



TWC 9000 Supplementary instructions

Signal converter for mass flowmeters

Description of Foundation Fieldbus interface

Electronic Revision: ER 3.3.xx (SW.REV. 3.3x)



The documentation is only complete when used in combination with the relevant documentation for the sensor.

Honeywell

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1.1 Scope of the document

These instructions are supplementary to the standard product documentation of the signal converter. The details depicted therein, in particular the safety information are valid and should be adhered to. The present supplementary instructions provide additional information for the devices when being operated and connected to a Foundation Fieldbus.



INFORMATION!

The present supplementary instruction for the signal converter with Foundation Fieldbus interface, plus the software with the DD and CCF files are included in our scope of supply, in addition to those items delivered for the standard device.

1.2 Device description

The mass flowmeters are designed exclusively to directly measure mass flow rates, product density and temperature as well to indirectly measure parameters such as the total volume and concentration of dissolved substances as well as the volume flow rate.

Your measuring device is supplied ready for operation. The factory settings for the operating data have been made in accordance with your order specifications.

The following versions are available:

- Compact version (the signal converter is mounted directly on the measuring sensor)
- Remote version (electrical connection to the measuring sensor via field current and signal cable)

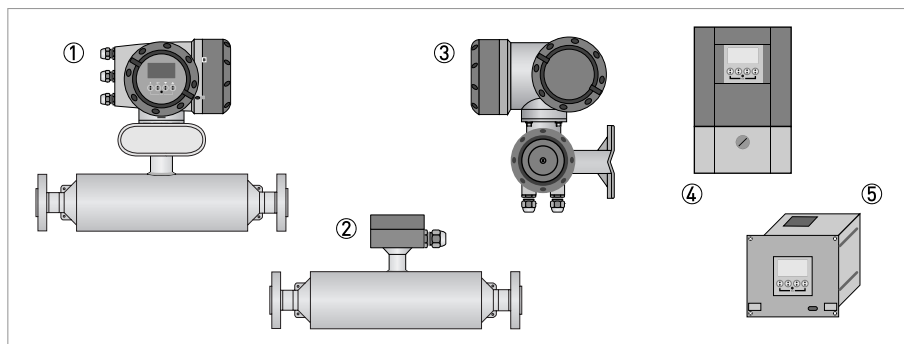


Figure 1-1: Device versions

- ① Compact version
- ② Measuring sensor with connection box
- ③ Field housing
- ④ Wall-mounted housing
- ⑤ 19" rack-mounted housing

2.1 Foundation Fieldbus data

Description

Type	Coriolis mass flowmeter
Physical layer	Foundation Fieldbus protocol that agrees with IEC 61158-2 and FISCO model; galvanically isolated
Communication standard	H1
ITK version	5.2

Data blocks

Function blocks	1 x Enhanced Resource Block (RB)
	1 x Customer Transducer Block (TB)
	6 x Analog Input Block (AI)
	3 x Integrator Block (IT)
	1 x Proportional Integral Derivate Block (PID)
Execution time	Analog Input Block: 10 ms
	Integrator Block: 15 ms
	Proportional Integral Derivate Block: 25 ms

Electrical connections

Device power supply	Not intrinsically safe: 9...32 VDC
	Intrinsically safe: 9...24 VDC
Basic current	10.5 mA
Maximum error current	16.5 mA (= basic current + error current = 10.5 mA + 6 mA)
Start current after 10 ms	14 mA
Polarity sensitivity	No
Minimum cycle time	250 ms

3.1 Installation in hazardous area and bus cable

We recommend that a Foundation Fieldbus network in the hazardous area should be projected in accordance with PTB's FISCO model. The FISCO model is based on the following conditions:

- All electrical components which should be connected to the bus must be approved according to the FISCO model (even the termination).
- The maximum cable length should not exceed 1000 m / 3280.8 ft.
- The approved input values of the field devices (U_0 , I_0 , P_0) comply to the output values of the power supply (e.g. segment coupler) according to: $U_0 \leq U_i$; $I_0 \leq I_i$; $P_0 \leq P_i$.
- The values of the cable must be within the following ranges:
 $R' = 15 \dots 150 \Omega/\text{km}$; $L' = 0.4 \dots 1 \text{ mH}/\text{km}$; $C' = 45 \dots 200 \text{ nF}/\text{km}$
 equivalent to
 $R' = 24 \dots 240 \Omega/\text{mile}$; $L' = 0.65 \dots 1.6 \text{ mH}/\text{mile}$; $C' = 72 \dots 320 \text{ nF}/\text{mile}$

Other limitations for the cable than the FISCO limitations are not existent. Nevertheless, a twisted pair and shielded cable is strongly recommended.

Example: a good quality cable could have the following data: $44 \Omega/\text{km} = 70.4 \Omega/\text{mile}$; $<90 \text{ nF}/\text{km}$
 $= <144 \text{ nF}/\text{mile}$; attenuation at 39 kHz: $<3 \text{ dB}/\text{km} = <4.9 \text{ dB}/\text{mile}$; impedance 100Ω at 31.25 kHz.

3.2 Foundation Fieldbus electrical connection

The output and input groups are electrically isolated from each other and from all other input and output circuits.



DANGER!

The signal converter must be properly grounded to avoid personnel shock hazard. All directions, operating data and connection diagrams do not apply to devices used in hazardous areas; in such cases, read the special Ex instructions without fail!

3.3 Cable types

The cable types are specified according to IEC 61158-2. Shielded cables offer the advantage of malfunction-free operation with adequate protection against electromagnetic influences, and make it possible to employ the full performance of the Foundation Fieldbus system.

Core cross-section	0.8 mm ² or AWG 18	0.32 mm ² or AWG 22	0.13 mm ² or AWG 26	1.25 mm ² or AWG 16
Cable type	A twisted pair, individually shielded	B individual or multiple twisted pairs with overall shield	C multiple twisted pairs, without shielding	D multiple non-twisted cables, without shielding
Max. length incl. branch line	1900 m / 6200 ft	1200 m / 3900 ft	400 m / 1300 ft	200 m / 650 ft

In non-hazardous areas the maximum number of field devices is limited to 32. For detailed information refer to the following table.

In non-hazardous areas the ignition protection class of the devices and the limited electric power available limit the number of field devices to 4.

Number of devices	Cable lengths for number of devices per branch line			
	1 device	2 devices	3 devices	4 devices
25...32	1 m / 3.3 ft	1 m / 3.3 ft	1 m / 3.3 ft	1 m / 3.3 ft
19...24	30 m / 100 ft	1 m / 3.3 ft	1 m / 3.3 ft	1 m / 3.3 ft
15...18	60 m / 200 ft	30 m / 100 ft	1 m / 3.3 ft	1 m / 3.3 ft
13...14	90 m / 300 ft	60 m / 200 ft	30 m / 100 ft	1 m / 3.3 ft
1..12	120 m / 400 ft	90 m / 300 ft	60 m / 200 ft	30 m / 100 ft

All bus segments must be fitted with a terminator at both ends.

3.4 Shielding and grounding

- For optimum electromagnetic compatibility of systems it is extremely important that the system components, and particularly the bus cables connecting the components, are shielded and that such shields - if possible - form an unbroken cover.
- Hence, it follows that, for use in non-hazardous duty systems, the cable shield should be grounded as often as possible.
- In Ex systems an adequate equipotential bonding in the hazardous and non-hazardous location along the entire Fieldbus installation is strongly recommended. Multiple grounding of the shield is of advantage.



INFORMATION!

The use of twisted and shielded cables is strongly recommended, otherwise EMC protection of the signal converter cannot be assured.

3.5 Assembly of the terminals with Foundation Fieldbus

This signal converter is available with various in-/output combinations.

- The grey boxes in the tables denote unassigned or unused connection terminals.
- In the table, only the final digits of the CG No. are depicted.
- Connection terminal A+ is only operable in the basic input/output version.
- Term. = (connection) terminal

Fixed, non-alterable input/output versions

CG-No.	Connection terminals								
	A+	A	A-	B	B-	C	C-	D	D-
E 0 0						V/D+	V/D-	V/D+	V/D-
						FISCO Device		FISCO Device	
E 1 0		I _a active		P _N / S _N NAMUR C _p passive ①		V/D+	V/D-	V/D+	V/D-
						FISCO Device		FISCO Device	
E 2 0		I _p passive		P _N / S _N NAMUR C _p passive ①		V/D+	V/D-	V/D+	V/D-
						FISCO Device		FISCO Device	

① changeable

Alterable input/output versions

CG-No.	Connection terminals								
	A+	A	A-	B	B-	C	C-	D	D-
E		max. 2 optional modules for term. A + B				V/D+ (2)	V/D- (2)	V/D+ (1)	V/D- (1)

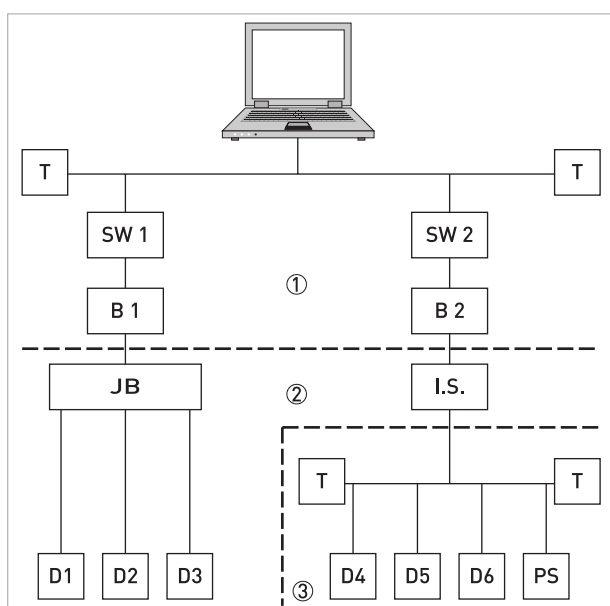
Description of abbreviations and CG identifier for possible optional modules on terminals A and B

Abbreviation	Identifier for CG No.	Description
I _a	A	Active current output
I _p	B	Passive current output
P _a / S _a	C	Active pulse, frequency, status output or limit switch (changeable)
P _p / S _p	E	Passive pulse, frequency, status output or limit switch (changeable)
P _N / S _N	F	Passive pulse, frequency, status output or limit switch according to NAMUR (changeable)
C _a	G	Active control input
C _p	K	Passive control input
C _N	H	Active control input to NAMUR Signal converter monitors cable breaks and short circuits acc. to EN 60947-5-6. Errors indicated on LC display. Error messages possible via status output.
IIn _a	P	Active current input
IIn _p	R	Passive current input
-	8	No additional module installed
-	0	No further module possible

3.6 Topology of FF networks

An example of mixed topology of FF networks is shown in the following example.

Connection is best made via short branch cables and T connectors. This connection type makes it possible to connect and disconnect the devices without interrupting the bus or the communication.



- ① HSE network
- ② H1 bus
- ③ Intrinsically safe, explosive area
- B1+B2 Bridge = coupling element for H1 bus and HSE network
- D1-D3 Device = field devices, own power supply, for non potentially explosive areas
- D4-D6 Intrinsically safe devices, external power supply, for potentially explosive areas
- I.S. Intrinsically safe barrier
- JB Junction box for field devices
- PS Power supply
- Switch = connection of multiple HSE sub networks
- T Terminator

4.1 Settable functions

- For Foundation Fieldbus the totalizers of the signal converter are not available!
- The following tables describe only the menus, functions and parameters that are different between the standard signal converter and the Foundation Fieldbus signal converter.
- For the electrical connections of the outputs, inputs and all settings of functions that are not listed in the following tables refer to the standard product documentation.

No.	Displayed text	Description and settings
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A Quick Setup

A2	Tag	Identifier for the measurement in a plant, appears in the display header (maximum 8 digits).
		Note: Only read, not changeable!

B Test

B3.5	Foundation fieldbus	Display information about Foundation fieldbus interface.
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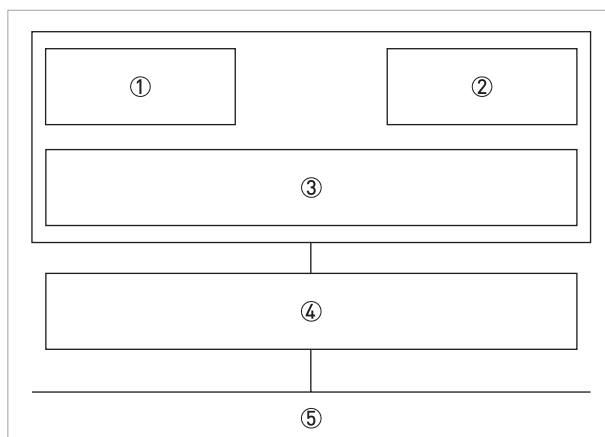
C Setup

C5.1.1	Tag	Identifier for the measurement in a plant, appears in the display header (maximum 8 digits).
		Note: Only read, not changeable!
C4	Totaliser	Not available for Foundation Fieldbus devices!
C5	I/O HART	Not available for Foundation Fieldbus devices!
C6.4	2nd Meas. Page	In case of Foundation Fieldbus device, the second measurement page is meant to check the output values of the different function blocks. Only Foundation Fieldbus values can be selected here. The analogue inputs are shown with exactly the value, seen on the bus system.
C6.4.1	1st Line Variable	Select: AI1 analog inp. / AI2 analog inp. / AI3 analog inp. / AI4 analog inp. / AI5 analog inp. / AI6 analog inp. / PID / INT1 integrator / INT2 integrator / INT3 integrator
C6.4.2	1st Line Format	Fixed number of digits after the decimal point or automatic, where the number of digits is automatically adjusted to the available space.
C6.4.3	2nd Line Variable	Select: AI1 analog inp. / AI2 analog inp. / AI3 analog inp. / AI4 analog inp. / AI5 analog inp. / AI6 analog inp. / PID / INT1 integrator / INT2 integrator / INT3 integrator
C6.4.4	2nd Line Format	Fixed number of digits after the decimal point or automatic, where the number of digits is automatically adjusted to the available space.
C6.4.5	3rd Line Variable	Select: AI1 analog inp. / AI2 analog inp. / AI3 analog inp. / AI4 analog inp. / AI5 analog inp. / AI6 analog inp. / PID / INT1 integrator / INT2 integrator / INT3 integrator
C6.4.6	3rd Line Format	Fixed number of digits after the decimal point or automatic, where the number of digits is automatically adjusted to the available space.
C6.8	Foundation Field	-
C6.8.1	Simulate	Select: disabled / enabled
C6.8.2	Information	Display information about hardware and software versions, the calibration and test date of this interface.

4.2 Description of the FF block system

The Foundation Fieldbus is a Local Area Network (LAN) for connecting field devices like sensors and actuators. One of the main benefits of Foundation Fieldbus is line saving in comparison to the traditional 4...20 mA technology.

The different device functions are implemented in a block-based scheme within a user application. In this block scheme, a distinction is made between the Resource Block, Transducer Block and Function Block.



- ① Resource Block (RB)
- ② Transducer Block (TB)
- ③ Function Block (FB)
- ④ Device FF communication
- ⑤ Foundation Fieldbus

4.3 Used abbreviations

AI	Analogue Input Block
IT	Integrator Block
PID	Proportional Integral Derivate Block
RB	Resource Block
TB	Transducer Block
R	Read
W	Write
R/W	Read and Write
BLK	Block mode
MAN	Manual mode
Mix	Mix mode (R, W and R/W)
Auto	Automatic mode
OOS	Out Of Service mode
OD	Object Directory
SP	Set Point
IV	Initial Value
PV	Process Value (factory settings)

4.4 Resource Block (RB)

The following tables list the Resource Block parameters in alphabetical order.

It describes characteristics of the Fieldbus device (e.g. device name, serial number, etc.) and is not included in the functional tasks of the signal converter for FF.

The following tables contain short parameter description, factory settings (Initial Value (IV)) and possible settings.

4.4.1 Foundation Fieldbus parameters for Resource Block

Parameter Subelement	Access	Description and settings	Initial Value
ALERT_KEY Alert Key	R/W	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc. Setting: 1...255	1
BLOCK_ERR Block Error	R	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown. Setting: <ul style="list-style-type: none"> • Other: Non-specific error active • Block Configuration: Error detected in block configuration • Simulation Active: Simulation enabled in this block • Local Override: Output tracking of faultstate active • Device Fault State: Device faultstate set • Device Maintenance: Device needs maintenance soon • Input Failure: Process variable has bad status • Output Failure: Failure detected in output hardware • Memory Failure: Memory error detected • Lost Static Data: Static parameters cannot be recovered • Lost NV Data: Non-volatile parameters cannot be recovered • Readback Check: Failure detected in READBACK • Maintenance Needed: Device NEEDS maintenance NOW • Power Up: Recovery from power failure • Out Of Service: Block actual mode is out of service 	00S
MODE_BLK Block Mode	Mix	The actual, target, permitted and normal modes of the block.	-
TARGET Target	R/W	By setting this parameter to an allowed value (one of the value from permitted modes) user can change the block execution mode. Changing of modes is required to change the access permissions available to various parameters. Setting: Auto / 00S	00S
ACTUAL Actual	R	This is the current mode of the block, which may differ from the target based on operating conditions. Its value is calculated as part of block execution. Setting: Auto / 00S	00S
PERMITTED Permitted	R/W	This parameter defines allowed modes for this function block and can be set by user. Setting: Auto / 00S	Auto or 00S

Parameter Subelement	Access	Description and settings	Initial Value
NORMAL Normal	R/W	This is the mode which the block should be set to during normal operating conditions.	Auto
		Setting: Auto / OOS	
ST_REV Static Revision	R	The revision level of the static data associated with the function block. The revision value will be incremented each time a static parameter value in the block is changed.	0
		Setting: 0...65535	
STRATEGY Strategy	R/W	The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block.	0 (=uninitialized)
		Setting: 0...65535	
TAG_DESC Tag Description	R/W	The user description of the intended application of the block.	spaces
		Setting: ≤32 digits	
ACK_OPTION Acknowledge Option	R/W	Selection of whether alarms associated with the function block will be automatically acknowledged.	Uninitialized
		Setting: Disc Alm Disabled / Block Alm Disabled	
ALARM_SUM Alarm Summary	R	The current alert status, unacknowledged states, unreported states and disabled states of the alarms associated with the function block.	Uninitialized
Current	R	The active status of each alarm. The zero (0) state will be used to indicate alarm clear.	0
Unacknowledged	R	Setting: Disc Alm Unack / Block Alm Unack	Uninitialized
Unreported	R	Setting: Disc Alm Unrep / Block Alm Unrep	Uninitialized
Disabled	R/W	Setting: Disc Alm Disabled / Block Alm Disabled	Uninitialized
BLOCK_ALM Block Alarm	Mix	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the "Active" status in the "Status" attribute. As soon as the "Unreported" status is cleared by the alert reporting task, another block alert may be reported without clearing the "Active" status, if the subcode has changed.	-
Unacknowledged	R/W	A discrete enumeration which is set to "Unacknowledged" when an alarm occurs, and set to "Acknowledged" by a write from a human interface device or other entity which can acknowledge that the alarm/event has been noticed.	Uninitialized
		Setting: Uninitialized / Acknowledged / Unacknowledged	
Alarm State	R	A discrete enumeration which gives an indication of whether the alert is active and whether it has been reported.	Uninitialized
		Setting: Uninitialized / Clear - reported / Clear - not reported / Active - reported / Active - not reported	

Parameter Subelement	Access	Description and settings	Initial Value
Time Stamp	R	The time when evaluation of the block was started and a change in alarm/event state was detected that is unreported. The time stamp value will be maintained constant until alert confirmation has been received - even if another change of state occurs.	Uninitialized
		Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	
Subcode	R	An enumeration specifying the cause of the alert to be reported.	Other
		Setting: Other / Block Configuration / Link Configuration / Simulation Active / Local Override / Device Fault State / Device Maintenance / Input Failure / Output Failure / Memory Failure / Lost Static Data / Lost NV Data / Readback Check / Maintenance Needed / Power Up / Out Of Service	
Value	R	The value of the associated parameter at the time the alert was detected.	0
		Setting: 0...255	
CLR_FSTATE Clear Fault State	R/W	Writing a "Clear" to this parameter will clear the device fault state if the field condition, if any, has cleared.	Off
		Setting: Uninitialized / Off / Clear	
CONFIRM_TIME Confirm Time	R/W	The minimum time between retries of alert reports.	640000
		Setting: 0...4294967295 in [1/32 ms]	
CYCLE_SEL Cycle Selection	R/W	Used to select the block execution method for this resource.	Uninitialized
		Setting: Scheduled / Block execution / Manufacturer specific	
CYCLE_TYPE Cycle Type	R	Identifies the block execution methods available for this resource.	Scheduled / Block execution
		Setting: Scheduled / Block execution	
DD_RESOURCE DD Resource	R	String identifying the tag of the resource which contains the Device Description for this resource.	32 blanks
DD_REV DD Revision	R	Revision of the DD associated with the resource - used by an interface device to locate the DD file for the resource.	Dependent on device version.
DEV_REV Device Revision	R	Manufacturer revision number associated with the resource - used by an interface device to locate the DD file for the resource.	Dependent on device version.
DEV_TYPE Device Type	R	Manufacturer's model number associated with the resource - used by interface devices to locate the DD file for the resource.	TWC9000
FAULT_STATE Fault State	R	Condition set by loss of communication to an output block, failure promoted to an output block or a physical contact. When fault state condition is set, then output function blocks will perform their "FSTATE" actions.	Clear
		Setting: Uninitialized / Off / Clear	
FEATURES Features	R	Used to shows supported resource block options.	Reports / Faultstate / Soft W Lock
		Setting: Reports / Faultstate / Soft W Lock / MVC Report Distribution supported / MVC Publishing/Subscribing supported / Multi-Bit Alarm (Bit-Alarm) supported	
FEATURES_SEL Features Selection	R/W		

Parameter Subelement	Access	Description and settings	Initial Value
FREE_SPACE Free Space	R	Percent of the memory available for further configuration. Zero in a preconfigured resource.	0.0
		Setting: 0.0...100.0	
FREE_TIME Free Time	R	Percent of the block processing time that is free to process additional blocks.	0.0
		Setting: 0.0...100.0	
GRANT_DENY Grant Deny	R/W	Options for controlling access of host computers and local control panels to operating, tuning and alarm parameters of the block.	-
GRANT Grant	R/W	Depending on the philosophy of the plant, the operator or a higher level device (HLD) or a local operator's panel (LOP) in the case of "Local", may turn on an item of the "Grant" attribute - "Program, Tune, Alarm or Local".	Uninitialized
		Setting: Program / Tune / Alarm / Local	
DENY Deny	R/W	The deny attribute is provided for use by a monitoring application in an interface device and may not be changed by an operator.	Uninitialized
		Setting: Program denied / Tune denied / Alarm denied / Local denied	
HARD_TYPES Hardware Types	R	The types of hardware available as channel numbers.	Scalar input
ITK_VER ITK Version (Interoperability Test Kit)	R	Major revision number of the interoperability test case used to register this device.	5
		Setting: 5	
LIM_NOTIFY Limit Notify	R/W	Maximum number of unconfirmed notify messages allowed.	20
		Setting: 0...255	
MANUFAC_ID Manufacturer ID	R	Manufacturer identification number - used by an interface device to locate the DD file for the resource.	HONEYWELL
		Setting: HONEYWELL	
MAX_NOTIFY Maximum Notify	R	Maximum number of unconfirmed notify messages possible.	20
		Setting: 0...255	
MEMORY_SIZE Memory Size	R	Available configuration memory in the empty resource.	0
		Setting: 0	
MIN_CYCLE_T Minimum Cycle Time	R	Time duration of the shortest cycle interval of which the resource is capable.	6400
		Setting: 6400 in [1/32 ms]	
NV_CYCLE_T Nonvolatile Cycle Time	R	Interval between writing copies of NV parameters to non-volatile memory. Zero means never.	256000
		Setting: 256000 in [1/32 ms]	

Parameter Subelement	Access	Description and settings	Initial Value
RESTART Restart	R/W	Allows a manual restart to be initiated. Several degrees of restart are possible. They are 1: Run, 2: Restart resource, 3: Restart with defaults and 4: Restart processor.	Run
		Setting: Run / Resource / Defaults / Processor	
RS_STATE Resource State	R	State of the function block application state machine.	Standby
		Setting: Uninitialized / Start_Restart / Initialization / Online Linking / Online / Standby / Failure	
SET_FSTATE Set Fault State	R/W	Allows the fault state condition to be manually initiated by selecting "Set".	Off
		Setting: Uninitialized / Off / Set	
SHED_RCAS Shed Remote Out	R/W	Time duration at which to give up on computer writes to function block RCAS locations. Shed from RCAS shall never happen when SHED_RCAS = 0.	640000
		Setting: 0...4294967295 in [1/32 ms]	
SHED_ROUT Shed Remote Out	R/W	Time duration at which to give up on computer writes to function block RCAS locations.	640000
		Setting: 0...4294967295 in [1/32 ms]	
TEST_RW Test Read Write	R/W	Read/write test parameter - used only for conformance testing. Note: Subelements "Value 1..15" have no function!	-
UPDATE_EVT Update Event	Mix	This alert is generated by any change to the static data.	-
Unacknowledged	R/W	A discrete enumeration which is set to "Unacknowledged" when an alarm occurs, and set to "Acknowledged" by a write from a human interface device or other entity which can acknowledge that the alarm/event has been noticed.	Uninitialized
		Setting: Uninitialized / Acknowledged / Unacknowledged	
Update State	R	A discrete enumeration which gives an indication of whether the alert has been reported.	Uninitialized
		Setting: Uninitialized / Reported / Not reported	
Time Stamp	R	The time when evaluation of the block was started and a change in alarm/event state was detected that is unreported. The time stamp value will be maintained constant until alert confirmation has been received - even if another change of state occurs.	Uninitialized
		Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	
Static Revision	R	The static revision of the block whose static parameter was changed and is being reported. It is possible for the present value of static revision to be greater than this because static can be changed at any time.	0
		Setting: 0...65535	

Parameter Subelement	Access	Description and settings	Initial Value
Relative Index	R	The OD index of the static parameter whose change caused this alert, minus the FB starting index. If the update event was caused by a write to multiple parameters at the same time, then this attribute will be zero. Setting: 0...65535	0
WRITE_ALM Write Alarm	Mix	This alert is generated if the write lock parameter is cleared.	-
Unacknowledged	R/W	A discrete enumeration which is set to "Unacknowledged" when an alarm occurs, and set to "Acknowledged" by a write from a human interface device or other entity which can acknowledge that the alarm/event has been noticed. Setting: Uninitialized / Acknowledged / Unacknowledged	Uninitialized
Alarm State	R	A discrete enumeration which gives an indication of whether the alert is active and whether it has been reported. Setting: Uninitialized / Clear - reported / Clear - not reported / Active - reported / Active - not reported	Uninitialized
Time Stamp	R	The time when evaluation of the block was started and a change in alarm/event state was detected that is unreported. The time stamp value will be maintained constant until alert confirmation has been received - even if another change of state occurs. Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	Uninitialized
Subcode	R	An enumeration specifying the cause of the alert to be reported. Setting: Other / Block Configuration / Link Configuration / Simulation Active / Local Override / Device Fault State / Device Maintenance / Input Failure / Output Failure / Memory Failure / Lost Static Data / Lost NV Data / Readback Check / Maintenance Needed / Power Up / Out Of Service	Other
Discrete Value	R	The value of the associated parameter at the time the alert was detected. Setting: Discrete State 0...16	State 0
WRITE_LOCK Write Lock	R/W	If set, no writes from anywhere are allowed, except to clear WRITE_LOCK. Block inputs will continue to be updated. Setting: Uninitialized / Not locked / Locked	Not locked
WRITE_PRI Write Priority	R	Priority of the alarm generated by clearing the write lock. Setting: 0...15	0

4.4.2 Manufacturer specific parameters of the signal converter for Resource Block

Parameter Subelement	Access	Description and settings	Initial Value
DEV_DESCRIPTION Device Description	R	Describes some characteristics of the device.	-
DB_DEVICE Data Base GDC	R	Data base version of the GDC device.	Current data base version
C_NUMBER_DEVICE C-Number Device	R	Current C-Number of this device.	Current C-Number Device
C_NUMBER_PRODUCT C-Number Production	R	C-Number of production; this number identifies the type of electronics, can be found on the converter assembly sticker as well.	Current C-Number Production
CONVERTER_MODEL Converter Model	R	The model of signal converter.	TWC9000
LOGICAL_PLACE Logical Place	R	Setting: Error / Standard / Extended standard / Special	Standard
SUPPLY_OPTION Supply Option	R	Supply of sensor and electronics option. Setting: configuration error / unknown / 100...230 VAC + no option / 100...230 VAC + capacit.Elect. / 100...230 VAC + Virtual Ref / 100...230 VAC + non Ex Adapter / 12...24 VDC + no option / 12...24 VDC capacit.Elect. / 12...24 VDC + Virtual Ref / 12...24 VDC + non Ex Adapter / 24 VAC/DC + no option / 24 VAC/DC + capacit.Elect. / 24 VAC/DC + Virtual Ref / 24 VAC/DC + non Ex Adapter	Current Supply Option
DISPLAY_OPTION Display Option	R	Setting: Configuration error or missing / Standard / Eastern Europe / Northern Europe / Southern Europe / Far East / Japanese / Chinese / Russian	as ordered
IO_SELECTION IO1 Modules IO	R	Setting: configuration error or missing / no IO selection / Basic IO / Exi IO: CO act + PO pas / Exi IO: CO pas + PO pas / Mod. IO: CO act, PO act/high current / Reserved / Mod. IO: CO act, PO pas/high current / Mod. IO: CO act, PO pas/Namur / Mod. IO: CO pas, PO act/high current / Mod. IO: CO pas, PO pas/high current / Mod. IO: CO pas, PO pas/Namur / PROFIBUS PA / Foundation Fieldbus / PROFIBUS DP / RS485 Modbus / RS485 Modbus with active termination / CAN Bus BATCHCONTROL / CAN Bus BATCHCONTROL + outputs /	Foundation Fieldbus
IO_MODULE_A IO2 Module Term. A	R	Setting: configuration error or missing / without carrier / Exi OPt.: CO act +PO/CI pas / Exi OPt.: CO pas + PO/CI pas / Exi OPt.2: Currin act + PO/CI pas / Exi OPt.3: 2xCurrin act / Incl. carrier, without IO module / Current Out act / Current Out pas / Pulse Out act/high current / Pulse Out pas/high current / Pulse Out pas/Namur / Control In act/high current / Control In pas/high current / Control In act/Namur / Tidalflex / Temperature Input / Current Input act / Current Input pas	as ordered
IO_MODULE_B IO Module B		No module possible.	-

Parameter Subelement	Access	Description and settings	Initial Value
DIAGNOSIS Diagnosis	R	Detailed diagnosis of the device.	-
MEMORY_SUMMARY Memory Summary	R	Summary of self diagnosis. Setting: ok / bit 8... 15 not used / EEPROM / FRAM / FLASH / ROM application / ROM boot area / RAM ext / RAM int / Task Control	ok
EEPROM_DIAG EEPROM Diagnosis	R	Result of EEPROM self diagnosis. Setting: ok / not supported action / unknown / busy / wait / first init / changed / parameter error / page error / chip error / write error / warning: inconsistent / warning: uncertain / warning: write cycles / warning: one header / ok, page high	ok
FRAM_DIAG FRAM Diagnosis	R	Result of FRAM self diagnosis. Setting: ok / not supported action / unknown / busy / wait / first init / changed / parameter error / page error / chip error / write error / warning: inconsistent / warning: uncertain / warning: write cycles / warning: one header / ok, page high	ok
workLOAD	R	Work load of the processor.	Current work load
DIAGNOSIS_BLK Diagnosis Block	R	Detailed diagnosis of the blocks.	-
RB_DIAG RB Diagnosis	R	Setting: Startup Device / MODE_BLK.ACTUAL is OOS / Memory failure / Operating System / new : ID , DEV_TYPE , SNR / no GDC Communication / Startup GDC , data invalid / Startup Sensor , data valid / C-Number doesn't match to FF Software / Hardware changed , C raw != C detected / Data Base doesn't match to FF Software / MODE_BLK.PERMITTED doesn't include Auto / MODE_BLK.TARGET is set OOS / GDC bold F message / GDC F message / write from GDC to RB/TB doesn't work / GDC Mfr unknown / GDC serial number / Boardinfo incomplete or corrupt / action : write from GDC to RB/TB / GDC W : no , M : no / GDC W : no , M : some / GDC W : some , M : no / GDC W : no , M : all / GDC W : all , M : no / GDC W : some , M : some / GDC W : some , M : all / GDC W : all , M : some / GDC Communication few loss / RS_STATE is not On-Line / simulation active / unknown reason / Ok	Current diagnosis
TB_DIAG TB Diagnosis	R	Setting: Startup Device / RB : MODE_BLK.ACTUAL is OOS / Memory failure / no GDC Communication / Startup GDC , data invalid / Startup Sensor , data valid / Data Base doesn't match to FF Software / MODE_BLK.PERMITTED doesn't include Auto / MODE_BLK.TARGET is set OOS / GDC bold F message / GDC F message / write from GDC to RB/TB doesn't work / Sensor serial number / Sensor calibration date / GDC unit not convertible to TB.prim_val / prim_val is outside range / action : write from GDC to RB/TB / GDC Communication few loss / no unit of GDC / GDC unit can't be converted to TB.prim_range / a GDC value was not received / a GDC short status is fatal or warn2 / PRIMARY_VALUE_1.status is Uncertain / unknown reason / Ok	Current diagnosis

Parameter Subelement	Access	Description and settings	Initial Value
AI1_DIAG AI1 Diagnosis	R	Setting: Startup Device / RB : MODE_BLK.ACTUAL is OOS / Memory failure / no schedule / period of execution / period of execution to large / MODE_BLK.PERMITTED doesn't include Auto / MODE_BLK.TARGET is set OOS / MODE_BLK.TARGET is set MAN / MODE_BLK.ACTUAL is MAN , Startup to Auto / CHANNEL is uninitialized / UNIT of CHANNEL selected TB.prim_val not convertible to XD UNIT / XD_SCALE : difference between EU_100 and EU_0 is to less / OUT_SCALE : difference between EU_100 and EU_0 is to less / L_TYPE is uninitialized / L_TYPE is direct , XD_SCALE is not equal OUT_SCALE / SIMULATE_STATUS is not Good , Simulation is active / SIMULATE_STATUS limited , STATUS_OPTS is set , Simulation active / Simulation is active / Transducer Block MODE_BLK.ACTUAL is OOS / CHANNEL selected TB.prim_val.status is Bad / TB.prim_val.status is limited , STATUS_OPTS is set / CHANNEL selected TB.prim_val.status is Uncertain / OUT.value exceeds OUT_SCALE / unknown reason / Ok	Current diagnosis
AI2_DIAG AI2 Diagnosis	R	For settings see AI1_DIAG	Current diagnosis
AI3_DIAG AI3 Diagnosis	R	For settings see AI1_DIAG	Current diagnosis
AI4_DIAG AI4 Diagnosis	R	For settings see AI1_DIAG	Current diagnosis
AI5_DIAG AI5 Diagnosis	R	For settings see AI1_DIAG	Current diagnosis
AI6_DIAG AI6 Diagnosis	R	For settings see AI1_DIAG	Current diagnosis
PID_DIAG PID Diagnosis	R	Setting: Startup Device / RB : MODE_BLK.ACTUAL is OOS / Memory failure / no schedule / period of execution / period of execution to large / MODE_BLK.PERMITTED doesn't include Auto / MODE_BLK.TARGET is set OOS / MODE_BLK.TARGET is set MAN / MODE_BLK.ACTUAL is MAN , Startup to Auto / BYPASS is uninitialized / SHED_OPT is uninitialized / PV_SCALE : EU_100 <= EU_0 / OUT_SCALE : EU_100 <= EU_0 / TRK_SCALE : EU_100 <= EU_0 / FF_SCALE : EU_100 <= EU_0 / unknown reason / Ok	Current diagnosis
IT1_DIAG IT1 Diagnosis	R	Setting: Startup Device / RB : MODE_BLK.ACTUAL is OOS / Memory failure / no schedule / period of execution / period of execution to large / MODE_BLK.PERMITTED doesn't include Auto / MODE_BLK.TARGET is set OOS / MODE_BLK.TARGET is set MAN / MODE_BLK.ACTUAL is MAN , Startup to Auto / INTEG_TYPE is uninitialized / IN_1 and IN_2 are not connected / TIME_UNIT1 and TIME_UNIT2 are uninitialized / CLOCK_PER <= period of execution / TIME_UNIT1 is uninitialized / TIME_UNIT2 is uninitialized / IN_1.status is Bad / IN_2.status is Bad / IN_1.value is NaN or INF / IN_2.value is NaN or INF / PCT_INCL < UNCERT_LIM / PCT_INCL < GOOD_LIM / PULSE_VAL1 and PULSE_VAL2 are 0 / TOTAL_SP is 0 : cyclic reset / unknown reason / Ok	Current diagnosis
IT2_DIAG IT2 Diagnosis	R	For settings see IT1_DIAG	Current diagnosis
IT3_DIAG IT3 Diagnosis	R	For settings see IT1_DIAG	Current diagnosis

Parameter Subelement	Access	Description and settings	Initial Value
DIAGNOSIS_DEV Diagnosis Device	R	Display of maximum 8 (error) messages.	Current diagnosis
		Setting: 0:Startup phase / 255:no message F: Device Error / Configuration / Parameter / Software User Interface / Hardware Detection / Hardware Settings / Display / RAM/ROM Error IO1 / IO 1 / RAM/ROM Error IO2 / IO 2 / Fieldbus / Current Output C / Current Output B / Current Output A / Sensor Electronics / SE Drive Failure / SE Data Error / Sensor: Local Data Error / Sensor: Global Data Error / SE Hardware Failure / SE Data Different / SE Defective / Interface PCB Failure / SE Wiring Error / 2 Phase Flow / RS485/Modbus / Application Error / Backup 2 Settings / Backup 1 Settings / Factory Settings / Active Settings / Over Range C / Wiring B / Wiring A / Over Range B (current) / Over Range A (current) / Over Range A (pulse) / Over Range B (pulse) / Over Range D / Open Circuit C / Open Circuit B / Open Circuit A / Sensor Exceeding Limit / Sensor Exceeding Limit / Sensor Electronics / Tube Not Oscillating / System Control / Stop Mode / Sensor: System Error / SE Comms. Failure S: Out Of Specification / Backplane Invalid / Overflow Totaliser 1 / Overflow Totaliser 3 / Overflow Totaliser / Overflow Totaliser 2 / Density Calib. Failed / Sensor Signal Error / Excessive Noise / External Vibration / Sensor Levels / Temperature Drift / Tube Asymmetry / System Control / SE PCB Temperature / Tube Temperature / Density / Startup / Power Fail / BE PCB Temperature / Res. Circ. Defective / SE Defective / 2 Phase Flow / Interface PCB Fault / Checks In Progress C: Sensor Electronics / Standby Mode / Zero Calibration I: Optical Interface / Backplane Difference / Backplane Settings / Backplane Sensor / Over Range Display 1 / Over Range Display 2 / Control Input A act. / Control Input B act. / Power Fail / Totaliser 1 Stopped / Totaliser 3 Stopped / Totaliser 1 Stopped / Totaliser 2 Stopped / Baudrate Search / No Data Exchange / Write Cycles Overfl.	Current diagnosis
DISPLAY_CNFG Display Configuration	R/W	Select the function block output value to display at which line. For details see subelements.	-
DISP_LINE1 Display Line 1		Setting: AI1 / AI2 / AI3 / AI4 / AI5 / AI6 / PID / INT1 / INT2 / INT3	AI1
DISP_LINE2 Display Line 2			AI2
DISP_LINE3 Display Line 3			AI3
ELECTRONIC_INFO Electronic Information	R	Information about ident number, electronic revision and production date. For details see subelements.	-
IDENT_NUMBER Ident Number		Actual ident number	
ELECTRONIC_REV Electronic Revision		Actual electronic revision	
PRODUCTION_DATE Production Date		Date of production	

Parameter Subelement	Access	Description and settings	Initial Value
FF_BOARD_INFO Foundation Fieldbus Board Information	R	For details see subelements.	"Actual values"
IDENT_NUMBER Ident Number	R	Actual ident number	
HARDWARE_ID Hardware Ident Number		Actual hardware number	
SOFTWARE_VERSION Software Version		Actual software version	
PRODUCTION_DATE Production Date		Date of production	
CALIBRATION_DATE Calibration Date		Date of calibration	
FF_SERIAL_NO Foundation Fieldbus Serial Number		Actual serial number	
OPERATION_HOUR Operation Hour	R	Operation hour since first start-up.	"Actual values"
PASSWRD Password	R/W	Password to activate access rights to restricted parameters.	0
PROTECT_INFO Protection Information	R	Current protection level to restricted parameters.	Production
		Setting: Concentration / bit 6...7 (not used) / User / Service Level / Production / Custody Transfer / Write Lock	
SERIAL_NO Serial Number	R	Device serial number and serial number of the system.	"Actual values"
SW_SIMULATE Software Simulate	R/W	Enable/disable simulation like simulation jumper.	Disable
		Setting: Disable / Active	

4.5 Transducer Block (TB)

The following tables list the Transducer Block parameters in alphabetical order.

It describes characteristics of the sensor output functions required to read the measurement value from the Function Blocks.

The following tables contain short parameter description, factory settings (Initial Value (IV)) and possible settings.

4.5.1 Foundation Fieldbus parameters for Transducer Block

Parameter Subelement	Access	Description and settings	Initial Value
Alert Key	R/W	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc. Setting: 1...255	0
BLOCK_ERR Block Error	R	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown. Setting: <ul style="list-style-type: none"> • Other: Non-specific error active • Block Configuration: Error detected in block configuration • Simulation Active: Simulation enabled in this block • Local Override: Output tracking of faultstate active • Device Fault State: Device faultstate set • Device Maintenance: Device needs maintenance soon • Input Failure: Process variable has bad status • Output Failure: Failure detected in output hardware • Memory Failure: Memory error detected • Lost Static Data: Static parameters cannot be recovered • Lost NV Data: Non-volatile parameters cannot be recovered • Readback Check: Failure detected in READBACK • Maintenance Needed: Device NEEDS maintenance NOW • Power Up: Recovery from power failure • Out Of Service: Block actual mode is out of service 	0 (Actual Block Error)
MODE_BLK Block Mode	Mix	The actual, target, permitted and normal modes of the block.	-
TARGET Target	R/W	By setting this parameter to an allowed value (one of the value from permitted modes) user can change the block execution mode. Changing of modes is required to change the access permissions available to various parameters. Setting: Auto / OOS	Auto
ACTUAL Actual	R	This is the current mode of the block, which may differ from the target based on operating conditions. Its value is calculated as part of block execution. Setting: Auto / OOS	No Actual Mode
PERMITTED Permitted	R/W	This parameter defines allowed modes for this function block and can be set by user. Setting: Auto / OOS	Auto or OOS

Parameter Subelement	Access	Description and settings	Initial Value
NORMAL Normal	R/W	This is the mode which the block should be set to during normal operating conditions.	Auto
		Setting: Auto	
ST_Rev Static Revision	R	The revision level of the static data associated with the function block. The revision value will be incremented each time a static parameter value in the block is changed.	0
		Setting: 0...65535	
STRATEGY Strategy	R/W	The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block.	0 (=uninitialized)
		Setting: 0...65535	
TAG_DESC Tag Description	R/W	The user description of the intended application of the block.	spaces
		Setting: ≤32 digits	
BLOCK_ALM Block Alarm	R	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the "Active" status in the "Status" attribute. As soon as the "Unreported" status is cleared by the alert reporting task, another block alert may be reported without clearing the "Active" status, if the subcode has changed.	-
Unacknowledged	R/W	A discrete enumeration which is set to "Unacknowledged" when an alarm occurs, and set to "Acknowledged" by a write from a human interface device or other entity which can acknowledge that the alarm/event has been noticed.	Uninitialized
		Setting: Uninitialized / Acknowledged / Unacknowledged	
Alarm State	R	A discrete enumeration which gives an indication of whether the alert is active and whether it has been reported.	Uninitialized
		Setting: Uninitialized / Clear - reported / Clear - not reported / Active - reported / Active - not reported	
Time Stamp	R	The time when evaluation of the block was started and a change in alarm/event state was detected that is unreported. The time stamp value will be maintained constant until alert confirmation has been received - even if another change of state occurs.	Uninitialized
		Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	
Subcode	R	An enumeration specifying the cause of the alert to be reported.	Other
		Setting: Other / Block Configuration / Link Configuration / Simulation Active / Local Override / Device Fault State / Device Maintenance / Input Failure / Output Failure / Memory Failure / Lost Static Data / Lost NV Data / Readback Check / Maintenance Needed / Power Up / Out Of Service	
Value	R	The value of the associated parameter at the time the alert was detected.	0
		Setting: 0...255	

Parameter Subelement	Access	Description and settings	Initial Value
UPDATE_EVT Update Event	R	This alert is generated by any change to the static data.	-
Unacknowledged	R	A discrete enumeration which is set to "Unacknowledged" when an alarm occurs, and set to "Acknowledged" by a write from a human interface device or other entity which can acknowledge that the alarm/event has been noticed. Setting: Uninitialized / Acknowledged / Unacknowledged	Uninitialized
Update State	R	A discrete enumeration which gives an indication of whether the alert has been reported. Setting: Uninitialized / Update reported / Update not reported	Uninitialized
Time Stamp	R	For mapping of errors from device and status information from cyclic telegrams refer sheet "Device Error Mapping". The time when evaluation of the block was started and a change in alarm/event state was detected that is unreported. The time stamp value will be maintained constant until alert confirmation has been received - even if another change of state occurs. Time stamp records the time when parameter was updated. Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	Uninitialized
Static Revision	R	The static revision of the block whose static parameter was changed and is being reported. It is possible for the present value of static revision to be greater than this because static can be changed at any time. Setting: 0...65535	0
Relative Index	R	The OD index of the static parameter whose change caused this alert, minus the FB starting index. If the update event was caused by a write to multiple parameters at the same time, then this attribute will be zero. Setting: 0...65535	0

4.5.2 Manufacturer specific parameters of the signal converter for Transducer Block

Parameter Subelement	Access	Description and settings	Initial Value
COLLECTION_DIRECTORY Collection Directory	R	A directory that specifies the number, starting indices and DD Item IDs of the data collections in each transducer within a Transducer Block.	-
PRIMARY_VALUE PRIMARY_VALUE_RANGE	R/W	<p>There are 19 Primary Values (1...19); Setting is for all identical. Therefore the description follows only for Primary Value 1.</p> <p>Setting:</p> <ul style="list-style-type: none"> • 1 (Mass Flow in kg/s) • 2 (Density in kg/m³) • 3 (Tube Temp. in °C) • 4 (Flow Velocity in m/s) • 5 (Volume Flow in m³/s) • 6 (Conc. Mass Flow 1 in kg/s) • 7 (Conc. Mass Flow 2 in kg/s) • 8 (Conc. Volume Flow 1 in m³/s) • 9 (Conc. Volume Flow 2 in m³/s) • 10 (Concentration 1 in %sol/wt) • 11 (Concentration 2 in %sol/wt) • 12 (2 Phase Signal in %) • 13 (Sensor Average in %) • 14 (Sensor Deviation in %) • 15 (Drive Level in %) • 16 (Tube Frequency in Hz) • 17 (Strain MT in Ohm) • 18 (Strain IC in Ohm) • 19 (Electronic Temp. in °C) 	-
PRIMARY_VALUE_1 Primary Value 1	R	The measured value and status available to the Function Block.	-
STATUS Status	R	Digital transducers, unlike their analogue versions, can detect faults that make the measurement bad or prevent the actuator from responding. This additional, valuable information will be passed along with each transmission of a data value in the form of a status attribute.	-
VALUE Value		A numerical quantity entered by a user or calculated by the algorithm.	
PRIMARY_VALUE_1_RANGE Primary Value 1 Range	R	The high and low range limit values, the engineering units code and the number of digits to the right of the decimal point to be used to display the Primary Value.	-
EU_100 Engineering Unit 100	R	The engineering unit value which represents the upper end of range of the associated Block Parameter.	-
EU_0 Engineering Unit 0	R	The engineering unit value which represents the lower end of range of the associated Block Parameter.	-
UNITS_INDEX Inits Index	R	Device Description units code index for the engineering unit descriptor for the associated block value.	-
DECIMAL Decimal (Point)	R	The number of digits to the right of the decimal point which should be used by an interface device in displaying the specified parameter.	0
		Setting: 0...255	

Parameter Subelement	Access	Description and settings	Initial Value
SELECTOR_DIAG_CONC Selector Diagnosis Concentration	R/W	Selector for concentration functions and diagnosis. Please note: The following subelements are only writeable by setting "OOS" in MODE_BLK, see before!	-
SELECT_DIAG1 Diagnosis 1	R/W	Select diagnosis 1 value. Setting: <ul style="list-style-type: none"> • Off • Drive Level • Strain IC • Sensor Average • Tube Frequency • Sensor Deviation • Strain MT • 2 Phase Signal 	Off
SELECT_DIAG2 Diagnosis 2	R/W	Select diagnosis 2 value. Setting: <ul style="list-style-type: none"> • Off • Drive Level • Strain IC • Sensor Average • Tube Frequency • Sensor Deviation • Strain MT • 2 Phase Signal 	Off
SELECT_CONC1 Concentration 1	R/W	Select concentration 1 value Setting: <ul style="list-style-type: none"> • Off • Brix • % NaOH • % mass • Baume 144 • Plato • % volume • Baume 145 • API 	Off
SELECT_CONC2 DIAG3 Concentration 2/ Diagnosis 3	R/W	Select concentration 2 or diagnosis 3 values. Setting: <ul style="list-style-type: none"> • Off • Brix • % NaOH • % mass • Baume 144 • Plato • % volume • Baume 145 • API • Drive Level • Strain IC • Sensor Average • Tube Frequency • Sensor Deviation • Strain MT • 2 Phase Signal 	Off

Parameter Subelement	Access	Description and settings	Initial Value
SENSOR_CAL_DATE Sensor Calibration Date	R	The date of the last measuring sensor calibration.	-
SENSOR_DIAMETER Sensor Diameter	R	Pipe diameter of the measuring sensor.	-
SENSOR_SN Sensor Serial number	R	The serial number of the measuring sensor.	-
SENSOR_TYPE Sensor Type	R	The type of measuring sensor. Setting: 101 (= Coriolis)	101
TRANSDUCER_DIRECTORY Transducer Directory	R	A directory that specifies the number and starting indices of the transducers in the Transducer Block. Setting: 0...65535	0
TRANSDUCER_TYPE Transducer Type	R	Identifies the transducer type. This is included in all the 4 views as per definition given in the standard pressure transducer block given by FF.	Other
XD_ERROR Transducer Error	R	One of the transducer error codes defined in the FF Transducer Specifications in "Block Alarm Subcodes". Setting: 16: Unspecified error (An error has occurred that was not identified.) 17: General error (An error has occurred that could not be classified as one of the errors below.) 18: Calibration error (An error occurred during calibration of the device or a calibration error has been detected during operation of the device.) 19: Configuration error (An error occurred during configuration of the device or a configuration error has been detected during operation of the device.) 20: Electronics Failure (An electronic component has failed.) 21: Mechanical Failure (An mechanical component has failed.) 22: I/O Failure (An I/O failure has occurred.) 23: Data Integrity Error (Indicates that data stored within the system may not longer be valid due to NVM checksum failure. Data verify after write failure, etc.) 24: Software Error (The software has detected an error. This could be caused by an improper interrupt service routine, an arithmetic overflow, a watchdog timer, etc.) 25: Algorithm Error (The algorithm used in the Transducer Block produced an error. This could be due to an overflow, data reasonableness failure, etc.)	0
FLOW_DIRECTION Flow Direction	R/W	Setting: <ul style="list-style-type: none"> • Normal • Reverse 	Normal

4.6 Analog Input Block (AI)

The following tables list the Analog Input Block parameters in alphabetical order.

It describes characteristics of the measurement values obtained from the Transducer Block in a user defined way and to deliver it to the control system. There are also some parameters in the Analog Input Block, that can be configured to get a measurement value quality as desired by the user.

The following tables contain short parameter description, factory settings (Initial Value (IV)) and possible settings.

Parameter Subelement	Access	Description and settings	Initial Value
Alert Key	R/W	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc. Setting: 1...255	0
BLOCK_ERR Block Error	R	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown. Setting: <ul style="list-style-type: none"> • Other: Non-specific error active • Block Configuration: Error detected in block configuration • Simulation Active: Simulation enabled in this block • Local Override: Output tracking of faultstate active • Device Fault State: Device faultstate set • Device Maintenance: Device needs maintenance soon • Input Failure: Process variable has bad status • Output Failure: Failure detected in output hardware • Memory Failure: Memory error detected • Lost Static Data: Static parameters cannot be recovered • Lost NV Data: Non-volatile parameters cannot be recovered • Readback Check: Failure detected in READBACK • Maintenance Needed: Device NEEDS maintenance NOW • Power Up: Recovery from power failure • Out Of Service: Block actual mode is out of service 	Other
MODE_BLK Block Mode	Mix	The actual, target, permitted and normal modes of the block.	-
TARGET Target	R/W	By setting this parameter to an allowed value (one of the value from permitted modes) user can change the block execution mode. Changing of modes is required to change the access permissions available to various parameters. Setting: Auto / Manual / OOS	Auto
ACTUAL Actual	R	This is the current mode of the block, which may differ from the target based on operating conditions. Its value is calculated as part of block execution.	Factory Settings
PERMITTED Permitted	R/W	This parameter defines allowed modes for this function block and can be set by user. Setting: Auto / Manual / OOS	Auto, Manual or OOS
NORMAL Normal	R/W	This is the mode which the block should be set to during normal operating conditions. Setting: Auto	Auto

Parameter Subelement	Access	Description and settings	Initial Value
ST_REV Static Revision	R	The revision level of the static data associated with the function block. The revision value will be incremented each time a static parameter value in the block is changed.	0
		Setting: 0...65535	
STRATEGY Strategy	R/W	The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block.	0 (=uninitialized)
		Setting: 0...65535	
TAG_DESC Tag Description	R/W	This is the user description of the block useful for documentation purpose. Not being updated frequently as it is not being accessed by application.	spaces
		Setting: ≤32 digits	
ACK_OPTION Acknowledge Option	R/W	Selection of whether alarms associated with the function block will be automatically acknowledged.	Uninitialized
		Setting: Unack Alarm 1...15	
ALARM_HYS Alarm Hysteresis	R/W	Amount the PV must return within the alarm limits before the alarm condition clears. Alarm Hysteresis is expressed as a percent of the PV span.	0.05
		Setting: 0...50%	
ALARM_SUM Alarm Summary	Mix	The current alert status, unacknowledged states, unreported states and disabled states of the alarms associated with the function block.	-
Current	R	Setting: HiHi Alarm / Hi Alarm / LoLo Alarm / Lo Alarm / Block Alarm	Uninitialized Uninitialized
Unacknowledged	R	Setting: HiHi Alarm Unack / Hi Alarm Unack / LoLo Alarm Unack / Lo Alarm Unack / Block Alarm Unack	
Unreported	R	Setting: HiHi Alarm Unrep / Hi Alarm Unrep / LoLo Alarm Unrep / Lo Alarm Unrep / Block Alarm Unrep	Uninitialized
Disabled	R	Setting: HiHi Alarm Disabled / Hi Alarm Disabled / LoLo Alarm Disabled / Lo Alarm Disabled / Block Alarm Disabled	Uninitialized
BLOCK_ALM Block Alarm	Mix	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the "Active" status in the "Status" attribute. As soon as the "Unreported" status is cleared by the alert reporting task, another block alert may be reported without clearing the "Active" status, if the subcode has changed.	-
Unacknowledged	R/W	A discrete enumeration which is set to "Unacknowledged" when an alarm occurs, and set to "Acknowledged" by a write from a human interface device or other entity which can acknowledge that the alarm/event has been noticed.	Uninitialized
		Setting: Uninitialized / Acknowledged / Unacknowledged	
Alarm State	R	A discrete enumeration which gives an indication of whether the alert is active and whether it has been reported.	Uninitialized
		Setting: Uninitialized / Clear - reported / Clear - not reported / Active - reported / Active - not reported	

Parameter Subelement	Access	Description and settings	Initial Value
Time Stamp	R	The time when evaluation of the block was started and a change in alarm/event state was detected that is unreported. The time stamp value will be maintained constant until alert confirmation has been received - even if another change of state occurs.	Uninitialized
		Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	
Subcode	R	An enumeration specifying the cause of the alert to be reported.	Other
		Setting: Other / Block Configuration / Link Configuration / Simulation Active / Local Override / Device Fault State / Device Maintenance / Input Failure / Output Failure / Memory Failure / Lost Static Data / Lost NV Data / Readback Check / Maintenance Needed / Power Up / Out Of Service	
Value	R	The value of the associated parameter at the time the alert was detected.	0
		Setting: 0...255	
CHANNEL Channel	R/W	The number of the logical hardware channel that is connected to this I/O block. This information defines the transducer to be used going to or from the physical world. Note: W = Writeable only by setting "OOS" in MODE_BLK	Uninitialized
		Setting: <ul style="list-style-type: none"> • 1 (Mass Flow in kg/s) • 2 (Density in kg/m³) • 3 (Tube Temp. in °C) • 4 (Flow Velocity in m/s) • 5 (Volume Flow in m³/s) • 6 (Conc. Mass Flow 1 in kg/s) • 7 (Conc. Mass Flow 2 in kg/s) • 8 (Conc. Volume Flow 1 in m³/s) • 9 (Conc. Volume Flow 2 in m³/s) • 10 (Concentration 1 in %sol/wt) • 11 (Concentration 2 in %sol/wt) • 12 (2 Phase Signal in %) • 13 (Sensor Average in %) • 14 (Sensor Deviation in %) • 15 (Drive Level in %) • 16 (Tube Frequency in Hz) • 17 (Strain MT in Ohm) • 18 (Strain IC in Ohm) • 19 (Electronic Temp. in °C) 	
FIELD_VAL Field Value	R	Raw value of the field device in percent of the PV range, with a status reflecting the transducer condition, before signal characterization (L_TYPE) or filtering (PV_FTIME).	-
Status	R	Actual Status is displayed.	-
Value	R	Actual Field Value	-

Parameter Subelement	Access	Description and settings	Initial Value
GRANT_DENY Grant Deny	R/W	Options for controlling access of host computers and local control panels to operating, tuning and alarm parameters of the block.	-
GRANT Grant	R/W	Depending on the philosophy of the plant, the operator or a higher level device (HLD) or a local operator's panel (LOP) in the case of "Local", may turn on an item of the "Grant" attribute - "Program, Tune, Alarm or Local". Setting: Program / Tune / Alarm / Local	Uninitialized
DENY Deny	R/W	The deny attribute is provided for use by a monitoring application in an interface device and may not be changed by an operator. Setting: Program denied / Tune denied / Alarm denied / Local denied	Uninitialized
HI_ALM High Alarm	Mix	The status for High Alarm and its associated time stamp. Settings of 5 subelements see in the following part.	-
HI_HI_ALM High High Alarm	Mix	The status for High High Alarm and its associated time stamp. Settings of 5 subelements see in the following part.	-
Settings of 5 subelements for previous 2 parameters High Alarm and High High Alarm:			
Unacknowledged	R/W	Setting: Uninitialized / Acknowledged / Unacknowledged	Uninitialized
Alarm State	R	Setting: Uninitialized / Clear - reported / Clear - not reported / Active - reported / Active - not reported	Uninitialized
Time Stamp	R	Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	Uninitialized
Subcode	R	Setting: Other / Block Configuration / Link Configuration / Simulation Active / Local Override / Device Fault State / Device Maintenance / Input Failure / Output Failure / Memory Failure / Lost Static Data / Lost NV Data / Readback Check / Maintenance Needed / Power Up / Out Of Service	Other
Value	R	A numerical quantity entered by a user or calculated by the algorithm.	0.0
HI_HI_LIM High High Limit	R/W	The setting for High High Alarm in engineering units. Setting range see in the following part.	100
HI_HI_PRI High High Priority	R/W	Priority of the High High Alarm. Setting see in the following part.	0
HI_LIM High Limit	R/W	The setting for High Alarm in engineering units. Setting range see in the following part.	95
HI_PRI High Priority	R/W	Priority of the High Alarm. Setting see in the following part.	1
Setting range for previous 2 parameters: x_y_LIM x_y_Limit		-3.39 E38...+3.39 E38 / - INF (- infinite) / + INF (+ infinite)	
Setting for previous 2 parameters: x_y_PRI x_y_Priority		0: The associated alert may clear when the priority is changed to 0, but it will never occur. 1: The associated alert is not send as a notification. If the priority is above 1, then the alert must be reported. 2: Reserved for alerts that do not require the attention of a plant operator, e.g. diagnostic and system alerts. Block alarm, error alarm and update event have a fixed priority of 2. 3...7: Increasing higher priorities - advisory alarms. 8...15: Increasing higher priorities - critical alarms.	0

Parameter Subelement	Access	Description and settings	Initial Value
IO_OPTS IO Options (IO = Input/Output)	R/W	Options which the user may select to alter input and output block processing.	0 (no option enabled)
L_TYPE L_Type Linearization)	R/W	Determines if the values passed by the TB to the AI block may be used directly (Direct) or if the value is in different units and must be converted linearly (Indirect) or with square root (Ind Sqr Root), using the input range defined by the transducer and the associated output range. W = Writeable only by setting "OOS" in MODE_BLK	Uninitialized
		Setting: Uninitialized / Direct / Indirect / Ind Sqr Root	
LO_ALM Low Alarm	Mix	The status for Low Alarm and its associated time stamp. Settings of 5 subelements see in the following part.	-
LO_LO_ALM Low Low Alarm	Mix	The status for Low Low Alarm and its associated time stamp. Settings of 5 subelements see in the following part.	-
Settings of 5 subelements for previous 2 parameters Low Alarm and Low Low Alarm:			
Unacknowledged	R/W	Setting: Uninitialized / Acknowledged / Unacknowledged	Uninitialized
Alarm State	R	Setting: Uninitialized / Clear - reported / Clear - not reported / Active - reported / Active - not reported	Uninitialized
Time Stamp	R	Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	Uninitialized
Subcode	R	Setting: Other / Block Configuration / Link Configuration / Simulation Active / Local Override / Device Fault State / Device Maintenance / Input Failure / Output Failure / Memory Failure / Lost Static Data / Lost NV Data / Readback Check / Maintenance Needed / Power Up / Out Of Service	Other
Value	R	A numerical quantity entered by a user or calculated by the algorithm.	0.0
LO_LIM Low Limit	R/W	The setting for Low Alarm in engineering units. Setting range see in the following part.	0
LO_LO_LIM Low Low Limit	R/W	The setting for Low Low Alarm in engineering units. Setting range see in the following part.	0
LO_PRI Low Priority	R/W	Priority of the Low Alarm. Setting see in the following part.	1
LO_LO_PRI Low Low Priority	R/W	Priority of the Low Low Alarm. Setting see in the following part.	1
Setting range for previous 2 parameters: x_y_LIM x_y_Limit		-3.39 E38...+3.39 E38 / - INF (- infinite) / + INF (+ infinite)	
Setting for previous 2 parameters: x_y_PRI x_y_Priority		0: The associated alert may clear when the priority is changed to 0, but it will never occur. 1: The associated alert is not send as a notification. If the priority is above 1, then the alert must be reported. 2: Reserved for alerts that do not require the attention of a plant operator, e.g. diagnostic and system alerts. Block alarm, error alarm and update event have a fixed priority of 2. 3...7: Increasing higher priorities - advisory alarms. 8...15: Increasing higher priorities - critical alarms.	0

Parameter Subelement	Access	Description and settings	Initial Value
LOW_CUT Low Cutoff	R/W	Limit used in square root processing. A value of zero percent of scale is used in block processing if the transducer value falls below this limit, in %of scale. This feature may be used to eliminate noise near zero for a flow sensor.	0
		Setting: ≥0.0	
OUT Output	R/W	The primary analog discrete value calculated as a result of executing the function. Note: W = Writeable only by setting "OOS" in MODE_BLK	-
Status	R	Actual Status is displayed.	-
Value	R/W	Actual Value	-
OUT_SCALE Output Scale	R/W	The high and low scale values, engineering units code and number of digits to the right of the decimal point to be used in displaying the OUT parameter and parameters which have the same scaling as OUT.	-
EU_100 Engineering Unit 100	R/W	The engineering unit value which represents the upper end of range of the associated block parameter.	100.0
EU_0 Engineering Unit 0	R/W	The engineering unit value which represents the lower end of range of the associated block parameter.	0.0
Units Index	R/W	Setting: All units are possible.	Uninitialized
Decimal Point	R/W	The number of digits to the right of the decimal point which should be used by an interface device in displaying the specified parameter.	0
PV Process Value	R	Either the primary analogue value for use in executing the function or a process value associated with it.	-
Status			Actual status
Value			Actual value
PV_FTIME PV F Time (Process Value Filter Time Constant)	R/W	Time constant of a single exponential filter for the PV, in seconds.	0
		Setting: 0.0...60.0	
SIMULATE Simulate	Mix	Allows the transducer analogue input or output to the block to be manually supplied when "Simulate" is enabled. When simulation is disabled, the simulate value and status track the actual value and status.	-
Simulate Status	R/W	Used for the transducer status when simulation is enabled.	Bad: Non Specific: Non Limited
Simulate Value	R/W	Used for the transducer value when simulation is enabled.	0
		Setting: -3.39 E38 ... +3.39 E38, - INF, + INF	
Transducer Status	R	Status of value supplied by transducer.	-
Transducer Value	R	Current value supplied by transducer.	-
Simulate En/Disable	R/W	The parameter "SW_Simulated" in RB Block must be enabled.	Disabled
		Setting: Uninitialized / Disabled / Active	
STATUS_OPTS Status Option	R/W	Options which the user may select in the block processing of status.	0
		Setting: Propagate Fault Forward / Uncertain if limited / BAD if limited / Uncertain id Man mode	

Parameter Subelement	Access	Description and settings	Initial Value
UPDATE_EVT Update Event	R	This alert is generated by any change to the static data.	-
Unacknowledged	R	A discrete enumeration which is set to "Unacknowledged" when an alarm occurs, and set to "Acknowledged" by a write from a human interface device or other entity which can acknowledge that the alarm/event has been noticed. Setting: Uninitialized / Acknowledged / Unacknowledged	Uninitialized
Alarm State	R	A discrete enumeration which gives an indication of whether the alert is active and whether it has been reported. Setting: Uninitialized / Clear - reported / Clear - not reported / Active - reported / Active - not reported	Uninitialized
Time Stamp	R	The time when evaluation of the block was started and a change in alarm/event state was detected that is unreported. The time stamp value will be maintained constant until alert confirmation has been received - even if another change of state occurs. Time stamp records the time when parameter was updated. Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	Uninitialized
Static Revision	R	The static revision of the block whose static parameter was changed and is being reported. It is possible for the present value of static revision to be greater than this because static can be changed at any time.	0
Relative Index	R	The OD index of the static parameter whose change caused this alert, minus the FB starting index. If the update event was caused by a write to multiple parameters at the same time, then this attribute will be zero.	0
XD_SCALE Transducer Scale	R/W	The high and low scale values, engineering units code and number of digits to the right of the decimal point used with the value obtained from the transducer for a specified channel. Note: W = Writeable only by setting "OOS" in MODE_BLK	-
EU_100 Engineering Unit 100	R/W	The engineering unit value which represents the upper end of range of the associated block parameter.	100
EU_0 Engineering Unit 0	R/W	The engineering unit value which represents the lower end of range of the associated block parameter.	0

Parameter Subelement	Access	Description and settings	Initial Value
Units Index	R/W	<p>Volume flow units: m^3/s; m^3/min; m^3/h; m^3/d; L/s; L/min; L/h; L/d; ML/d; cm^3/s; cm^3/min; cm^3/h; cm^3/d; kL/min; kL/h; kL/d; mL/min; ft^3/min = CFM; ft^3/h = CFH; ft^3/d; gal/s; gal/min = GPM; gal/h; gal/d; Mgal/d; ImpGal/s; ImpGal/min; ImpGal/h; ImpGal/d; bbl/s; bbl/min; bbl/h; bbl/d</p> <p>Mass flow units: g/s; g/min; g/h; g/d; kg/s; kg/min; kg/h; kg/d; t/s; t/min; t/h; t/d; lb/s; lb/min; lb/h; lb/d; st/s = (Ston/s); st/min = (Ston/min); st/h = (Ston/h); st/d = (Ston/d); lt/s = (LTon/s); lt/min = (LTon/min); lt/h = (LTon/h); lt/d = (LTon/d); MLB/H</p> <p>Temperature units: K; °C; °F; °R</p> <p>Speed (velocity) units: m/s; mm/s; m/h; km/h; knot; in/s; ft/s; yd/s</p> <p>Density units: kg/m^3; Mg/m^3; kg/dm^3; g/cm^3; g/m^3; t/m^3; kg/L; g/ml; g/L; lb/in^3; lb/ft^3; lb/gal; STon/yd³; lb/ImpGal</p> <p>Concentration units: degAPI; % sol/wt; % sol/vol; % plato; degBrix; Baume 144; Baume 145; % NaOH; % mass B; % vol B</p> <p>Frequency units: Hz</p> <p>Resistor units: Ohm</p> <p>Other units: %</p>	Uninitialized
Decimal Point	R/W	The number of digits to the right of the decimal point which should be used by an interface device in displaying the specified parameter.	0

4.7 Integrator Block (IT)

The following tables list the 2 Integrator Block parameters in alphabetical order.

It describes characteristics of the signal converter measurements for forward (positive) and reverse (negative) flow at the same time. Both integrators were intended to totalize the forward flow Integrator 1 (+ Flow Totalizer) on the one hand and the reverse flow Integrator 2 (- Flow Totalizer) on the other. The configuration of these blocks is almost the same, unless stated differently.

The following tables contain short parameter description, factory settings (Initial Value (IV)) and possible settings.

Parameter Subelement	Access	Description and settings	Initial Value
Alert Key	R/W	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc. Setting: 0...255	0
BLOCK_ERR Block Error	R	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown. Setting: <ul style="list-style-type: none"> • Other: Non-specific error active • Block Configuration: Error detected in block configuration • Simulation Active: Simulation enabled in this block • Local Override: Output tracking of faultstate active • Device Fault State: Device faultstate set • Device Maintenance: Device needs maintenance soon • Input Failure: Process variable has bad status • Output Failure: Failure detected in output hardware • Memory Failure: Memory error detected • Lost Static Data: Static parameters cannot be recovered • Lost NV Data: Non-volatile parameters cannot be recovered • Readback Check: Failure detected in READBACK • Maintenance Needed: Device NEEDS maintenance NOW • Power Up: Recovery from power failure • Out Of Service: Block actual mode is out of service 	Actual measured value
MODE_BLK Block Mode	Mix	The actual, target, permitted and normal modes of the block.	-
TARGET Target	R/W	By setting this parameter to an allowed value (one of the value from permitted modes) user can change the block execution mode. Changing of modes is required to change the access permissions available to various parameters. Setting: Auto / Manual / OOS	OOS
ACTUAL Actual	R	This is the current mode of the block, which may differ from the target based on operating conditions. Its value is calculated as part of block execution.	Factory Settings
PERMITTED Permitted	R/W	This parameter defines allowed modes for this function block and can be set by user. Setting: Auto / Manual / OOS	Auto, Manual or OOS

Parameter Subelement	Access	Description and settings	Initial Value
NORMAL Normal	R/W	This is the mode which the block should be set to during normal operating conditions.	Auto
		Setting: Auto	
ST_REV Static Revision	R	The revision level of the static data associated with the function block. The revision value will be incremented each time a static parameter value in the block is changed.	0
		Setting: 0...65535	
STRATEGY Strategy	R/W	The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block.	0 (=uninitialized)
		Setting: 0...65535	
TAG_DESC Tag Description	R/W	This is the user description of the block useful for documentation purpose. Not being updated frequently as it is not being accessed by application.	spaces
		Setting: ≤32 digits	
BLOCK_ALM Block Alarm	Mix	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the "Active" status in the "Status" attribute. As soon as the "Unreported" status is cleared by the alert reporting task, another block alert may be reported without clearing the "Active" status, if the subcode has changed.	-
Unacknowledged	R/W	A discrete enumeration which is set to "Unacknowledged" when an alarm occurs, and set to "Acknowledged" by a write from a human interface device or other entity which can acknowledge that the alarm/event has been noticed.	Uninitialized
		Setting: Uninitialized / Acknowledged / Unacknowledged	
Alarm State	R	A discrete enumeration which gives an indication of whether the alert is active and whether it has been reported.	Uninitialized
		Setting: Uninitialized / Clear - reported / Clear - not reported / Active - reported / Active - not reported	
Time Stamp	R	The time when evaluation of the block was started and a change in alarm/event state was detected that is unreported. The time stamp value will be maintained constant until alert confirmation has been received - even if another change of state occurs.	Uninitialized
		Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	
Subcode	R	An enumeration specifying the cause of the alert to be reported.	Other
		Setting: Other / Block Configuration / Link Configuration / Simulation Active / Local Override / Device Fault State / Device Maintenance / Input Failure / Output Failure / Memory Failure / Lost Static Data / Lost NV Data / Readback Check / Maintenance Needed / Power Up / Out Of Service	
Value	R	The value of the associated parameter at the time the alert was detected.	0
		Setting: 0...255	

Parameter Subelement	Access	Description and settings	Initial Value	
CLOCK_PER Clock Period	R/W	Establishes the period for periodic reset, in seconds.	0	
		Setting: Positive or 0		
GOOD_LIM Good Limit	R/W	Sets the limit for PCT_INCL. Below this limit OUT receives the status good.	0	
		Setting: 0...100%		
GRANT_DENY Grant Deny	R/W	Options for controlling access of host computers and local control panels to operating, tuning and alarm parameters of the block.	-	
Grant	R/W	Depending on the philosophy of the plant, the operator or a higher level device (HLD), or a local operator's panel (LOP) in the case of Local, may turn on an item of the Grant attribute - Program, Tune, Alarm or Local.	Uninitialized	
		Setting: Program / Tune / Alarm / Local		
Deny	R/W	The Denied attribute is provided for use by a monitoring application in an interface device and may not be changed by an operator.	Uninitialized	
		Setting: Program denied / Tune denied / Alarm denied / Local denied		
IN_1 Input 1	R/W	Input 1 of the Integrator Block.	-	
		Status		Status of IN_1
		Value		Actual value
IN_2 Input 2	R/W	Input 2 of the Integrator Block.	-	
		Status		Status of IN_2
		Value		Actual value
OUT_PTRIP Output Pre Trip	R/W	The second discrete output.	-	
Status	R/W	Setting: Good Non Cascade / Good Cascade / Uncertain / Bad Not Connected / Bad	Bad Not Connected	
Value	R/W	Setting: 0: Off / 1: On	0	

Parameter Subelement	Access	Description and settings	Initial Value
INTEG_OPTS Integration Options	R/W	<p>INTEG_OPTS is to be used to specify several integration options as type of input used in each input, flow direction to be considered in the totalization, status to be considered in the totalization and if the totalization residue shall be used in the next batch after a reset.</p> <p>The following INTEG_OPTS are possible (see also INTEG_TYPE):</p> <ul style="list-style-type: none"> • Input 1 accumulate: IN_1 is used as pulse (otherwise as rate) • Input 2 accumulate: IN_2 is used as pulse (otherwise as rate) • Flow forward: only positive net flow will be taken into account for totalization • Flow reverse: only negative net flow will be taken into account for totalization • Use Uncertain: IN_1 and IN_2 input will be taken into account even if their states are "Uncertain" (otherwise the value with the last "Good" status will be taken) • Use BAD Input: IN_1 or IN_2 with "Bad" status will be interpreted as "Good" (Note: only the status is interpreted as "Good", the value isn't used for totalization, but the good one, i.e. RTOTAL isn't affected with this setting. • Carry: integration after a reset starts with the init value, but with the residual after the trip value. • Add zero if Bad: if one of the input (IN_1 or IN_2) statuses are "Bad", not the last "Good" value is used for totalization, but zero [0]. • Confirm reset: after a manual reset of totalization, the next manual reset must be preceded by a reset confirmation by the control system. • Generate reset event: in case of reset (automatic or manual), an event notification will be sent to the control system. [This function is an option and not supported.] 	Uninitialized
N_RESET Number of Reset	R	Counts the number of resets. It can not be written nor reset.	-
OP_CMD_INT Operator Command Integration	R/W	Operator command. "Reset" resets the totalizer. Setting: 0: Off / 1: Reset	Off
OUT Output	R/W	The primary analog value calculated as a result of executing the function. The display scaling for the corresponding output. It has no effect on the block.	-
Status	R	Actual status of Output.	-
Value	R	Actual value	-
OUT_PTRIP Output Pre Trip	R/W	The second discrete output.	-
Status	R/W	Setting: Good Non Cascade / Good Cascade / Uncertain / Bad Not Connected / Bad	Bad Not Connected
Value	R/W	Setting: 0: Off / 1: On	Off
OUT_RANGE Output Range	R/W	This is the display scaling for the output. It has no effect on the block.	-
EU_100 Engineering Unit 100	R/W	The engineering unit value which represents the upper end of range of the associated block parameter.	100.0
EU_0 Engineering Unit 0	R/W	The engineering unit value which represents the lower end of range of the associated block parameter.	0.0

Parameter Subelement	Access	Description and settings	Initial Value
Units Index	R/W	Setting: All units are possible.	-
Decimal Point	R/W	The number of digits to the right of the decimal point which should be used by an interface device in displaying the specified parameter.	0
OUT_TRIP Output Trip	R/W	The first discrete output.	-
Status	R/W	Setting: Good Non Cascade / Good Cascade / Uncertain / Bad Not Connected / Bad	Bad Not Connected
Value	R/W	Setting: 0: Off / 1: On	Off
OUTAGE_LIM Outage Limit	R/W	The maximum tolerated duration for power failure. Setting: Positive or 0	0
PCT_INCL Percentage Increment Calculation	R	Indicates the percentage of inputs with good status compared to the ones with bad or uncertain and bad status.	0.0
PRE_TRIP Pre Trip	R/W	Adjusts the amount of mass, volume or energy that should set OUT_PTRIP when the integration reaches (TOTAL_SP - PRE_TRIP) when counting up or PRE_TRIP when counting down. Setting: Positive or 0	0
PULSE_VAL1 Pulse Value 1	R/W	Determines the mass, volume or energy per pulse. Setting: Positive or 0	0.0
PULSE_VAL2 Pulse Value 2	R/W	Determines the mass, volume or energy per pulse. Setting: Positive or 0	0.0
RESET_CONFIRM Reset Confirm	R/W	Momentary discrete value which can be written by a host to enable further resets, if the option confirm reset in INTEG_OPTS is chosen.	-
Status	R/W	Setting: Good Non Cascade / Good Cascade / Uncertain / Bad Not Connected / Bad / Bad No Comm with Last Useable Value (LUV)	Bad Not Connected
Value	R/W	Setting: 0: Off / 1: On	Off
RESET_IN Reset Input	R/W	Reset the totalizers.	-
Status	R/W	Setting: Good Non Cascade / Good Cascade / Uncertain / Bad Not Connected / Bad / Bad No Comm with Last Useable Value (LUV)	Bad Not Connected
Value	R/W	Setting: 0: Off / 1: On	Off
REV_FLOW1 Reverse Flow 1	R/W	Indicates reverse flow when true.	-
Status	R/W	Setting: Good Non Cascade / Good Cascade / Uncertain / Bad Not Connected / Bad / Bad No Comm with Last Useable Value (LUV)	Bad Not Connected

Parameter Subelement	Access	Description and settings	Initial Value
Value	R/W	Setting: 0: Forward / 1: Reverse	Forward
REV_FLOW2 Reverse Flow 2	R/W	Indicates reverse flow when true.	-
Status	R/W	Setting: Good Non Cascade / Good Cascade / Uncertain / Bad Not Connected / Bad / Bad No Comm with Last Useable Value (LUV)	Bad Not Connected
Value	R/W	Setting: 0: Forward / 1: Reverse	Forward
RTOTAL Rejected Total	R/W	Indicates the Totalization of BAD or BAD + UNCERTAIN Inputs, according to INTEG_OPTS.	0.0
SRTOTAL Snapshot of Rejected Total	R	The snapshot of RTOTAL, just before a reset.	0.0
SSP Snapshot of Setpoint	R	The snapshot of TOTAL_SP.	0.0
STATUS_OPTS Status Option	R/W	Options which the user may select in the block processing of status. Setting: Uncertain if Man	Uninitialized
STOTAL Snapshot of Total	R	Indicates the Snapshot of OUT just before a reset.	0.0
TIME_UNIT1 Time Unit 1	R/W	Converts the rate time units in seconds. Setting: 1: seconds / 2: minutes / 3: hour / 4: days	Uninitialized
TIME_UNIT2 Time Unit 2	R/W	Converts the rate time units in seconds. Setting: 1: seconds / 2: minutes / 3: hour / 4: days	Uninitialized
TOTAL_SP Total Setpoint	R/W	The SP for a batch totalization. Not just SP because SP has PV units and other special properties not used in this application. Setting: Positive or 0	0
UNIT_CONV Unit Conversion	R/W	Factor to convert the engineering units of input 2 into the engineering units of input 1. Setting: Positive or not 0	1.0
UPDATE_EVT Update Event	R	This alert is generated by any change to the static data.	-
Unacknowledged	R	A discrete enumeration which is set to "Unacknowledged" when an alarm occurs, and set to "Acknowledged" by a write from a human interface device or other entity which can acknowledge that the alarm/event has been noticed. Setting: Uninitialized / Acknowledged / Unacknowledged	Uninitialized
Update State	R	A discrete enumeration which gives an indication of whether the alert is active and whether it has been reported. Setting: Uninitialized / Acknowledged / Unacknowledged	Uninitialized

Parameter Subelement	Access	Description and settings	Initial Value
Time Stamp	R	The time when evaluation of the block was started and a change in alarm/event state was detected that is unreported. The time stamp value will be maintained constant until alert confirmation has been received - even if another change of state occurs. Time stamp records the time when parameter was updated.	Uninitialized
		Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	
Static Revision	R	The static revision of the block whose static parameter was changed and is being reported. It is possible for the present value of static revision to be greater than this because static can be changed at any time.	0
Relative Index	R	The OD index of the static parameter whose change caused this alert, minus the FB starting index. If the update event was caused by a write to multiple parameters at the same time, then this attribute will be zero.	0

4.8 Proportional Integral Derivative Block (PID)

The following tables list the PID Block parameters in alphabetical order.

The following tables contain short parameter description, factory settings (Initial Value (IV)) and possible settings.

Parameter Subelement	Access	Description and settings	Initial Value
ALERT_KEY Alert Key	R/W	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc. Setting: 1...255	1
BLOCK_ERR Block Error	R	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown. Setting: <ul style="list-style-type: none"> • Other: Non-specific error active • Block Configuration: Error detected in block configuration • Simulation Active: Simulation enabled in this block • Local Override: Output tracking of faultstate active • Device Fault State: Device faultstate set • Device Maintenance: Device needs maintenance soon • Input Failure: Process variable has bad status • Output Failure: Failure detected in output hardware • Memory Failure: Memory error detected • Lost Static Data: Static parameters cannot be recovered • Lost NV Data: Non-volatile parameters cannot be recovered • Readback Check: Failure detected in READBACK • Maintenance Needed: Device NEEDS maintenance NOW • Power Up: Recovery from power failure • Out Of Service: Block actual mode is out of service 	Current Block Error
MODE_BLK Block Mode	Mix	The actual, target, permitted and normal modes of the block.	-
TARGET Target	R/W	This is the mode requested by the operator. Only one mode from those allowed by the permitted mode parameter may be requested. Setting: ROut / RCas / Cas / Auto / Man / OOS	OOS
ACTUAL Actual	R	This is the current mode of the block, which may differ from the target based on operating conditions. Its value is calculated as part of block execution. Setting: ROut / RCas / Cas / Auto / Man / OOS	Actual mode
PERMITTED Permitted	R/W	Defines the modes which are allowed for an instance of the block. The permitted mode is configured based on application requirement. Setting: ROut / RCas / Cas / Auto / Man / OOS	ROut, RCas, Cas, Auto, Man or OOS
NORMAL Normal	R/W	This is the mode the block should be set to during normal operating conditions. Setting: Auto	Auto

Parameter Subelement	Access	Description and settings	Initial Value
ST_REV Static Revision	R	The revision level of the static data associated with the function block. The revision value will be incremented each time a static parameter value in the block is changed.	0
		Setting: 0...65535	
STRATEGY Strategy	R/W	This parameter can be used to create groups of blocks by control system. This data is not checked or processed by the block.	0 (=uninitialized)
		Setting: 0...65535	
TAG_DESC Tag Description	R/W	The user description of the intended application of the block.	spaces
		Setting: ≤32 digits	
ACK_OPTION Acknowledge Option	R/W	Selection of whether alarms associated with the function block will be automatically acknowledged.	No option selected
		Setting: <ul style="list-style-type: none"> • HiHi Alm Disabled: HiHi alarm disabled • Hi Alm Disabled: Hi alarm disabled • LoLo Alm Disabled: LoLo alarm disabled • Lo Alm Disabled: Lo alarm disabled • DevHi Alm Disabled: Deviation Hi alarm disabled • DevLo Alm Disabled: Deviation Lo alarm disabled • Block Alm Disabled: Block alarm disabled 	
ALARM_HYS Alarm Hysteresis	R/W	Amount the PV must return within the alarm limits before the alarm condition clears. Alarm hysteresis expressed as a percent of the span of the PV.	0.5
		Setting: 0.0...50.0%	
ALARM_SUM Alarm Summary	Mix	The current alert status, unacknowledged states, unreported states and disabled states of the alarms associated with the function block.	-
Current	R	Setting: HiHi Alm Active / Hi Alm Active / LoLo Alm Active / Lo Alm Active / DevHi Alarm Active / DevLo Alm Active / Block Alm Active	Uninitialized
Unacknowledged	R	Setting: HiHi Alm Unack / Hi Alm Unack / LoLo Alm Unack / Lo Alm Unack / DevHi Alarm Unack / DevLo Alm Unack / Block Alm Unack	Uninitialized
Unreported	R	Setting: HiHi Alm Unrep / Hi Alm Unrep / LoLo Alm Unrep / Lo Alm Unrep / DevHi Alarm Unrep / DevLo Alm Unrep / Block Alm Unrep	Uninitialized
Disabled	R	Setting: HiHi Alm Disabled / Hi Alm Disabled / LoLo Alm Disabled / Lo Alm Disabled / DevHi Alarm Disabled / DevLo Alm Disabled / Block Alm Disabled	Uninitialized
BAL_TIME Balance Time	R/W	This specifies the time for the internal working value of bias or ratio to return to the operator set bias or ratio, in seconds. In the PID block, it may be used to specify the time constant at which the integral term will move to obtain balance when the output is limited and the mode is Auto, Cas or RCas.	0
		Setting: 0.0 s	

Parameter Subelement	Access	Description and settings	Initial Value
BKCAL_HYS Back Calculation Hysteresis	R/W	Limits the minimum output value for modes other than "Manual". The limit status is turned off, expressed as a percent of the span of the output.	0.5
		Setting: 0.0...50.0%	
BKCAL_IN Back Calculation Input	R/W	The value and status used for backwards tracking of the output, provided by a link to the back calculation output parameter of a downstream block.	-
Status	R/W	Status of BKCAL_IN	-
Value	R/W	Value of BKCAL_IN	-
BKCAL_IN Back Calculation Input	R	The output value and status provided to an upstream block for output tracking when the loop is broken or limited, as determined by the status bits. This information is used to provide bumpless transfer to closed loop control and to prevent windup under limited conditions when that becomes possible.	-
		Status	
Value	R	Value of BKCAL_OUT	-
BLOCK_ALM Block Alarm	R/W	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the "Active" status in the "Status" attribute. As soon as the "Unreported" status is cleared by the alert reporting task, another block alert may be reported without clearing the "Active" status, if the subcode has changed.	-
Unacknowledged	R/W	A discrete enumeration which is set to "Unacknowledged" when an alarm occurs, and set to "Acknowledged" by a write from a human interface device or other entity which can acknowledge that the alarm/event has been noticed.	Uninitialized
		Setting: Uninitialized / Acknowledged / Unacknowledged	
Alarm State	R	A discrete enumeration which gives an indication of whether the alert is active and whether it has been reported.	Uninitialized
		Setting: <ul style="list-style-type: none"> • Uninitialized • Clear - reported: Alarm not active and reported • Clear - not reported: Alarm not active and not reported • Active - reported: Alarm active and reported • Active - not reported: Alarm active and not reported 	
Time Stamp	R	The time when evaluation of the block was started and a change in alarm/event state was detected that is unreported. The time stamp value will be maintained constant until alert confirmation has been received - even if another change of state occurs.	Uninitialized
		Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	

Parameter Subelement	Access	Description and settings	Initial Value
Subcode	R	<p>An enumeration specifying the cause of the alert to be reported.</p> <p>Setting:</p> <ul style="list-style-type: none"> • Other: Non-specific error active • BlockConfiguration: Error detected in block configuration • LinkConfiguration: Error detected in link configuration • SimulationActive: Simulation enabled in this block • LocalOverride: Output tracking or faultstate active • DeviceFaultState: DeviceFaultState • DeviceMaintenance: Device needs maintenance soon • InputFailure: Process variable has bad status • OutputFailure: Failure detected in output hardware • MemoryFailure: Memory error detected • LostStaticData: Static parameters cannot be recovered • LostNVData: Non-Volatile parameters cannot be recovered • ReadbackCheck: Failure detected in READBACK • MaintenanceNeeded: Device NEEDS maintenance NOW • PowerUp: Recovery from power failure • OutOfService: Block actual mode is Out of Service 	Other
Value	R	<p>The value of the associated parameter at the time the alert was detected.</p> <p>Setting: 0...255</p>	0
BYPASS Bypass	R/W	<p>The normal control algorithm may be bypassed through this parameter. When bypass is set, the setpoint value (in percent) will be directly transferred to the output. To prevent a bump on transfer to/from bypass, the setpoint will automatically be initialized to the output value or process variable, respectively, and the path broken flag will be set for one execution.</p> <p>Setting:</p> <ul style="list-style-type: none"> • ON: normal control algorithm bypassed, output based on setpoint • OFF: normal control 	Uninitialized
CAS_IN Cascade Input	R/W	This parameter is the remote setpoint value, which must come from another Fieldbus block or a DCS block through a defined link.	-
Status	R/W	Status of CAS_IN	-
Value	R/W	Value of CAS_IN	-

Parameter Subelement	Access	Description and settings	Initial Value
CONTROL_OPTS Control Options	R/W	Options which the user may select to alter the calculations done in a control block. Setting: <ul style="list-style-type: none"> • Bypass Enable: This parameter, if true, allows BYPASS to be set. Some control algorithms cannot provide closed loop control if bypassed. • SP-PV Track Man: Permits the setpoint to track the process variable when the block mode is "Man". • SP-PV Track ROut: Permits the setpoint to track the process variable when the block mode is "ROut". • SP-PV Track LO-IMan: Permits the setpoint to track the process variable when the block mode is "LO or IMan". • SP Track retain: Permits the setpoint to track the RCas or Cas parameter based on the retained target mode when the actual mode of the block is "Man, LO, Man, or ROut". • Direct acting: Defines the relationship between changes in PV and changes to output - when direct is selected, an increase in PV results in an increase in the output. • Track enable: This enables the external tracking function – when TRK_ENA is 1, the preset value in TRK_VAL is output if TRK_IN_D becomes true. • Track in manual: This is used only if TRK_ENA is YES (1) - when the block mode is Man, TRK_IN_D will be acted on only if the TRK_OVMAN control option is set. • PV for BKCaL_Out: The BKCAL_OUT value may be selected as the working SP or the PV - normally, BKCAL_OUT is the working SP. • Restrict SP to limits in Cas and RCas: If this option is selected, the setpoint will be restricted to the setpoint absolute and rate limits in Cas and Rcas modes. • No output limits in Man: Do not apply OUT_HI_LIM or OUT_LO_LIM when target and actual modes are "Man". 	No option selected
DV_HI_ALM Deviation High Alarm	Mix	The status and time stamp associated with the high deviation alarm.	-
Unacknowledged	R/W	A discrete enumeration which is set to "Unacknowledged" when an alarm occurs, and set to "Acknowledged" by a write from a human interface device or other entity which can acknowledge that the alarm/event has been noticed. Setting: Uninitialized / Acknowledged / Unacknowledged	Uninitialized
Alarm State	R	A discrete enumeration which gives an indication of whether the alert is active and whether it has been reported. Setting: <ul style="list-style-type: none"> • Uninitialized • Clear - reported: Alarm not active and reported • Clear - not reported: Alarm not active and not reported • Active - reported: Alarm active and reported • Active - not reported: Alarm active and not reported 	Uninitialized
Time Stamp	R	The time when evaluation of the block was started and a change in alarm/event state was detected that is unreported. The time stamp value will be maintained constant until alert confirmation has been received - even if another change of state occurs. Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	Uninitialized

Parameter Subelement	Access	Description and settings	Initial Value
Subcode	R	An enumeration specifying the cause of the alert to be reported.	Other
		Setting: Settings see above parameter "BLOCK_ALM", subelement "Subcode".	
Value	R	The value of the associated parameter at the time the alert was detected.	0
		Setting: 0...255	
DV_HI_LIM Deviation High Limit	R/W	The setting of the high deviation alarm limit in engineering units.	+INF
DV_HI_PRI Deviation High Priority	R/W	Priority of the high deviation alarm.	0
		Setting: 0...15	
DV_LO_ALM Deviation Low Alarm	Mix	The status and time stamp associated with the low deviation alarm.	-
Unacknowledged	R/W	A discrete enumeration which is set to "Unacknowledged" when an alarm occurs, and set to "Acknowledged" by a write from a human interface device or other entity which can acknowledge that the alarm/event has been noticed.	Uninitialized
		Setting: Uninitialized / Acknowledged / Unacknowledged	
Alarm State	R	A discrete enumeration which gives an indication of whether the alert is active and whether it has been reported.	Uninitialized
		Setting: <ul style="list-style-type: none"> • Uninitialized • Clear - reported: Alarm not active and reported • Clear - not reported: Alarm not active and not reported • Active - reported: Alarm active and reported • Active - not reported: Alarm active and not reported 	
Time Stamp	R	The time when evaluation of the block was started and a change in alarm/event state was detected that is unreported. The time stamp value will be maintained constant until alert confirmation has been received - even if another change of state occurs.	Uninitialized
		Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	
Subcode	R	An enumeration specifying the cause of the alert to be reported.	Other
		Setting: Settings see above parameter "BLOCK_ALM", subelement "Subcode".	
Value	R	The value of the associated parameter at the time the alert was detected.	0
		Setting: 0...255	
DV_LO_LIM Deviation Low Limit	R/W	The setting of the low deviation alarm limit in engineering units.	-INF
DV_LO_PRI Deviation Low Priority	R/W	Priority of the low deviation alarm.	0
		Setting: 0...15	

Parameter Subelement	Access	Description and settings	Initial Value
FF_GAIN Feed Forward Gain	R/W	The gain that the feed forward input is multiplied by before it is added to the calculated control output.	0
FF_SCALE Feed Forward Scale	R/W	The feed forward input high and low scale values, engineering units code and number of digits to the right of the decimal point.	-
EU at 100%	R/W	The engineering unit value which represents the upper end of range of the associated block parameter.	100
EU at 0%	R/W	The engineering unit value which represents the lower end of range of the associated block parameter.	0
Units Index	R/W	Device Description units code index for the engineering unit descriptor for the associated block value. Setting: All units are possible.	Uninitialized
FF_VAL Feed Forward Value	R	The feed forward value and status.	-
Status	R	Status of FF_VAL	-
Value	R	Value of FF_VAL	-
GAIN Gain	R/W	Dimensionless value used by the block algorithm in calculating the block output.	0
GRANT_DENY Grant Deny	R/W	Options for controlling access of host computers and local control panels to operating, tuning and alarm parameters of the block.	-
Grant	R/W	Depending on the philosophy of the plant, the operator or a higher level device (HLD), or a local operator's panel (LOP) in the case of Local, may turn on an item of the Grant attribute - Program, Tuning, Alarm or Local. Setting: <ul style="list-style-type: none"> • Program: Host may change mode, setpoint or output of block • Tune: Host may change the tuning parameters of block • Alarm: Host may change the alarm parameters of block • Local: A local panel or handheld device may change the target mode, setpoint or output 	No option selected
Deny	R/W	The "Denied" attribute is provided for use by a monitoring application in an interface device and may not be changed by an operator. Setting: <ul style="list-style-type: none"> • Program denied: Granting of program permission has been reset • Tune denied: Granting of tune permission has been reset • Alarm denied: Granting of alarm permission has been reset • Local denied: Granting of local permission has been reset 	No option selected
HI_ALM High Alarm	Mix	The status for High Alarm and its associated time stamp.	-
Unacknowledged	R/W	A discrete enumeration which is set to "Unacknowledged" when an alarm occurs, and set to "Acknowledged" by a write from a human interface device or other entity which can acknowledge that the alarm/event has been noticed. Setting: Uninitialized / Acknowledged / Unacknowledged	Uninitialized

Parameter Subelement	Access	Description and settings	Initial Value
Alarm State	R	A discrete enumeration which gives an indication of whether the alert is active and whether it has been reported.	Uninitialized
		Setting: <ul style="list-style-type: none"> • Uninitialized • Clear - reported: Alarm not active and reported • Clear - not reported: Alarm not active and not reported • Active - reported: Alarm active and reported • Active - not reported: Alarm active and not reported 	
Time Stamp	R	The time when evaluation of the block was started and a change in alarm/event state was detected that is unreported. The time stamp value will be maintained constant until alert confirmation has been received - even if another change of state occurs.	Uninitialized
		Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	
Subcode	R	An enumeration specifying the cause of the alert to be reported.	Other
		Setting: Settings see above parameter "BLOCK_ALM", subelement "Subcode".	
Value	R	The value of the associated parameter at the time the alert was detected.	0
HI_HI_ALM High High Alarm	Mix	The status for High High Alarm and its associated time stamp.	-
Unacknowledged	R/W	A discrete enumeration which is set to "Unacknowledged" when an alarm occurs, and set to "Acknowledged" by a write from a human interface device or other entity which can acknowledge that the alarm/event has been noticed.	Uninitialized
		Setting: Uninitialized / Acknowledged / Unacknowledged	
Alarm State	R	A discrete enumeration which gives an indication of whether the alert is active and whether it has been reported.	Uninitialized
		Setting: <ul style="list-style-type: none"> • Uninitialized • Clear - reported: Alarm not active and reported • Clear - not reported: Alarm not active and not reported • Active - reported: Alarm active and reported • Active - not reported: Alarm active and not reported 	
Time Stamp	R	The time when evaluation of the block was started and a change in alarm/event state was detected that is unreported. The time stamp value will be maintained constant until alert confirmation has been received - even if another change of state occurs.	Uninitialized
		Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	
Subcode	R	An enumeration specifying the cause of the alert to be reported.	Other
		Setting: Settings see above parameter "BLOCK_ALM", subelement "Subcode".	
Value	R	The value of the associated parameter at the time the alert was detected.	0

Parameter Subelement	Access	Description and settings	Initial Value
HI_HI_LIM High High Limit	R/W	The setting for High High Alarm in engineering units.	+INF
HI_HI_PRI High High Priority	R/W	Priority of the High High Alarm.	0
		Setting: 0...15	
HI_LIM High Limit	R/W	The High Limit imposed on the PV compensation term.	+INF
HI_PRI High Priority	R/W	Priority of the High Alarm.	0
		Setting: 0...15	
IN Input	R/W	Primary input value of the block, required for blocks that filter the input to get the PV.	-
Status	R/W	Status of IN	-
Value	R/W	Value of IN	-
LO_ALM Low Alarm	Mix	The status for Low Alarm and its associated time stamp.	-
Unacknowledged	R/W	A discrete enumeration which is set to "Unacknowledged" when an alarm occurs, and set to "Acknowledged" by a write from a human interface device or other entity which can acknowledge that the alarm/event has been noticed.	Uninitialized
		Setting: Uninitialized / Acknowledged / Unacknowledged	
Alarm State	R	A discrete enumeration which gives an indication of whether the alert is active and whether it has been reported.	Uninitialized
		Setting: <ul style="list-style-type: none"> • Uninitialized • Clear - reported: Alarm not active and reported • Clear - not reported: Alarm not active and not reported • Active - reported: Alarm active and reported • Active - not reported: Alarm active and not reported 	
Time Stamp	R	The time when evaluation of the block was started and a change in alarm/event state was detected that is unreported. The time stamp value will be maintained constant until alert confirmation has been received - even if another change of state occurs.	Uninitialized
		Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	
Subcode	R	An enumeration specifying the cause of the alert to be reported.	Other
		Setting: Settings see above parameter "BLOCK_ALM", subelement "Subcode".	
Value	R	The value of the associated parameter at the time the alert was detected.	0
LO_LIM Low Limit	R/W	The setting for Low Alarm in engineering units.	-INF
LO_LO_ALM Low Low Alarm	Mix	The status of the Low Low Alarm and its associated time stamp.	-

Parameter Subelement	Access	Description and settings	Initial Value
Unacknowledged	R/W	A discrete enumeration which is set to "Unacknowledged" when an alarm occurs, and set to "Acknowledged" by a write from a human interface device or other entity which can acknowledge that the alarm/event has been noticed. Setting: Uninitialized / Acknowledged / Unacknowledged	Uninitialized
Alarm State	R	A discrete enumeration which gives an indication of whether the alert is active and whether it has been reported. Setting: <ul style="list-style-type: none"> • Uninitialized • Clear - reported: Alarm not active and reported • Clear - not reported: Alarm not active and not reported • Active - reported: Alarm active and reported • Active - not reported: Alarm active and not reported 	Uninitialized
Time Stamp	R	The time when evaluation of the block was started and a change in alarm/event state was detected that is unreported. The time stamp value will be maintained constant until alert confirmation has been received - even if another change of state occurs. Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	Uninitialized
Subcode	R	An enumeration specifying the cause of the alert to be reported. Setting: Settings see above parameter "BLOCK_ALM", subelement "Subcode".	Other
Value	R	The value of the associated parameter at the time the alert was detected.	0
LO_LO_LIM Low Low Limit	R/W	The setting for Low Low Alarm in engineering units.	-INF
LO_LO_PRI Low Low Priority	R/W	Priority of the Low Low Alarm. Setting: 0...15	0
LO_PRI Low Priority	R/W	Priority of the Low Alarm. Setting: Max. 15	1
OUT Output	Mix	The primary analog value calculated as a result of executing the function block.	-
Status	R/W	Status of OUT	-
Value	R/W	Value of OUT	-
OUT_HI_LIM Output High Limit	R/W	Limits the maximum output value for modes other than "Manual".	100
OUT_LO_LIM Output Low Limit	R/W	Limits the minimum output value for modes other than "Manual".	0
OUT_SCALE Output Scale	R/W	The high and low scale values, engineering units code and number of digits to the right of the decimal point to be used in displaying the OUT parameter and parameters which have the same scaling as OUT.	-
EU at 100%	R/W	The engineering unit value which represents the upper end of range of the associated block parameter.	100
EU at 0%	R/W	The engineering unit value which represents the lower end of range of the associated block parameter.	0

Parameter Subelement	Access	Description and settings	Initial Value
Units Index	R/W	Device Description units code index for the engineering unit descriptor for the associated block value.	Uninitialized
		Setting: All units are possible.	
Decimal Point	R/W	The number of digits to the right of the decimal point which should be used by an interface device in displaying the specified parameter.	0
PV Process Value	R	This alert is generated by any change to the static data.	-
Status	R	Status of PV	-
Value	R	Value of PV	-
PV_FTIME PV F Time (Process Value Filter Time Constant)	R/W	Time constant of a single exponential filter for the PV, in seconds.	0
		Setting: 0.0...30.0	
PV_SCALE Process Value Scale	R/W	The high and low scale values, engineering units code and number of digits to the right of the decimal point to be used in displaying the PV parameter and parameters which have the same scaling as PV.	-
EU at 100%	R/W	The engineering unit value which represents the upper end of range of the associated block parameter.	100
EU at 0%	R/W	The engineering unit value which represents the lower end of range of the associated block parameter.	0
Units Index	R/W	Device Description units code index for the engineering unit descriptor for the associated block value.	Uninitialized
		Setting: All units are possible.	
Decimal Point	R/W	The number of digits to the right of the decimal point which should be used by an interface device in displaying the specified parameter.	0
RATE Rate	R/W	Defines the derivative time constant, in seconds.	0
RCAS_IN Remote Cascade Input	R	Target setpoint and status provided by a supervisory host to a analog control or output block.	-
Status	R	Status of RCAS_IN	-
Value	R	Value of RCAS_IN	-
RCAS_OUT Remote Cascade Output	R	Block setpoint and status after ramping - provided to a supervisory host for back calculation and to allow action to be taken under limiting conditions or mode change.	-
Status	R	Status of RCAS_OUT	-
Value	R	Value of RCAS_OUT	-
RESET Reset	R/W	The integral time constant, in seconds per repeat.	+INF
ROUT_IN Remote Out Input	R	Target output and status provided by a host to the control block for use as the output (ROut mode).	-
Status	R	Status of ROUT_IN	-
Value	R	Value of ROUT_IN	-
ROUT_OUT Remote Out Output	R	Block output and status - provided to a host for back calculation in ROut mode and to allow action to be taken under limited conditions or mode change.	-
Status	R	Status of ROUT_OUT	-

Parameter Subelement	Access	Description and settings	Initial Value
Value	R	Value of ROUT_OUT	-
SHED_OPT Shed Options	R/W	<p>Defines action to be taken on remote control device timeout.</p> <p>Setting:</p> <ul style="list-style-type: none"> • Uninitialized • NormalShed_NormalReturn: Actual mode changes to next lowest priority non-remote mode permitted, but returns to target remote mode after communications are re-established • NormalShed_NoReturn: Target mode changes to next lowest priority non-remote mode permitted • ShedToAuto_NormalReturn: Actual mode changes to "Auto", but returns to target remote mode after communications are re-established • ShedToAuto_NoReturn: Target mode changes to "Auto" • ShedToManual_NormalReturn: Actual mode changes to "Manual", but returns to target remote mode after communications are re-established • NormalShed_NoReturn: Target mode changes to next lowest priority non-remote mode permitted • ShedToRetainedTarget_NormalReturn: Shed to previous target mode and return target remote mode after communications are re-established • ShedToRetainedTarget_NoReturn: Target mode changes to target retained mode 	Uninitialized
SP Setpoint	R/W	Setpoint	0
Status		Status of SP	
Value		Value of SP	
SP_HI_LIM Setpoint High Limit	R/W	The setpoint high limit is the highest setpoint operator entry that can be used for the block.	100
SP_LO_LIM Setpoint Low Limit	R/W	The setpoint low limit is the highest setpoint operator entry that can be used for the block.	0
SP_RATE_DN Setpoint Rate Down	R/W	<p>Ramp rate at which downward setpoint changes are acted on in "Auto" mode, in PV units per second. If the ramp rate is set to zero or the block is in a mode other than "Auto", then the setpoint will be used immediately.</p> <p>Setting: 0.0...+INF</p>	+INF
SP_RATE_UP Setpoint Rate Up	R/W	<p>Ramp rate at which upward setpoint changes are acted on in "Auto" mode, in PV units per second. If the ramp rate is set to zero or the block is in a mode other than "Auto", then the setpoint will be used immediately.</p> <p>Setting: 0.0...+INF</p>	+INF

Parameter Subelement	Access	Description and settings	Initial Value
STATUS_OPTS Status Options	R/W	Options which the user may select in the block processing of status. Setting: <ul style="list-style-type: none"> • IFS if Bad IN: Set Initiate Fault State status in OUT if the status of IN is "Bad". • IFS if Bad CAS_IN: Set Initiate Fault State status in OUT if the status of CAS_IN is "Bad". • Use Uncertain as Good: If the status of IN is "Uncertain", treat it as "Good" otherwise treat it as "Bad". • Target to Man if Bad IN: Set the target mode to "Man" if the status of the IN parameter is "Bad". This latches a PID block into the "Man" state of the input ever goes "Bad". • Target to next permitted mode if BAD CAS_IN 	No option selected
TRK_IN_D Tracking Input Discrete	R/W	This discrete input is used to initiate external tracking of the block output to the value specified by TRL_VAL.	-
Status	R/W	Status of TRK_IN_D	-
Value	R/W	Value of TRK_IN_D	-
TRK_SCALE Tracking Scale	R/W	The high and low scale values, engineering units code and number of digits to the right of the decimal point associated with TRK_VAL.	-
EU at 100%	R/W	The engineering unit value which represents the upper end of range of the associated block parameter.	100
EU at 0%	R/W	The engineering unit value which represents the lower end of range of the associated block parameter.	0
Units Index	R/W	Device Description units code index for the engineering unit descriptor for the associated block value. Setting: All units are possible.	Uninitialized
Decimal Point	R/W	The number of digits to the right of the decimal point which should be used by an interface device in displaying the specified parameter.	0
TRK_VALUE Tracking Value	R/W	This input is used as the track value when external tracking is enabled by TRK_IN_D.	-
Status	R/W	Status of TRK_VAL	-
Value	R/W	Value of TRK_VAL	-
UPDATE_EVT Update Event	R	This alert is generated by any change to the static data.	-
Unacknowledged	R	A discrete enumeration which is set to "Unacknowledged" when an alarm occurs, and set to "Acknowledged" by a write from a human interface device or other entity which can acknowledge that the alarm/event has been noticed. Setting: Uninitialized / Acknowledged / Unacknowledged	Uninitialized
Update State	R	A discrete enumeration which gives an indication of whether the alert has been reported. Setting: Uninitialized / Reported / Not Reported	Uninitialized

Parameter Subelement	Access	Description and settings	Initial Value
Time Stamp	R	The time when evaluation of the block was started and a change in alarm/event state was detected that is unreported. The time stamp value will be maintained constant until alert confirmation has been received - even if another change of state occurs.	Uninitialized
		Setting: MM / DD / YY (Month / Day / Year) HH:MM:SS (Hour:Minute:Second)	
Static Revision	R	The static revision of the block whose static parameter was changed and is being reported. It is possible for the present value of static revision to be greater than this because static can be changed at any time.	0
Relative Index	R	The OD index of the static parameter whose change caused this alert, minus the FB starting index. If the update event was caused by a write to multiple parameters at the same time, then this attribute will be zero.	0

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