Baumer
Passion for Sensors



Description of functions and interfaces

IO-Link functions

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1 About this document

1.1 Purpose and scope of application

This manual enables safe and efficient sensor parameterization. The manual describes the functions and is intended to support sensor installation and use.

The illustrations are examples only. Deviations are at the discretion of Baumer at all times. This manual is a supplement to the existing product documentation.

1.2 Applicable documents

- Available for download at www.baumer.com:
  - Description of functions and interfaces
  - IODD
  - Data sheet
  - EU Declaration of Conformity
- Attached to product:
  - Quickstart
  - General information (11042373)

1.3 Labels in this manual

Identifier	Usage	Example
Dialog element	Indicates dialog elements.	Click ***OK***.
Unique name	Indicates the names of products, files, etc.	*Internet Explorer* is not supported in any version.
`Code`	Indicates entries.	Enter the following IP address: `192.168.0.250`

1.4 Warnings in this manual

Warnings draw attention to potential personal injury or material damage. The warnings in this manual indicate different hazard levels:

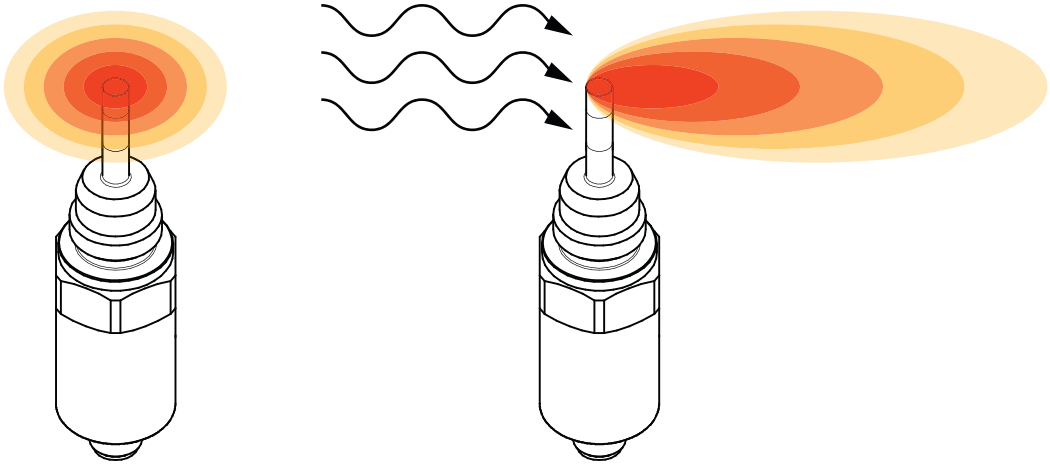
Symbol	Warning term	Explanation
	**DANGER**	Indicates an imminent potential danger with high risk of death or serious personal injury if not being avoided.
	WARNING	Indicates potential danger with medium risk of death or (serious) personal injury if not being avoided.
	CAUTION	Indicates a danger with low risk, which could lead to light or medium injury if not avoided.
	NOTE	Indicates a warning of material damage.
	**INFO**	Indicates practical information and tips that enable optimal use of the devices.

2 General functionality

The calorimetric flow sensor serves to measure and monitor flow rates of fluids. Typical applications are cooling circuits, temperature control systems as well as industrial process and utility systems.

The measurement result depends on the medium's thermal properties and the installation conditions. Only use the sensor the media and operating conditions specified in the data sheet.

Measurement principle



Ill. 1: Measurement principle of the calorimetric flow sensor

The sensor operates on the calorimetric measurement principle. Here, the heating element in the sensor head heats up in regular cycles. Heat dissipates off the sensor head into the flow medium.

The amount of heat dissipation depends on the flow rate: The higher the flow rate, the greater the cooling effect. The resulting temperature change is detected by the temperature sensor and used for flow rate calculation.

In parallel, the sensor measures the medium's temperature.

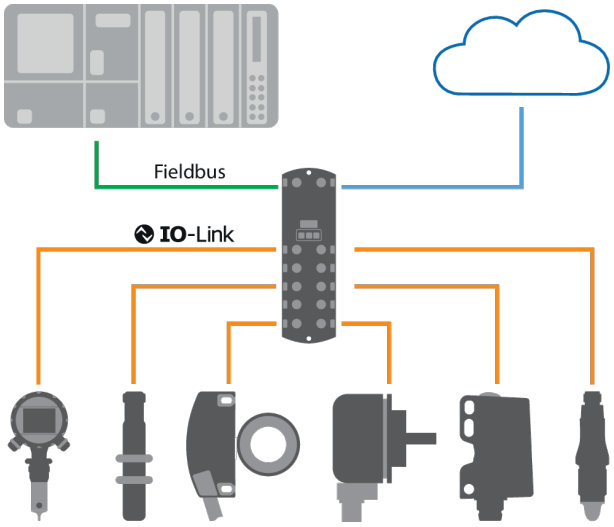
3 Interfaces

This chapter describes the sensor's communication interfaces

3.1 IO-Link

IO-Link enables manufacturer-independent digital, bidirectional point-to-point communication. For this purpose, actuators or sensors are connected to an IO-Link master by standardized 3-wire connecting cables.

The IO-Link interface serves for parameterization of the sensor functions. In addition, measurement data and the function-generated sensor and status information are digitally transmitted in the form of process data to the machine controller (PLC). Secondary data informing on the machine condition allow for continuous process monitoring and process optimization.



Ill. 2: IO-Link architecture

The IO-Link master clustering several sensors connects the controller via the respective fieldbus system, which is the so-called operational technology communication (OT communication). In addition, another Ethernet-based connection to the IO-Link master(e.g., via OPC UA or MQTT) enables direct communication between sensor and IT systems (IT communication).

There are two types of communication between IO-Link master and device.

- **Cyclic communication:**
  Transmission in real time - This data and information (process data) is used for process control in automation systems.
- **Acyclic communication:**
  Time-uncritical communication for secondary data transmission or sensor parameterization.

To address both sensor functions and secondary data correctly, IO-Link interface description utilizes the so-called IODD (IO Device Description). IODD is available for download on the sensor website (download section). Digital sensor communication, secondary data and the option of direct sensor communication with the IT world makes IO-Link a cornerstone in Smart Factory.

INFO

For IO-Link sensor evaluation, parameterization and use, *Baumer* provides both IO-Link USB-C Masters as well as *Baumer Sensor Suite (BSS)*. IO-Link devices utilize IO-Link USB-C Masters to communicate with a computer without external power supply.
Baumer Sensor Suite is a computer-based tool for programming of multi-vendor IO-Link sensors and to visualize the sensor functions. This allows for engineering both at the workplace and straight at the machine. More information at baumer.com/bss.

4 Process Data In

Process Data In (PDI) Describes sensor data in cyclic transmission via Master to PLC. *PDI* may comprise several *Measurement Data Channels (MDC)*. Every physical sensor measurand in cyclic transmission is mapped in a separate *MDC*.

PDI is a 12 byte respectively 96bit string in the structure of Smart Sensor Profile Definition *PDI96.MSDC48_2* .

Sub index	Function	Description
1	MDC1 - Velocity	Reports the sensor's measurement value (MDC1).
2	MDC1 - Scale	Change the value to adjust the measurement value scaling of *MDC*.
3	SSC1.1	Switching Signal Channel 1.1 state (speed threshold 1)
4	SSC1.2	Switching Signal Channel 1.2 state (speed threshold 2)
5	Overflow	Indicating speed overflow.
6	Uncertainty	This bit informs on measurement value quality. ▪ 0: The sensor signal quality is sufficient. ▪ 1: The sensor signal quality is insufficient. Recommended to check the sensor in the application.
7	Alarm	The alarm bit indicates a problem identified in sensor configuration or function. ▪ 0: Sensor is in standard operation. ▪ 1: A problem in sensor configuration or function has been identified.
8	DO1 Output	Status of digital output 1.
11	MDC2 - Temperature	Reports the sensor's measurement value (MDC2).
12	MDC2 - Scale	Change the value to adjust the measurement value scaling of *MDC*.
13	SSC2.1	Switching Signal Channel 2.1 state (Temperature threshold 1)
14	SSC2.2	Switching Signal Channel 2.2 state (Temperature threshold 2)

Tab. 1: Process Data In

5 Operating functions

5.1 Service Functions

5.1.1 Device Reset

The device proceeds a warm start and restarts standard operation. Device communication is interrupted but re-established by Master.

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

IO-Link Access: Device Reset

Name	Index	Subindex	Description
Device Reset (System Command)	2	–	Write value 128 to System Command. A warm start is triggered and the device is set to an initial state. Communication is interrupted by the device and then resumed by the master.

5.1.2 Application Reset

This command resets the technology-specific application. Particularly useful when a technology-specific application requires a predefined operating state without any communication interrupt and shutdown cycle.

Unlike *Reset Factory Settings* only the application-specific parameters will be reset to *Standard*. All communication and identification parameters will be retained.

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

IO-Link Access: Application Reset

Name	Index	Subindex	Description
Application Reset (System Command)	2	–	Write value 129 to System Command. The parameters of the technology-specific application are set to default values. The identification parameters remain unchanged. An upload to the data memory of the master is carried out if this is activated in the port configuration of the master.

5.1.3 Reset Factory Settings

This command restores factory default in the sensor parameterization.

Some parameters (e.g., operating hour counter) are not implicated.

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

IO-Link Access: Reset Factory Settings

Name	Index	Subindex	Description
Restore Factory Settings (System Command)	2	–	Write value 130 to System Command. The device parameters are reset to the factory settings. Note: A download of the data memory can be carried out the next time the device is switched on and overwrite the factory settings!

5.1.4 Back-to-box

Under this command the sensor restores factory default without interfering with higher-level mechanisms such as data saving or PLC-based parameterization. For example, this is particularly useful when the sensor is removed from an already configured system and restarted as a replacement.

NOTICE

Under command *Back-to-box* the sensor terminates IO-Link communication. Disconnect the sensor from the Master Port prior to the next PowerCycle. Otherwise, the Master may again transmit to the sensor the parameters saved in Data Storage.

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

IO-Link Access: Back-to-box

Name	Index	Subindex	Description
Back-to-box (System Command)	2	–	Write value 131 to System Command. The device parameters are set to the factory default values. Communication is blocked until the next switch-on process. Note: Disconnect the device directly from the master connection.

5.2 General Settings

5.2.1 Temperature Unit

This function is for selecting temperature unit Kelvin, Celsius or Fahrenheit. This adjustable setting allows for using the sensor in different environments and simplifies system integration in compliance to different regional or industrial standards. Users can select their preferred temperature scale to ensure precise measurements according to their specific requirements.

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

IO-Link Access: General Settings

Name	Index	Subindex	Description
Temperature Unit	74	1	Select temperature unit. ▪ 0 = Celsius ▪ 1 = Fahrenheit

5.3 Measurement Data Settings

This feature is used to define the *Moving Average Filter* length.

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

IO-Link Access: Moving Average Filter Length

Name	Index	Subindex	Description
Moving Average Filter Length	161	2	Moving average filter length. Higher values provide more stable readings but slower response. Allowed values: 0 ... 10 (see table below)

Filter	Number of Measured Values	Step Response Time
0	1	1.8 s
1	2	7.2 s
2	4	16 s
3	8	32 s
4	16	65 s (1 min)
5	32	131 s (2 min)
6	64	265 s (4 min)
7	128	529 s (9 min)
8	256	1060 s (18 min)
9	512	2120 s (35 min)
10	1024	4242 s (71 min)

5.4 Analog Output

The analog output function refers to the measured process value that is provided at the analog output.

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

IO-Link Access: Analog Output Function

Name	Index	Subindex	Description
Analog Output Function	116	1	Selects the process value for the analog output. ▪ `0`: Velocity (default) ▪ `1`: Temperature

5.4.1 Velocity

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

IO-Link Access: Velocity

Name	Index	Subindex	Description
Process value 1	202	2	Measurement value corresponding to the first scaling point of the analog output. The analog output generates Analog signal 1 at this measurement value [m/s].
Analog signal 1	202	3	Signal level generated by the analog output when the process value equals Process value 1 [mA].
Process value 2	202	4	Measurement value corresponding to the second scaling point of the analog output. The analog output generates Analog signal 2 at this measurement value [m/s].
Analog signal 2	202	5	Signal level generated by the analog output when the process value equals Process value 2 [mA].

5.4.2 Temperature

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

IO-Link Access: Temperature

Name	Index	Subindex	Description
Process value 1	202	12	Measurement value corresponding to the first scaling point of the analog output. The analog output generates Analog signal 1 at this measurement value [°C].
Analog signal 1	202	13	Signal level generated by the analog output when the process value equals Process value 1 [mA].
Process value 2	202	14	Measurement value corresponding to the second scaling point of the analog output. The analog output generates Analog signal 2 at this measurement value [°C].
Analog signal 2	202	15	Signal level generated by the analog output when the process value equals Process value 2 [mA].

5.5 Digital Input / Output

Make digital input and output settings here.

These settings aim at harmonized communication between sensor and PLC in the respective application.

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

IO-Link Access: DI/DO Settings

Name	Index	Subindex	Description
Output 1 Configuration			
Function	78	2	Select the output function. ▪ 0: SSC1.1 ▪ 1: SSC1.2 ▪ 2: SSC2.1 ▪ 3: SSC2.2 ▪ 4: Uncertainty ▪ 5: Overflow
Overlay	78	5	Select the overlay. ▪ 0: Off ▪ 1: On Alarm High ▪ 2: On Alarm Low

5.6 Switching Signal Channel 1.1

This function is to configure *Switching Signal Channel 1.1*. The channel changes switching status according to the process value, defined setpoints and the selected switching logic.

Parameters *Config*

Defines the switching logic of *Switching Signal Channel 1.1*. A difference is made between logic, mode and hysteresis.

- Logic: Defines whether output is active or inactive when reaching the setpoint.
- Mode: Defines the output mode. Available modes:
  - *Deactivated*
  - *Single point*
  - *Window*
  - *Two point*
- Hysteresis: Defines the output hysteresis.

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

IO-Link Access: Switching Signal Channel 1.1

Name	Index	Subindex	Description
Param			
SP1	60	1	Defines the setpoint 1 value for the switching signal channel.
SP2	60	2	Defines the setpoint 2 value for the switching signal channel.
Config			
Logic	61	1	Defines the logical representation of the switching signal SSC in the process data. ■ *0: High active* ■ *1: Low active*
Mode	61	2	Defines the evaluation mode for the switching signal SSC. ■ *0: Deactivated* ■ *1: Single point* ■ *2: Window* ■ *3: Two point*
Hysteresis	61	3	Defines the hysteresis at the switchpoint [%]. A high hysteresis may help to increase stability in critical application.

5.7 Switching Signal Channel 1.2

This function is to configure *Switching Signal Channel 1.2*. The channel changes switching status according to the process value, defined setpoints and the selected switching logic.

Parameters *Config*

Defines the switching logic of *Switching Signal Channel 1.2*. A difference is made between logic, mode and hysteresis.

- Logic: Defines whether output is active or inactive when reaching the setpoint.
- Mode: Defines the output mode. Available modes:
  - *Deactivated*
  - *Single point*
  - *Window*
  - *Two point*
- Hysteresis: Defines the output hysteresis.

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

IO-Link Access: Switching Signal Channel 1.2

Name	Index	Subindex	Description
Param			
SP1	62	1	Defines the setpoint 1 value for the switching signal channel.
SP2	62	2	Defines the setpoint 2 value for the switching signal channel.
Config			
Logic	63	1	Defines the logical representation of the switching signal SSC in the process data. ▪ *0: High active* ▪ *1: Low active*
Mode	63	2	Defines the evaluation mode for the switching signal SSC. ▪ *0: Deactivated* ▪ *1: Single point* ▪ *2: Window* ▪ *3: Two point*
Hysteresis	63	3	Defines the hysteresis at the switchpoint [%]. A high hysteresis may help to increase stability in critical application.

5.8 Switching Signal Channel 2.1

This function is to configure *Switching Signal Channel 2.1*. The channel changes switching status according to the process value, defined setpoints and the selected switching logic.

Parameters *Config*

Defines the switching logic of *Switching Signal Channel 2.1*. A difference is made between logic, mode and hysteresis.

- Logic: Defines whether output is active or inactive when reaching the setpoint.
- Mode: Defines the output mode. Available modes:
  - *Deactivated*
  - *Single point*
  - *Window*
  - *Two point*
- Hysteresis: Defines the output hysteresis.

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

IO-Link Access: Switching Signal Channel 2.1

Name	Index	Subindex	Description
Param			
SP1	16396	1	Defines the setpoint 1 value for the switching signal channel.
SP2	16396	2	Defines the setpoint 2 value for the switching signal channel.
Config			
Logic	16397	1	Defines the logical representation of the switching signal SSC in the process data. ■ *0: High active* ■ *1: Low active*
Mode	16397	2	Defines the evaluation mode for the switching signal SSC. ■ *0: Deactivated* ■ *1: Single point* ■ *2: Window* ■ *3: Two point*
Hysteresis	16397	3	Defines the hysteresis at the switchpoint [%]. A high hysteresis may help to increase stability in critical application.

5.9 Switching Signal Channel 2.2

This function is to configure *Switching Signal Channel 2.2*. The channel changes switching status according to the process value, defined setpoints and the selected switching logic.

Parameters *Config*

Defines the switching logic of *Switching Signal Channel 2.2*. A difference is made between logic, mode and hysteresis.

- Logic: Defines whether output is active or inactive when reaching the setpoint.
- Mode: Defines the output mode. Available modes:
  - *Deactivated*
  - *Single point*
  - *Window*
  - *Two point*
- Hysteresis: Defines the output hysteresis.

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

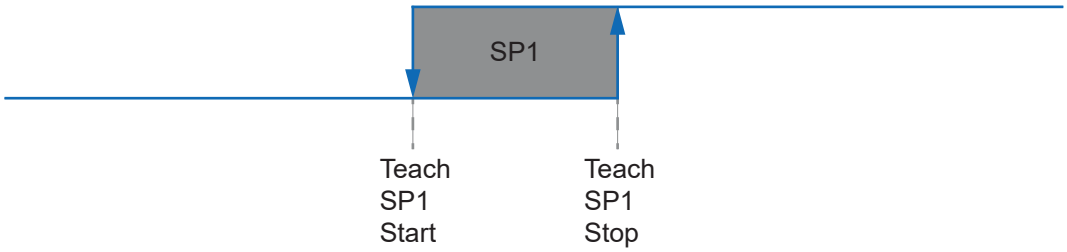
IO-Link Access: Switching Signal Channel 2.2

Name	Index	Subindex	Description
Param			
SP1	16398	1	Defines the setpoint 1 value for the switching signal channel.
SP2	16398	2	Defines the setpoint 2 value for the switching signal channel.
Config			
Logic	16399	1	Defines the logical representation of the switching signal SSC in the process data. ▪ *0: High active* ▪ *1: Low active*
Mode	16399	2	Defines the evaluation mode for the switching signal SSC. ▪ *0: Deactivated* ▪ *1: Single point* ▪ *2: Window* ▪ *3: Two point*
Hysteresis	16399	3	Defines the hysteresis at the switchpoint [%]. A high hysteresis may help to increase stability in critical application.

5.10 Teach

The function is for teaching the recognized value (+/- Teach Point Offset) as switching point. Using teach commands, the setpoints 1 and 2 (SP1 and SP2) are defined by placing the object at the desired position and executing the command. The switching output for a teach operation can be selected via *Baumer Sensor Suite (BSS)* and directly started via System Command (SC).

Using teach commands you can teach setpoints 1 and 2 (SP1 and SP2). Set the required process value for flow rate or temperature. Wait until the measurement value is stable. Use button *Teach Select* to select the required *Switching Signal Channel*. Next, execute *Teach SP1* or *Teach SP2*.



Name	Index	Subindex	Description
Teach Select	58	1	Selects the signal output for which the teach procedure is applied. ▪ *1: SSC1.1* ▪ *2: SSC1.2* ▪ *11: SSC2.1* ▪ *12: SSC2.2*
Teach - Single Value			
SC: Teach SP1	2	65	Determine setpoint 1 in a single teach procedure.
SC: Teach SP2	2	66	Determine setpoint 2 in a single teach procedure.
State	59	1	Indicates the status of the teach procedure. ▪ *0: Idle* ▪ *1: SP1 Success* ▪ *2: SP2 Success* ▪ *3: SP12 Success* ▪ *4: Waiting for Command* ▪ *5: Busy* ▪ *6: Error*

5.11 Factory settings

The sensor supports several functionalities for multiple reset commands. Select the command from the following table.

You have the following options:

Designation	Description
Device Reset	Proceeds a warm start and the device is in initial state. Device communication is interrupted but re-established by Master.
Application Reset	Restores default in the parameterization of the technology-specific application. Identification parameters will be retained. If enabled, an upload to the data memory of the master is executed.
Restore Factory Settings	Restores default in all device parameters. Note: A download of the data memory can be executed at next device power on to overwrite the default settings.
Back-to-box	Restores default in all device parameters and communication is blocked until next power on of the device. Note: Disconnect device straight at the master port.

Overview on default settings

Configurable parameters		Sensor factory defaults
General Settings	Temperature Unit	`Celsius`
Measurement Data Settings	Moving Average Filter Length	`0`
	Fluid Type	`Water`
Analog Output	Analog Output Function	`Velocity`
	Process value 1	`0.1 m/s`
	Analog signal 1	`4.00 mA`
	Process value 2	`4 m/s`
	Analog signal 2	`20.00 mA`
Digital Input / Output	Function	`SSC1.1`
	Overlay	`Off`
Switching Signal Channel 1.1	SP1	`2 m/s`
	SP2	`1.5 m/s`
	Logic	`High active`
	Mode	`Single point`

Configurable parameters		Sensor factory defaults
	Hysteresis	5 %
Switching Signal Channel 1.2	SP1	2 m/s
	SP2	1.5 m/s
	Logic	High active
	Mode	Disabled
	Hysteresis	5 %
Switching Signal Channel 2.1	SP1	50 °C
	SP2	75 °C
	Logic	High active
	Mode	Single point
	Hysteresis	5 %
Switching Signal Channel 2.2	SP1	50 °C
	SP2	75 °C
	Logic	High active
	Mode	Disabled
	Hysteresis	5 %
Teach	Teach Select	SSC1.1

Output signal IO-Link & 4...20mA

Configurable parameters		Sensor factory defaults
Analog Output	Analog Output Function	Velocity
	Process value 1	0.1 m/s
	Analog signal 1	4.00 mA
	Process value 2	4 m/s
	Analog signal 2	20.00 mA
Digital Input / Output	Function	SSC1.1
	Overlay	Off

Output signal IO-Link & 0...10V

Configurable parameters		Sensor factory defaults
Analog Output	Analog Output Function	Velocity
	Process value 1	0.1 m/s
	Analog signal 1	0 V
	Process value 2	4 m/s
	Analog signal 2	10 V
Digital Input / Output	Function	SSC1.1
	Overlay	Off

Output signal IO-Link & Push/Pull

Configurable parameters		Sensor factory defaults
Digital Input / Output	Output 1 Function	SSC1.1
	Output 1 Overlay	Off
	Output 2 Function	SSC1.1
	Output 2 Overlay	Off

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

IO-Link access: factory settings

Name	Index	Subindex	Description
System Command	2	–	▪ 128 = Device Reset ▪ 129 = Application Reset ▪ 130 = Restore Factory Settings ▪ 131 = Back-to-box

6 Diagnostic functions

6.1 Device Status Information

This function is for retrieving information on the device status.

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

IO-Link Access: Device Status Information

Name	Index	Subindex	Description
Device Status	36	0	Indicator for the current device condition and diagnosis state. ▪ 0 = OK ▪ 1 = Maintenance-Required ▪ 2 = Out-of-Specification ▪ 3 = Functional-Check ▪ 4 = Failure
Detailed Device Status	37	1,2	List of all currently pending events in the device.

6.2 Identification

These functions read/write various different information for sensor identification.

Have the following information ready:

- Product ID
- Serial number
- Firmware version
- Production code

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

IO-Link access: Identification

Name	Index	Subindex	Description
Vendor Name	16	–	The vendor name that is assigned to a Vendor ID. Default value: Baumer Electric AG
Vendor Text	17	–	Additional information about the vendor. Default value: www.baumer.com
Product Name	18	–	Complete product name.
Product ID	19	–	Vendor-specific product or type identification (e.g. item number or model number).
Product Text	20	–	Additional product information for the device.
Application-specific Tag	24	–	Possibility to mark a device with user- or application-specific information.
Function Tag	25	–	User specified function tag.
Location Tag	26	–	User specified location tag.
Serial Number	21	–	Unique, vendor-specific identifier of the individual device.
Firmware Revision	23	–	Unique, vendor-specific identifier of the firmware revision of the individual device.
Hardware Revision	22	–	Unique, vendor-specific identifier of the hardware revision of the individual device.

6.3 Measurement Data Information

This function is for retrieving additional information on the measurement data.

For more detailed information on the following please refer to chapter *Annex [▶ 28]*.

IO-Link Access: Measurement Data Information

Name	Index	Subindex	Description
MDC1 Descriptor			
Lower Value	16512	1	Shows the lower value of measurement range.
Upper Value	16512	2	Shows the upper value of measurement range.
Unit	16512	3	Shows the physical unit.
Scale	16512	4	Shows the multiplier for measurement value - 10exp(scale).
MDC2 Descriptor			
Lower Value	16513	1	Shows the lower value of measurement range.
Upper Value	16513	2	Shows the upper value of measurement range.
Unit	16513	3	Shows the physical unit.
Scale	16513	4	Shows the multiplier for measurement value - 10exp(scale).

7 Annex

7.1 IO-Link

7.1.1 PDI

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	64	32-bit Integer	-2147483640 = Out of range (-), 2147483640 = Out of range (+), 2147483644 = No measurement data, -2147483639..2147483639					MDC1 - Velocity	Measurement value of velocity (MDC1).
2	56	8-bit Integer						MDC1 - Scale	Dynamic scale for velocity measurement.
3	48	Boolean	false = Low, true = High					SSC1.1	Switching signal channel 1.1 state (Velocity threshold 1).
4	49	Boolean	false = Low, true = High					SSC1.2	Switching signal channel 1.2 state (Velocity threshold 2).
5	50	Boolean						Overflow	Velocity overflow indicator
6	51	Boolean						Uncertainty	Measurement uncertainty indicator
7	52	Boolean						Alarm	Alarm state indicator (potential hardware fault)
8	53	Boolean						DO1 Output	Digital output 1 state
11	16	32-bit Integer	-2147483640 = Out of range (-), 2147483640 = Out of range (+), 2147483644 = No measurement data, -2147483639..2147483639					MDC2 - Temperature	Measurement value of temperature (MDC2).
12	8	8-bit Integer						MDC2 - Scale	Dynamic scale for temperature measurement.
13	0	Boolean	false = Low, true = High					SSC2.1	Switching signal channel 2.1 state (Temperature threshold 1).
14	1	Boolean	false = Low, true = High					SSC2.2	Switching signal channel 2.2 state (Temperature threshold 2).

Octet 0

bit offset	95	94	93	92	91	90	89	88
subindex	1							
element bit	31	30	29	28	27	26	25	24

Octet 1

bit offset	87	86	85	84	83	82	81	80
subindex	1							
element bit	23	22	21	20	19	18	17	16

Octet 2

bit offset	79	78	77	76	75	74	73	72
subindex	1							
element bit	15	14	13	12	11	10	9	8

Octet 3

bit offset	71	70	69	68	67	66	65	64
subindex	1							
element bit	7	6	5	4	3	2	1	0

Octet 4

bit offset	63	62	61	60	59	58	57	56
subindex	2							
element bit	7	6	5	4	3	2	1	0

Octet 5

bit offset	55	54	53	52	51	50	49	48
subindex	//////	//////	8	7	6	5	4	3

Octet 6

bit offset	47	46	45	44	43	42	41	40
subindex	11							
element bit	31	30	29	28	27	26	25	24

Octet 7

bit offset	39	38	37	36	35	34	33	32
subindex	11							
element bit	23	22	21	20	19	18	17	16

Octet 8

bit offset	31	30	29	28	27	26	25	24
subindex	11							
element bit	15	14	13	12	11	10	9	8

Octet 9

bit offset	23	22	21	20	19	18	17	16
subindex	11							
element bit	7	6	5	4	3	2	1	0

Octet 10

bit offset	15	14	13	12	11	10	9	8
subindex	12							
element bit	7	6	5	4	3	2	1	0

Octet 11

bit offset	7	6	5	4	3	2	1	0
subindex	//////	//////	//////	//////	//////	//////	14	13

7.1.2 Identification

Index	Subindex	Name	Data type	Access rights	Value range	Description
16	0	Vendor Name	String	R	ASCII	Vendor name that is assigned to a vendor ID, e. g. Baumer.
17	0	Vendor Text	String	R	ASCII	Additional information about the vendor, e. g. www.baumer.com
18	0	Product Name	String	R	ASCII	Complete product name, e. g. IFxx.DxxL.
19	0	Product ID	String	R	ASCII	Vendor-specific product or type identification, e. g. item number or model number.
20	0	Product Text	String	R	ASCII	Additional product information for the device.
21	0	Serial number	String	R	ASCII	Unique, vendor-specific identifier of the individual device.
22	0	Hardware revision	String	R	ASCII	Unique, vendor-specific identifier of the hardware revision of the individual device, e. g. 00.00.01
23	0	Firmware Revision	String	R	ASCII	Unique, vendor-specific identifier of the firmware revision of the individual device, e .g. 00.00.04
24	0	Application specific Tag	String	R/W	ASCII	Possibility to mark a device with user-or application-specific information.
25	0	Function Tag	String	R/W	ASCII	Possibility to mark a device with function-specific information.
26	0	Location Tag	String	R/W	ASCII	Possibility to mark a device with location-specific information.

7.1.3 Parameters

7.1.3.1 System Command

Index	Subindex	Name	Data type	Access rights	Value range	Description
2	–	System Command	Uint8	W		▪ 128 = Device Reset ▪ 129 = Application Reset ▪ 130 = Restore Factory Settings ▪ 131 = Back-to-box

7.1.3.2 General Settings

Index	Subindex	Name	Data type	Access rights	Value range	Description
74	1	Temperature Unit	Uint8	R/W		Select temperature unit. ▪ 0 = Celsius ▪ 1 = Fahrenheit

7.1.3.3 Measurement Data Settings

Index	Subindex	Name	Data type	Access rights	Value range	Description
161	2	Moving Average Filter Length	Uint8	R/W	0 ... 10	Moving average filter length. Higher values provide more stable readings but slower response. ▪ 0 = no filter (1 sample) ▪ 1 = 2 samples ▪ 2 = 4 samples ▪ ... ▪ 10 = 1024 samples

7.1.3.4 Analog Output

Index	Subindex	Name	Data type	Access rights	Value range	Description
116	1	Analog Output Function	Uint8	R/W		Selects the process value for the analog output. ▪ 0: Velocity (default) ▪ 1: Temperature
Velocity						
202	2	Process value 1	Int16	R/W	0 ... 400	Measurement value corresponding to the first scaling point of the analog output. The analog output generates Analog signal 1 at this measurement value [m/s].
202	3	Analog signal 1	Uint16	R/W	400 ... 2000	Signal level generated by the analog output when the process value equals Process value 1 [mA].
202	4	Process value 2	Int16	R/W	0 ... 400	Measurement value corresponding to the second scaling point of the analog output. The analog output generates Analog signal 2 at this measurement value [m/s].
202	5	Analog signal 2	Uint16	R/W	400 ... 2000	Signal level generated by the analog output when the process value equals Process value 2 [mA].
Temperature						
202	12	Process value 1	Int16	R/W	-250 ... 1500	Measurement value corresponding to the first scaling point of the analog output. The analog output generates Analog signal 1 at this measurement value [°C].
202	13	Analog signal 1	Uint16	R/W	400 ... 2000	Signal level generated by the analog output when the process value equals Process value 1 [mA].
202	14	Process value 2	Int16	R/W	-250 ... 1500	Measurement value corresponding to the second scaling point of the analog output. The analog output generates Analog signal 2 at this measurement value [°C].
202	15	Analog signal 2	Uint16	R/W	400 ... 2000	Signal level generated by the analog output when the process value equals Process value 2 [mA].

7.1.3.5 Digital Input / Output

Index	Subindex	Name	Data type	Access rights	Value range	Description
78	2	Function	UInt8	R/W		Select the output function. ▪ 0: SSC1.1 ▪ 1: SSC1.2 ▪ 2: SSC2.1 ▪ 3: SSC2.2 ▪ 4: Uncertainty ▪ 5: Overflow
78	5	Overlay	UInt8	R/W		Select the overlay. ▪ 0: Off ▪ 1: On Alarm High ▪ 2: On Alarm Low

7.1.3.6 Switching Signal Channel

Switching Signal Channel 1.1

Index	Subindex	Name	Data type	Access rights	Value range	Description
Param						
60	1	SP1	Int32	R/W	0.1 ... 4	Defines the setpoint 1 value for the switching signal channel.
60	2	SP2	Int32	R/W	0.1 ... 4	Defines the setpoint 2 value for the switching signal channel.
Config						
61	1	Logic	Uint8	R/W		Defines the logical representation of the switching signal SSC in the process data. ▪ *0: High active* ▪ *1: Low active*
61	2	Mode	Uint8	R/W		Defines the evaluation mode for the switching signal SSC. ▪ *0: Deactivated* ▪ *1: Single point* ▪ *2: Window* ▪ *3: Two point*
61	3	Hysteresis	Int32	R/W	1 ... 100	Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications.

Switching Signal Channel 1.2

Index	Subindex	Name	Data type	Access rights	Value range	Description
Param						
62	1	SP1	Int32	R/W	0.1 ... 4	Defines the setpoint 1 value for the switching signal channel.
62	2	SP2	Int32	R/W	0.1 ... 4	Defines the setpoint 2 value for the switching signal channel.
Config						
63	1	Logic	Uint8	R/W		Defines the logical representation of the switching signal SSC in the process data. ▪ *0: High active* ▪ *1: Low active*

Index	Subindex	Name	Data type	Access rights	Value range	Description
63	2	Mode	Uint8	R/W		Defines the evaluation mode for the switching signal SSC. ▪ *0: Deactivated* ▪ *1: Single point* ▪ *2: Window* ▪ *3: Two point*
63	3	Hysteresis	Int32	R/W	1 ... 100	Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications.

Switching Signal Channel 2.1

Index	Subindex	Name	Data type	Access rights	Value range	Description
Param						
16396	1	SP1	Int32	R/W	-25 ... 150	Defines the setpoint 1 value for the switching signal channel.
16396	2	SP2	Int32	R/W	-25 ... 150	Defines the setpoint 2 value for the switching signal channel.
Config						
16397	1	Logic	Uint8	R/W		Defines the logical representation of the switching signal SSC in the process data. ▪ *0: High active* ▪ *1: Low active*
16397	2	Mode	Uint8	R/W		Defines the evaluation mode for the switching signal SSC. ▪ *0: Deactivated* ▪ *1: Single point* ▪ *2: Window* ▪ *3: Two point*
16397	3	Hysteresis	Int32	R/W	1 ... 100	Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications.

Switching Signal Channel 2.2

Index	Subindex	Name	Data type	Access rights	Value range	Description
Param						
16398	1	SP1	Int32	R/W	-25 ... 150	Defines the setpoint 1 value for the switching signal channel.
16398	2	SP2	Int32	R/W	-25 ... 150	Defines the setpoint 2 value for the switching signal channel.
Config						
16399	1	Logic	Uint8	R/W		Defines the logical representation of the switching signal SSC in the process data. ▪ *0: High active* ▪ *1: Low active*
16399	2	Mode	Uint8	R/W		Defines the evaluation mode for the switching signal SSC. ▪ *0: Deactivated* ▪ *1: Single point* ▪ *2: Window* ▪ *3: Two point*
16399	3	Hysteresis	Int32	R/W	1 ... 100	Defines the hysteresis at the switchpoint. A higher hysteresis may help to increase stability in critical applications.

7.1.3.7 Teach

Index	Subindex	Name	Data type	Access rights	Value range	Description
58	1	Teach Select	UInt8	R/W		Selects the signal output for which the teach procedure is applied. ▪ *1: SSC1.1* ▪ *2: SSC1.2* ▪ *11: SSC2.1* ▪ *12: SSC2.2*
Teach Single Value						
2	65	SC: Teach SP1	UInt8	W		Determine setpoint 1 in a single teach procedure.
2	66	SC: Teach SP2	UInt8	W		Determine setpoint 2 in a single teach procedure.
59	1	State	UInt4	R		Indicates the status of the teach procedure. ▪ *0: Idle* ▪ *1: SP1 Success* ▪ *2: SP2 Success* ▪ *3: SP12 Success* ▪ *4: Waiting for Command* ▪ *5: Busy* ▪ *6: Error*

7.1.4 Diagnosis

7.1.4.1 Device Status

Index	Subindex	Name	Data type	Access rights	Value range	Description
36	0	Device Status	UInt8	R		Indicator for the current device condition and diagnosis state. ▪ 0 = OK ▪ 1 = Maintenance-Required ▪ 2 = Out-of-Specification ▪ 3 = Functional-Check ▪ 4 = Failure
37	1,2	Detailed Device Status	Array	R		List of all currently pending events in the device.

7.1.4.2 Measurement Data Information

Index	Subindex	Name	Data type	Access rights	Value range	Description
MDC1 Descriptor						
16512	1	Lower Value	Int32	R		Shows the lower value of measurement range.
16512	2	Upper Value	Int32	R		Shows the upper value of measurement range.
16512	3	Unit	UInt16	R		Shows the physical unit.
16512	4	Scale	Int8	R		Shows the multiplier for measurement value - 10exp(scale).
MDC2 Descriptor						
16513	1	Lower Value	Int32	R		Shows the lower value of measurement range.
16513	2	Upper Value	Int32	R		Shows the upper value of measurement range.
16513	3	Unit	UInt16	R		Shows the physical unit.
16513	4	Scale	Int8	R		Shows the multiplier for measurement value - 10exp(scale).

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