read capability (r)
	Indicates that static data were changed, including date and time stamp.

Parameter index: MAO Function Block

Index	Parameter
0	–
1	ST_REV
2	TAG_DESC
3	STRATEGY
4	ALERT_KEY
5	MODE_BLK
6	BLOCK_ERR
7	CHANNEL
8	IN_1
9	IN_2
10	IN_3
11	IN_4
12	IN_5
13	IN_6
14	IN_7

Index	Parameter
15	IN_8
16	MO_OPTS
17	FSTATE_TIME
18	FSTATE_VAL1
19	FSTATE_VAL2
20	FSTATE_VAL3
21	FSTATE_VAL4
22	FSTATE_VAL5
23	FSTATE_VAL6
24	FSTATE_VAL7
25	FSTATE_VAL8
26	FSTATE_STATUS
27	UPDATE_EVT
28	BLOCK_ALM

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