OPERATION MANUAL

Digital instrumentation amplifier for strain gage sensors with IO-Link interface
Model 9210

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Contents

1 Introduction

1.1 Purpose of this manual

This operation manual is intended to help you familiarize yourself with the device and gain the full functional benefit from its high performance capabilities.

The operation manual contains important information for the safe, proper and effective use of the device. Follow the instructions carefully to reduce repair costs and downtime, and increase the reliability and service life of the device.

1.2 Scope of this manual

This operation manual applies exclusively to the model 9210 Digital Instrumentation Amplifier for Strain Gage Sensors with IO-Link Interface (henceforth: device).

1.3 Target group

This operation manual is intended for personnel tasked with installing and operating the device.

1.4 Presentation of information

To enable you to work quickly and safely with this manual, standardized formatting, numbering, symbols, warnings (see section 2.2), terms and abbreviations are used.

▶ Instructions are indicated by an arrow.

Note: Please observe these notes to ensure correct handling of the device.

IMPORTANT: Observe the information in the operation manual.

1.5 Warranty

burster präzisionsmesstechnik gmbh & co. kg provides a manufacturer's warranty for a period of 24 months after delivery.

Any repairs required during this time will be made without charge. This does not include damage arising from improper use.

Please note the following when sending the device in for repair:

- If there is a problem with the device, please attach a note to the body of the device summarizing the fault.
- Technical specifications subject to change at any time without notice.
  We also state explicitly that we do not accept liability for consequential damage.
- The device must always be dispatched in suitable packaging.

Conversions and modifications

Note: The warranty shall be deemed void **immediately** if you open or dismantle the device during the warranty period.

The device does not contain any parts that are intended to be serviced by the user. Only the manufacturer's own qualified personnel are permitted to open the device.

It is not permitted to make any changes to the device without the written agreement of burster präzisionsmesstechnik gmbh & co. kg. burster präzisionsmesstechnik gmbh & co. kg does not accept liability for damages or injury if this condition is disregarded.

2 Safety

IMPORTANT: Read the operation manual carefully before using the equipment, and keep it for future reference.

2.1 Applications

2.1.1 Intended use

This product is a precision device and is used to measure objects, items or physical variables and to process and provide measured values as electrical values for the higher-level system.

Unless this product is specially marked, it may not be used in potentially explosive atmospheres.

2.1.2 Restrictions on use

The device does not pose a hazard if used within its specification and in accordance with the safety regulations.

The manufacturer does not accept liability for any personal injury or property damage arising from improper installation or operation, or from misinterpretation of measurement results.

2.1.3 Limitation of liability

All information and instructions in this manual have been compiled in accordance with the applicable standards and regulations, the state of the art and our many years of knowledge and experience.

The manufacturer accepts no liability for damage resulting from the following:

- Failure to observe the instructions
- Use contrary to the intended purpose
- Use by unqualified persons
- Unauthorized modifications

The obligations agreed in the delivery contract, the General Terms and Conditions and the delivery conditions of the manufacturer and its suppliers, and the statutory regulations in force at the time of entering into the contract shall apply.

2.2 Representation of hazards

Hazards are represented in the following ways in this operation manual:

!	NOTICE
	Property damage to the equipment or the surroundings will result if the hazard is not avoided. ▶ Observe the advice for protecting the device.

2.3 Requirements for personnel

Personnel must be familiar with the relevant regulations. They must follow these regulations. Only trained personnel who are familiar with the applicable safety regulations are permitted to operate the device.

3 Description

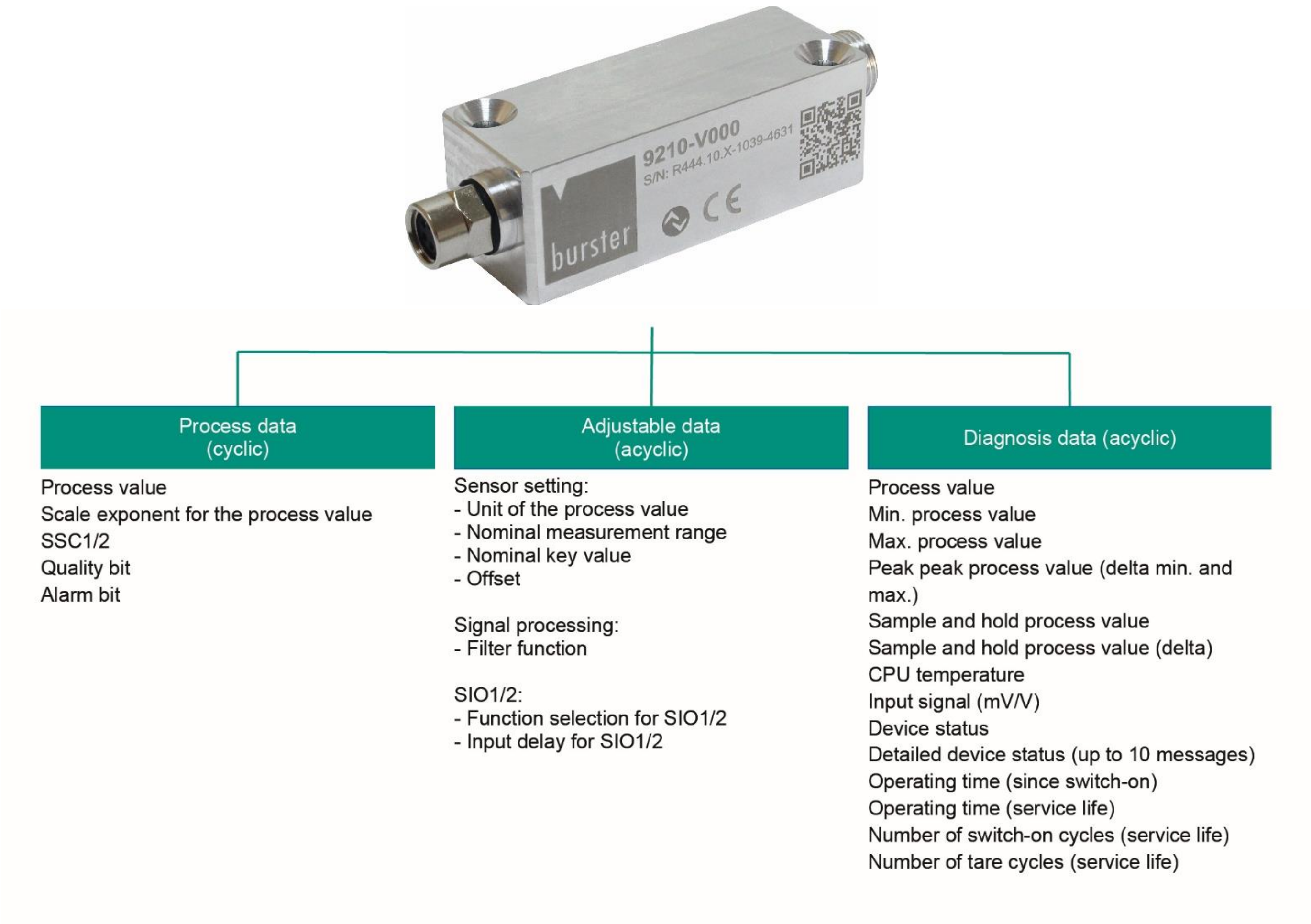
3.1 How it works – general principle

The amplifier electronics process signals from sensors with strain gages and transmit the measured values digitally. Communication conforms to the IO-Link standard.

3.2 IO-Link communication (overview)

IO-Link communication uses cyclic and acyclic data:

- **Cyclic data:**
  Data that the device transmits automatically and at regular intervals (process data).
- **Acyclic data:**
  Data that the device only transmits on request. This data stream can be used to configure the device (parameter data). Acyclic data also enables the transmission of data for diagnostics (diagnostic data).



4 Unpacking / what's included / storage

4.1 Unpacking

!	NOTICE
	▶ Never connect the device if it shows signs of damage incurred in transit. ▶ Only ever use the device under the conditions specified in this operation manual.

▶ Inspect the device for damage. If you suspect that the device has been damaged during shipping, notify the delivery company within 72 hours.

The packaging should be retained by a representative of the manufacturer and/or the delivery company.

The device should be transported only in its original packaging or in packaging capable of providing an equivalent degree of protection.

4.2 Contents of pack

- IO-Link instrumentation amplifier, model 9210

4.3 Storage

The device must be stored under the following conditions only:

- Ambient humidity 20 … 85 %
- Store in a dry and dust-free location
- Do not expose to aggressive media
- Protect from sunlight
- Avoid mechanical shocks
- Do not store outdoors
- Temperature between -40 °C and +85 °C

Note: Provided the storage conditions have been observed, no special steps need to be taken after storage and prior to commissioning.

5 Electrical installation

5.1 Connection diagram instrumentation amplifier 9210-V000

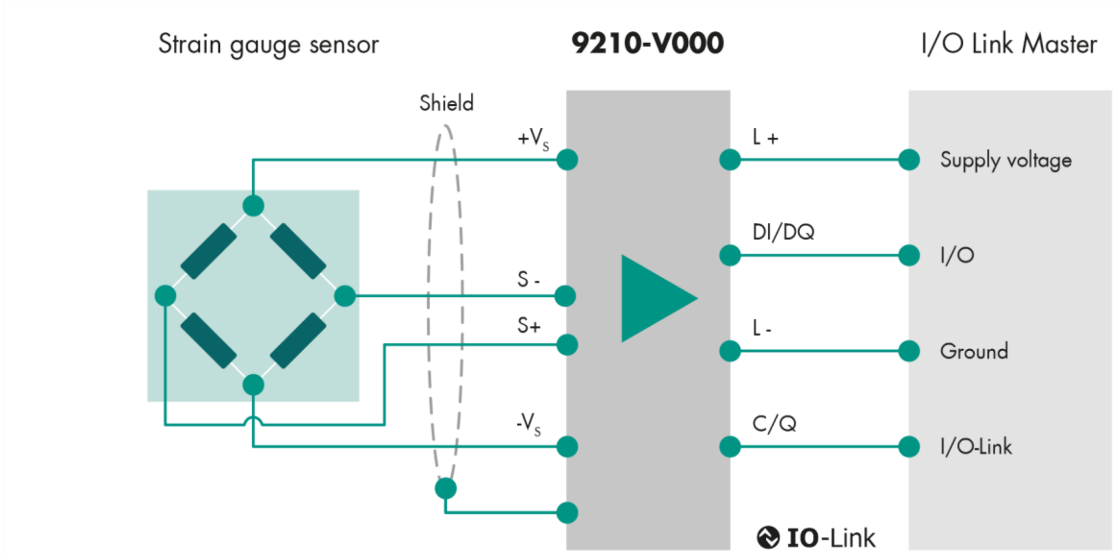


Figure 1: Connection diagram instrumentation amplifier 9210-V000

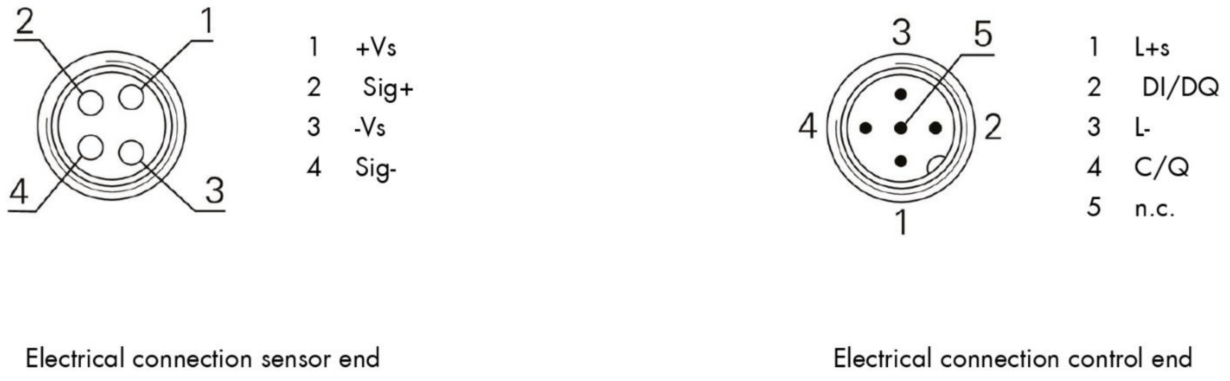


Figure 2: Electrical connections for instrumentation amplifier 9210-V000

6 Using the device for the first time

	NOTICE
!	▶ Never put the device into operation if it shows signs of damage incurred in transit. ▶ Only ever use the device under the conditions specified in this operation manual.

6.1 Putting the instrumentation amplifier into operation

The instrumentation amplifier input is set to 1 mV/V as standard. With optional calibration, the instrumentation amplifier is calibrated for the connected sensor.

6.2 Parameterization of the instrumentation amplifier

Note: For parameterization, you need an IO-Link master and the IO-Link Device Description (IODD) of the instrumentation amplifier.
You can find the IODD to download at www.burster.com or ioddfinder.io-link.com.

The following parameterization options can be used to adapt the instrumentation amplifier to your application (parameterization via IO-Link):

- Sensor setup:
  - Unit of the process value
  - Nominal measuring range
  - Nominal sensitivity
  - Offset
- Signal processing:
  - Filter function
- SIO1/2:
  - Function selection for SIO1/2
  - Input delay for SIO1/2
- IO-Link communication (cyclic data)
  - Signal selection
- SSC1/SSC2:
  - Mode (single point / window / two point)
  - Hysteresis
  - Response delay
  - Pulse duration

7 Functions

7.1 Process data

The process value and the individual status bits are presented on the Process Data tab.

7.1.1 Process Data In (PDI) process value

The cyclic process value is displayed here. Under ***Parameter*** | ***MDC Selection Source*** select what is to be presented here via the IO-Link communication (cyclic). You can choose from the following options:

- Process value
- Min. process value
- Max. process value
- Peak Peak process value (delta between min. and max. process value)
- Sample and Hold process value
- Sample and Hold process value (delta)

Note: The cyclic process value is always transmitted as Int32. Therefore, for simplification, all process-value-related acyclic parameters/values are also transmitted as Int32.
The scale exponent -5 is included in the IO-Link Device Description (IODD), but is not applied by all masters. Thus, depending on the master, the value is displayed as Int32 or as Int32 scaled at a factor of 10^{-5}.

The process value is transmitted in the unit that has been parameterized in the input scaling (N, µm/m, kg, t). Regardless of the unit, the process value is always output with the identical exponent:

- MDC Descriptor.Scale Exponent = −5

This way, process values of up to ±20000 can be transmitted. The process value that can be represented in the amplifier is always twice the sensor's set nominal measuring range:

- 2 × parameter *Nominal Process Value*

With very small nominal values, the resolution is increasingly reduced. However, in such cases another value can be selected that is better suited for the fixed exponent (e.g. 100 N instead of 0.1 kN).

Nominal value		**Resolution**		**Display range**
	as value	in % FS	in bits	
0.01	0.0001	0.1 %	10.0	-0.0200 … 0.0200
0.1	0.0001	0.01 %	13.3	-0.2000 … 0.20000
1.0	0.0001	0.001 %	16.6	-2.00000 … 2.00000
10	0.0001	0.0001 %	19.9	-20.00000 … 20.00000
…	…	…	…	…
10000	0.0001			-20000.00000 … 20000.00000

7.1.2 Status Bits Process Data In (PDI)

The following bits are presented:

Status bit	Description
Bit 0: SSC1	• Switching status of SSC1
Bit 1: SSC2	• Switching status of SSC2
Bit 2: Quality	• An internal value is not in the optimal range and possibly near the function threshold. • The presented process values remain valid. • You can find out the precise reason under *IO-Link Device Status*.
Bit 3: Alarm	• The presented process values are invalid. • Possible causes: ▪ The input signal is outside the measurable range ▪ Internal signal overflow ▪ Hardware or system error • You can find out the precise reason under *IO-Link Device Status*.

7.1.3 Status Bits Process Data Out (PDO)

The following bits are presented:

Status bit	Description
Bit 2: S&H trigger	• Trigger signal for the sample and hold functions (flank-triggered). • Flank-triggered means that the sample and hold stores the process value if the bit was set to 0 at the last transmission and to 1 at the most recent transmission.
Bit 3: Teach-in offset / tare	• Triggers an offset teach-in (*teach-in offset*). • The function remains active as long as the bit is set.
Bit 4: Memory reset	• Trigger signal for resetting the storage functions: max., min. or peak peak process value (flank-triggered).
Bit 5: Teach-in sensitivity	• Triggers a sensitivity teach-in (*teach-in sensitivity*). • The function remains active as long as the bit is set. • The function is only active if the parameter *Teach-in.Sensitivity Enable* is set to `Enable`. If not, this bit is not evaluated.

7.2 Observation

On the *Observation* tab, next to the processed process value, peak values and sample and hold process values are presented.

Note: **Resetting memory values and sample and hold**
Memory values and sample and hold can each be reset via the cyclic data or via one of the two I/O pins. The peak value memory is reset via the *Memory Reset* signal, while sample and hold is reset via the *Sample and Hold Trigger* signal.

IO-Link parameters: Peak value memory and sample and hold (measured values)

Parameter name	Description
Process Value.Processed	Output the current process value (processed).
Process Value.Minimum	Output the min. process value since the last memory reset.
Process Value.Maximum	Output the max. process value since the last memory reset.
Process Value.Peak Peak	Output the peak to peak process value (delta between min. and max. process value) since the last memory reset.
Process Value.Sample and Hold	Output the process value that was held during the last S&H trigger.
Process Value.Sample and Hold Delta	Output the difference between the process value held during the last S&H trigger and the current process value.

7.2.1 Peak value memory (Memory Values)

The following values are stored with the Memory Values:

- Min. measured process value since the last memory reset
- Max. measured process value since the last memory reset
- Peak Peak process value (delta between min. and max. process value)

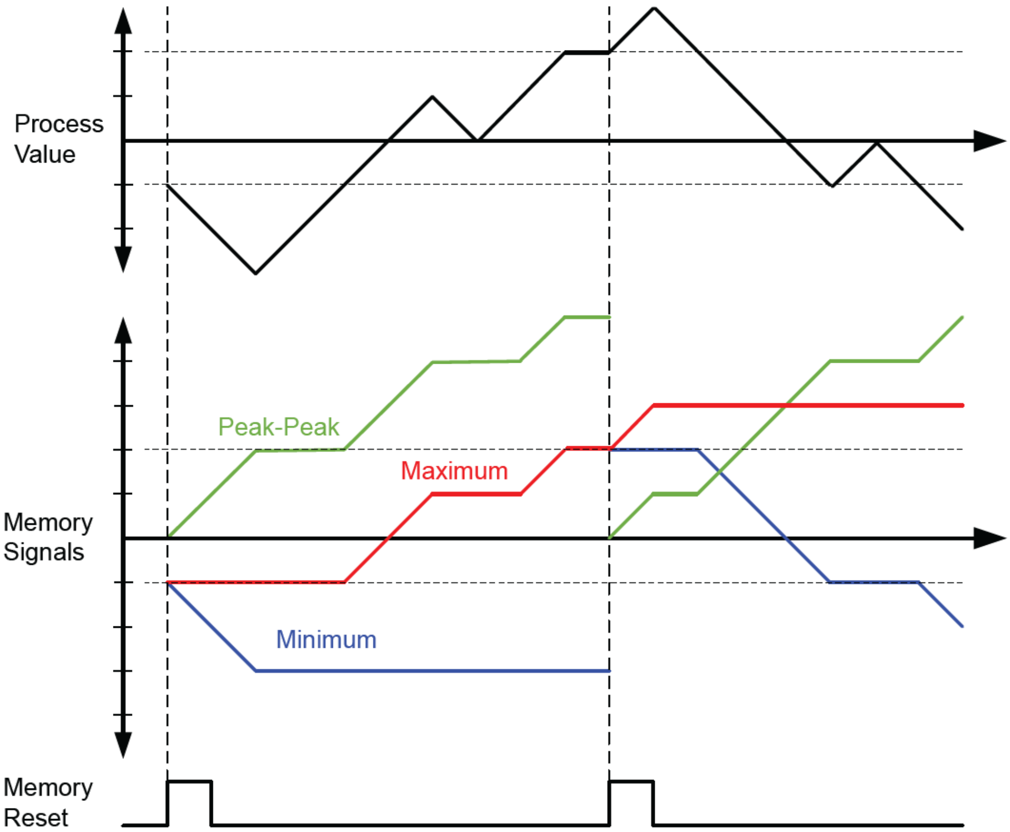


Figure 3: Peak value memory

The peak values are output via the cyclic process data. In addition, all memory values can be read out acyclically via IO-Link.

7.2.2 Sample and Hold

Sample and Hold (S&H) stores the following values:

- The process value that was held during the last sample and hold trigger (cf. fig. 4: S&H value). The measured value (process value) at the trigger time is held.
- The difference between the process value held during the last sample and hold trigger and the current process value (cf. fig. 4: S&H Delta. S&H Delta = S&H Value – Process Value).

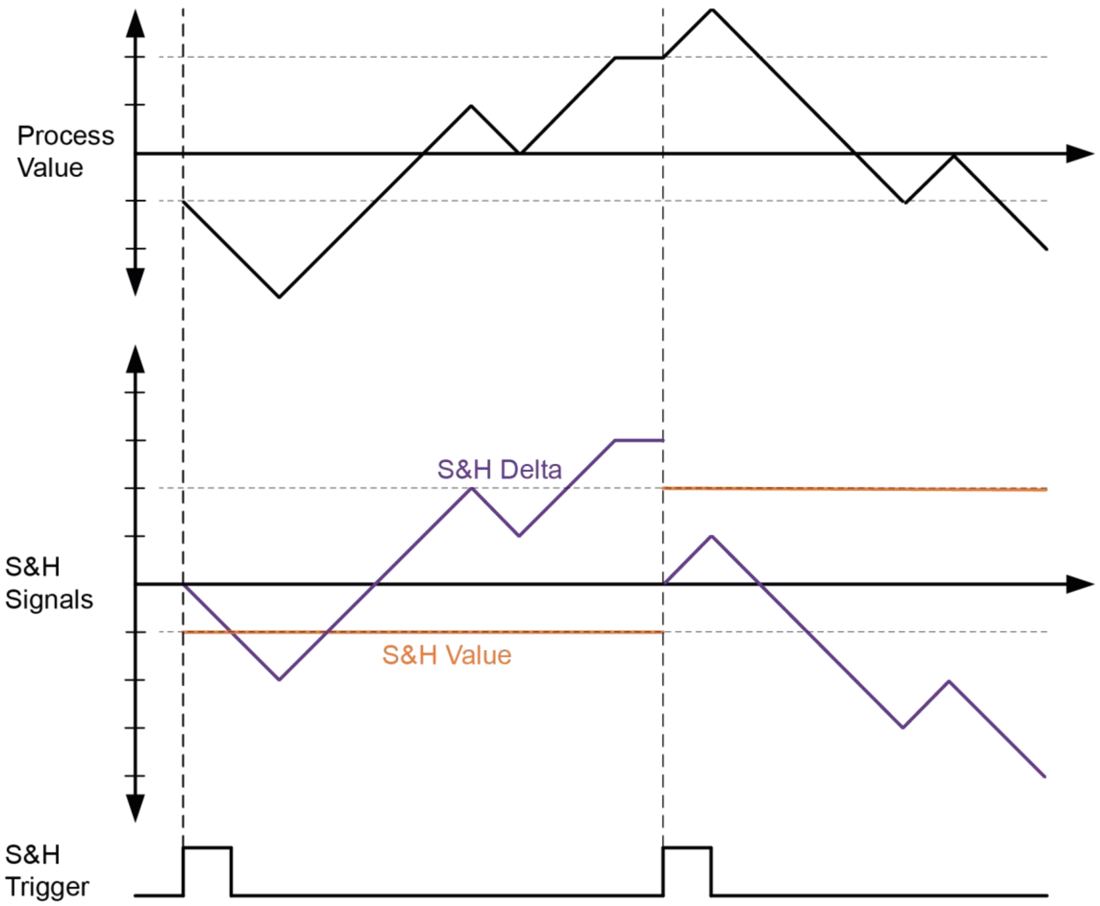


Figure 4: Sample and Hold

The values are output via the cyclic process data. In addition, all memory values can be read out acyclically via IO-Link.

7.3 Parameter

On the *Parameter* tab, you can set various sensor characteristics.

7.3.1 Parameterization of the sensor characteristics

By parameterizing the characteristics of the sensor you can define the conversion of the input signal (mV/V) into the process value (N, kN, µm/m, …). You have the following options for setting the parameters:

- Manual parameterization of the sensor characteristics (teach-in by value): Input of the parameters directly via IO-Link
- Teaching in the parameters via the teach-in process
  - Offset teach-in (Teach-In Offset / Taring)
  - Sensitivity teach-in (Teach-In Sensitivity)

7.3.1.1 Parameterizable sensor characteristics

In general, you can parameterize the following sensor characteristics on the instrumentation amplifier:

- Unit of the process value (*Process Value Unit*)
- Nominal measuring range of the process value / rated load (*Nominal Process Value*)
- Nominal sensitivity of the sensor in mV/V (*Nominal Sensitivity*)
- Input signal in mV/V at which a process value of 0 should be output / zero signal (*Offset*)

Note: With a factory calibration, the instrumentation amplifier is adjusted so that the output signal is 0 when the sensor is unloaded without attachment parts and without pre-load.

Example: Conversion of the input signal into the process value

The sensor is parameterized with the following characteristics:

- *Process Value Unit* = N
- *Nominal Process Value* = 1000 N
- *Nominal Sensitivity* = 1 mV/V
- *Offset* = 0.2 mV/V

This means that the process value is converted as shown in the following graph:

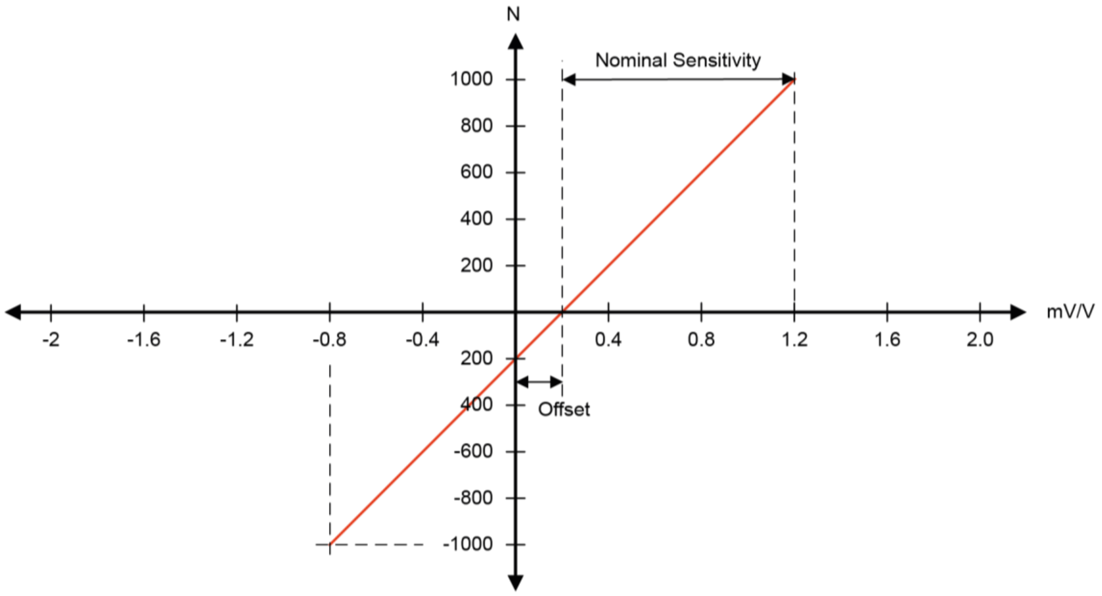


Figure 5: Converting the input signal into the process value

Note: Limited evaluable measuring range

The evaluable measuring range is limited to double the set parameter *Nominal Process Value* (in positive and negative signal direction). Example:
Nominal Process Value: 1000 N
Input signal range: -0.8 ... 1.2 mV/V (nominal)
Evaluable measuring range: ±(2 × 1000 N) = ±2000 N
This corresponds to: 0.2 ± (2 × 1 mV/V) = -1.8 ... 2.2 mV/V
Therefore: Process values smaller than -2000 N or larger than +2000 N are not displayed (see Diagnosis **|** Device Status).

7.3.1.2 Manual parameterization of the sensor characteristics (Teach-In by Value)

With the *Teach-In by Value* function you enter the sensor characteristics directly as values via IO-Link.

Example

Sensor characteristics:

- Nominal process value: 1000 N
- Rated output sensitivity: 1.5110 mV/V
- Zero point: Is not specified exactly, but lies within a certain specified range.

Parameterize the amplifier electronics as follows:

- *Process Value Unit* = N
- *Nominal Process Value* = 1000 N
- *Nominal Sensitivity* = 1.5110 mV/V
- *Offset* = initially 0, can be set via *Teach-In Offset*

IO-Link parameters: Manual parameterization (customer sensor adjustment)

Parameter name	Description
Customer Sensor Adjustment.Process Value Unit	Enter the unit of the process value that is measured with the sensor.
Customer Sensor Adjustment.Nominal Process Value	Enter the nominal process value (in the unit defined for the process value).
Customer Sensor Adjustment.Nominal Sensitivity	Enter the nominal sensitivity of the sensor (in mV/V).
Customer Sensor Adjustment.Offset	Enter the input signal at which a process value of 0 is output (in mV/V)

7.3.1.3 Teaching in the sensor characteristics via the teach-in process

In addition to the manual parameterization of the sensor characteristics, you can also carry out the parameterization via a teach-in process:

- Offset teach-in (*Teach-In Offset / Taring*)
- Sensitivity teach-in (*Teach-In Sensitivity*)

During the teach-in process, the instrumentation amplifier superimposes the *Moving Average* filter over the input signal. The filter increases the accuracy for measuring the input signal.

7.3.1.3.1 Offset teach-in (Teach-In Offset / Taring)

With the *Teach-In Offset / Taring* function you can tare the sensor. Carry out the offset teach-in after installation and ideally following several cycles at full load. The following options are available to you for the offset teach-in:

- Via IO-Link (cyclic data)
- Via one of the two I/O pins. In the factory settings, SIO2 (DQ/DI connection) is assigned with this function.

Example 1: Offset teach-in without pre-load

Sensor characteristics:

- Nominal process value: 1000 N
- Rated output sensitivity: 1.5110 mV/V
- Zero signal without mounted parts: 0.2000 mV/V

Enter the nominal process value and the sensitivity under ***Parameter*** | ***Customer Sensor Adjustment***. Activating *Teach-In Offset* under ***Process Data*** | PDO initiates the offset teach-in. Subsequently, the value 0.2 is displayed under ***Parameter*** | ***Offset***.

Example 2: Offset teach-in with pre-load

Sensor characteristics:

- Nominal process value: 1000 N
- Rated output sensitivity: 1.5110 mV/V
- Pre-load (sensor in a loaded state): 200 N
- Output signal with pre-load: 0.5020 mV/V

Enter the nominal process value and the sensitivity under ***Parameter | Customer Sensor Adjustment***. Now enter the pre-load 200 N in the parameter *Teach-in.Offset Process Value*. With the above sensitivity, 200 N result in a signal of 0.302 mV/V. Deducting this value from 0.502 mV/V results in the actual offset of 0.2 mV/V no-load. Activating *Teach-In Offset* under ***Process Data | PDO*** initiates the offset teach-in. Subsequently, the value 0.2 is displayed under ***Parameter | Offset***.

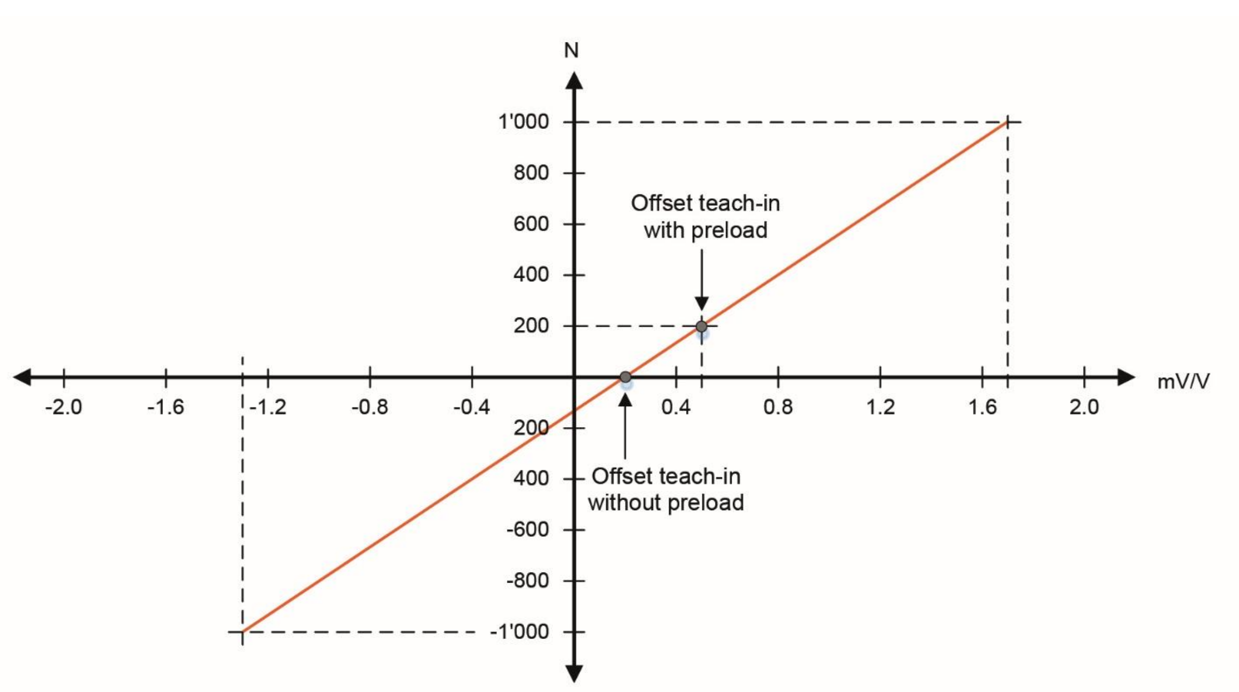


Figure 6: Offset teach-in (with and without pre-load)

IO-Link parameters: Offset teach-in (Teach-In Offset / Taring)

Parameter name	**Description**
Teach-in.Offset Process Value	Process value for which the current input signal corresponds to this process value. The teach-in offset only affects the offset register and does not alter the sensitivity register.

7.3.1.3.2 Sensitivity teach-in (Teach-In Sensitivity)

With the sensitivity teach-in, the sensitivity is set so that the current input signal (mV/V) corresponds to this process value, without changing the previously taught-in offset. The sensitivity register and the offset register are affected.

Condition:

⇨ You carried out an offset teach-in before the sensitivity teach-in. The taught-in offset is not affected by the sensitivity teach-in and serves as the first reference point.

Method:

a) Activate the sensitivity teach-in function via the parameter *Teach-in.Sensitivity Enable*.
b) Carry out the sensitivity teach-in.
✓ The parameter *Customer Sensor Adjustment.Nominal Sensitivity* is set so that with the current input signal (mV/V), the process value is output that is specified in the parameter *Teach-in.Sensitivity Process Value*. The offset is not altered.
c) Deactivate the function via the *Teach-in.Sensitivity Enable* parameter (this will prevent overwriting of the sensitivity).

Example

A strain sensor is mounted on a press. The strain sensor has the following characteristics as standard:

- 500 µm/m
- Rated output sensitivity: 1 mV/V
- Output process value when there is no press force: 100 µm/m (= 0.2 mV/V)
- Output process value with a press force of 50 kN: 300 µm/m (= 1 mV/V)

Prior to the offset teach-in and sensitivity teach-in, enter the following parameters via IO-Link:

- *Customer Sensor Adjustment.Process Value Unit* = kN (the press force should be measured)
- *Customer Sensor Adjustment.Nominal Process Value* = 100 (maximum force to be measured)
- *Teach-in.Offset Process Value* = 0
- *Teach-in.Sensitivity Process Value* = 50 kN

Parameters

	Before offset teach-in	**After offset teach-in**	**After sensitivity teach-in**
Process Value Unit	kN	kN	kN
Nominal Process Value	100	100	100
Nominal Sensitivity	1 (factory setting)	1 (factory setting)	1.6
Offset	0 (factory setting)	0.2	0.2

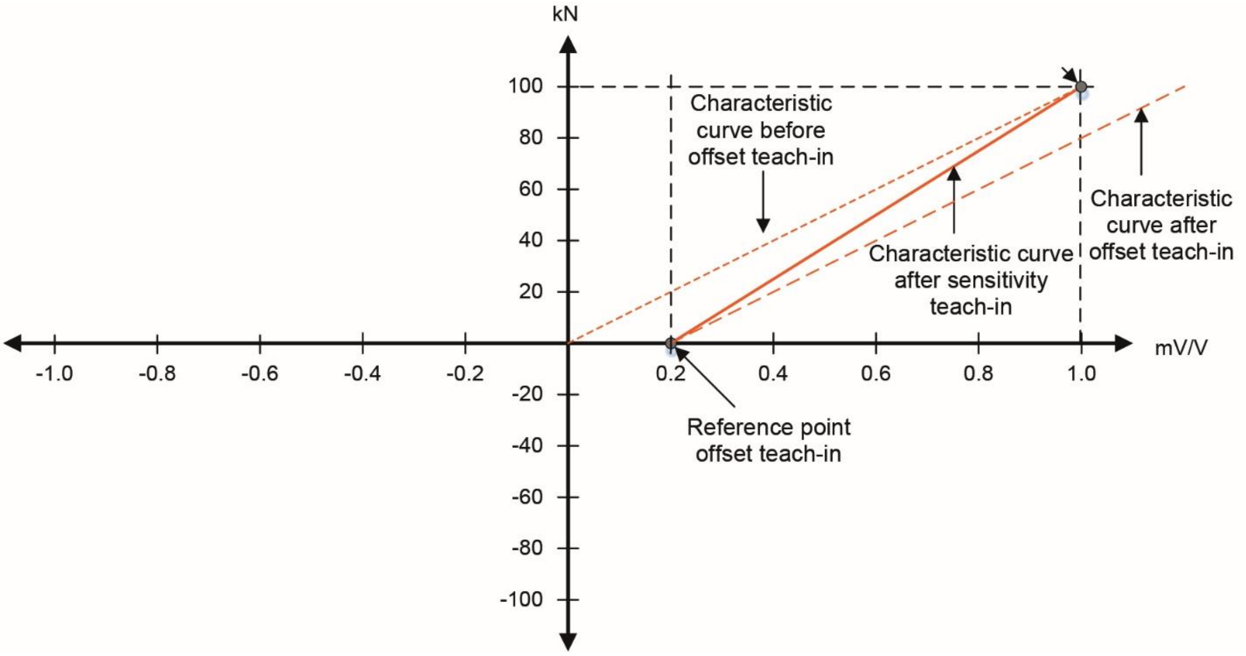


Figure 7: Sensitivity teach-in

IO-Link parameters: Sensitivity teach-in (Teach-In Sensitivity)

Parameter name	Description
Teach-in.Sensitivity Process Value	Sensitivity teach-in
Teach-in.Sensitivity Enable	Enable/disable sensitivity teach-in: • 0: Disabled • 1: Enabled

7.3.1.3.3 Filter moving average for offset teach-in and sensitivity teach-in

The *Moving Average* filter is active on the input signal during the offset teach-in and sensitivity teach-in to increase the measurement accuracy. The filter smoothes the signal curve by calculating the average of a specified number of measured values per filter interval. You can select the number of measured values per filter interval via IO-Link.

IO-Link parameters: Filter Moving Average (Moving Average Filter)

Parameter name	Description
Teach-in.Moving Average Filter	Select the number of measured values per filter interval of the *Moving Average* filter: 0: Deactivated 1: 2 measured values / filter interval (0.25 ms) 2: 4 (0.5 ms) 3: 8 (1 ms) 4: 16 (2 ms) 5: 32 (4 ms) 6: 64 (8 ms) 7: 128 (16 ms)

7.3.2 Low-pass filter (IIR filter)

Optionally, you can run the input signal through a low-pass filter (infinite impulse response filter, IIR filter). The low-pass filter is recommended in the following cases:

- Increasing the effective resolution by reducing the noise.
- Band limitation if the output signal is used for further signal processing with a slower sampling rate.

IO-Link parameters: Low-pass filter (Input Low Pass Filter)

Parameter name	Description
Input Low Pass Filter.Enable	Enabling/disabling of the low-pass filter: 0: Disabled 1: Enabled
Input Low Pass Filter.Frequency	Select the cut-off frequency for the low-pass filter: 0: 1 kHz 1: 500 kHz 2: 200 kHz 3: 100 kHz 4: 50 kHz 5: 10 kHz 6: 10 kHz 7: 5 kHz 8: 2 kHz 9: 1 kHz

7.3.3 Parameterization SIO1/2

Note: In the IO-Link environment, the signals are named from the perspective of the IO-Link master. This means: The input on the sensor is called *DO*, as DO is an output on the IO-Link master. Conversely, *DI* is an input on the IO-Link master and an output on the sensor.

For SIOx mode you can select the following functions in the *Settings.SIOx Function Select* parameter:

- DI (Digital Input):
  - State of SSC1
  - State of SSC2
  - Quality Bit
  - Alarm Bit
- DO (Digital Output):
  - High state: Teach-in offset/tare activated
  - Positive flank: Reset the memory functions
  - Positive flank: Sample and hold trigger
  - High state: Teach-In.Sensitivity activated

Depending on the selected function, the SIO is connected as an input or an output.

The selected functions are also available via the cyclic PDI and PDO data. The DO or PDO functions are internally connected *OR*. This means that the internally processed signal of the individual functions is *high*, when either PDO, SIO1, or SIO2 is set to *high*.

Input delay

You can set an input delay for an input signal (DO) for each SIO (*Settings.SIOx Input Delay*). Input delay means that an external signal is recognized and adopted by the amplifier electronics if the input signal is permanently in a new state throughout the time set as the input delay.

Example:

- *Settings.SIO1 Input Delay* = 3 ms

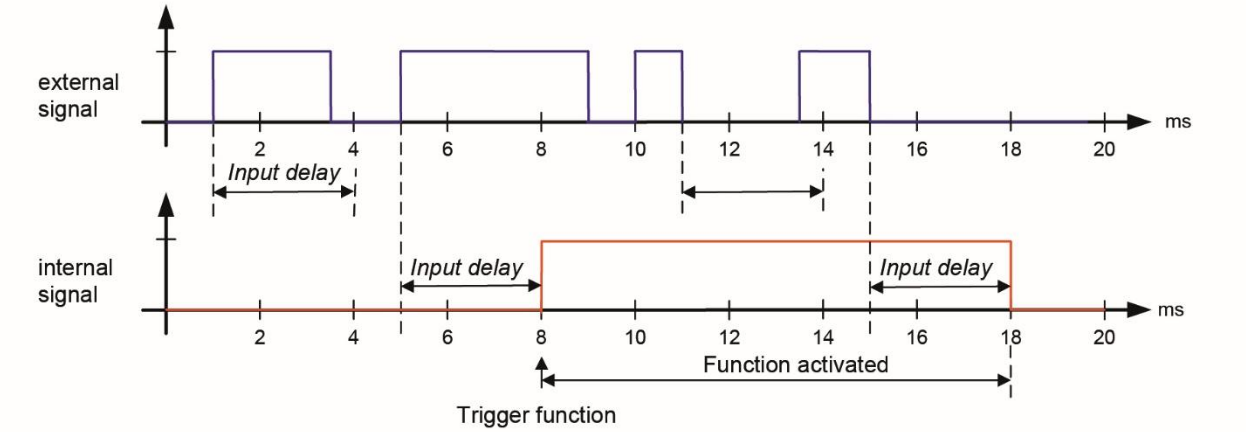


Figure 8: Timing SIO1/2

IO-Link parameters: Parameterization of the SIO (SIOx settings):

Parameter name	Description
Settings.SIOx Function Selection	Select function for SIOx: 0: SSC1 (DI) 1: SSC2 (DI) 5: Quality Bit (DI) 6: Alarm Bit (DI) 10: Inactive (DO) 11: Teach-in Offset/Tare (DO) 12: Memory Reset (DO) 13: Sample & Hold (DO) 14: Teach-in Sensitivity (DO)
Settings.SIOx Input Delay	Set the input delay time (in ms). To ensure error-free IO-Link communication, we recommend at least 3 ms.

7.3.4 Parameterization of the SSCx switching functions

With the SSC, any number of switching functions can be set depending on the current process value. For parameterization of the SSC, the following must be defined:

- Mode (single point / window / two point)
- Setpoints (1 or 2 setpoints, depending on the mode)
- Logic (inversion of the signal)
- Hysteresis
- Timing

IO-Link parameters: Parameterization of the switching functions (SSCx Settings / SSCx Hysteresis)

Parameter name	Description
Settings.SSCx Mode	Select the switching behavior of SSCx: • *Single Point* • *Window* • *Two Point*
Settings.SSCx Setpoint 1	Definition of the process value at which SSCx is set to enabled.
Settings.SSCx Setpoint 2	Definition of the process value at which SSCx is set to disabled (for the modes *Window* and *Two Point*).
Settings.SSCx Logic	Logic of SSCx: • *Normal* • *Inverted*
Hysteresis.SSCx Alignment Mode	Selection of the hysteresis alignment (for the modes *Single Point* and *Window*).
Hysteresis.SSCx Width	Definition of the hysteresis width.
Hysteresis.SSCx.Width Mode	Define the scale of the hysteresis width of SSCx. The width can be stated as an absolute value in the unit of the process factor (e.g. 10 N).

7.3.4.1 SSC modes

You can choose among the following modes for the SSC:

- *Single Point*
- *Window*
- *Two Point*

Mode *Single Point*, normal

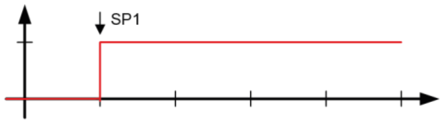


Figure 9: SSC mode – Single Point

1 switching threshold across the entire measuring range.

Mode *Window*, normal

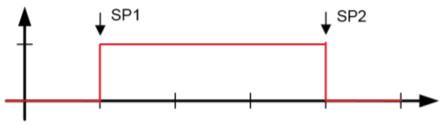


Figure 10: SSC mode – Window

2 switching thresholds, at which the signal is reversed.

Mode *Two Point*, normal

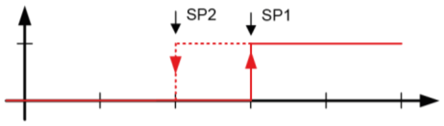


Figure 11: SSC mode – Two Point

2 switching thresholds that indicate when the signal should switch to *high* and when it should switch to *low*. In this mode, the hysteresis is defined based on the setpoints. The hysteresis parameters have no effect in this mode.

7.3.4.2 SSC Logic

SSC Logic *Single Point, inverted*

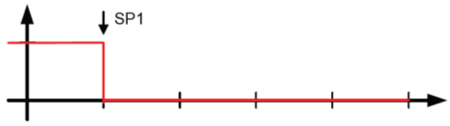


Figure 12: SSC Logic – Single Point, inverted

SSC Logic *Window, inverted*

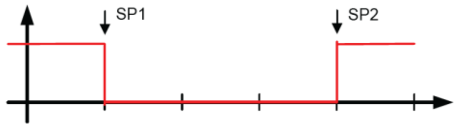


Figure 13: SSC Logic – Window, inverted

SSC Logic *Two Point, inverted*

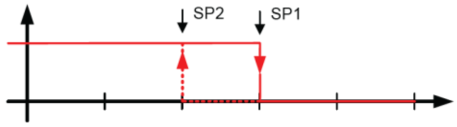


Figure 14: SSC Logic – Two Point, inverted

7.3.4.3 SSC Hysteresis

With the *SSC Hysteresis* function you can define how the hysteresis should be set in relation to the setpoint. The function is relevant for the *Single Point* and *Window* modes:

- *Single Point:* The hysteresis is set either to the left, right or center of the setpoint.
- *Window:* The hysteresis is set either outside, inside or at the center of the respective setpoint.

Example 1: Hysteresis, <u>not</u> inverted

The instrumentation amplifier is parameterized as follows:

- *Settings.SSC1 Logic:* `Normal`
- *Settings.SSCx Mode:* `Single Point, Window`
- *Settings.SSCx Setpoint 1:* `200 N`
- *Settings.SSCx Setpoint 2:* `800 N`
- *Hysteresis.SSCx Alignment Mode:* `Left/Outer, Center, Right/Inner`
- *Hysteresis.SSCx Width:* `100 N`

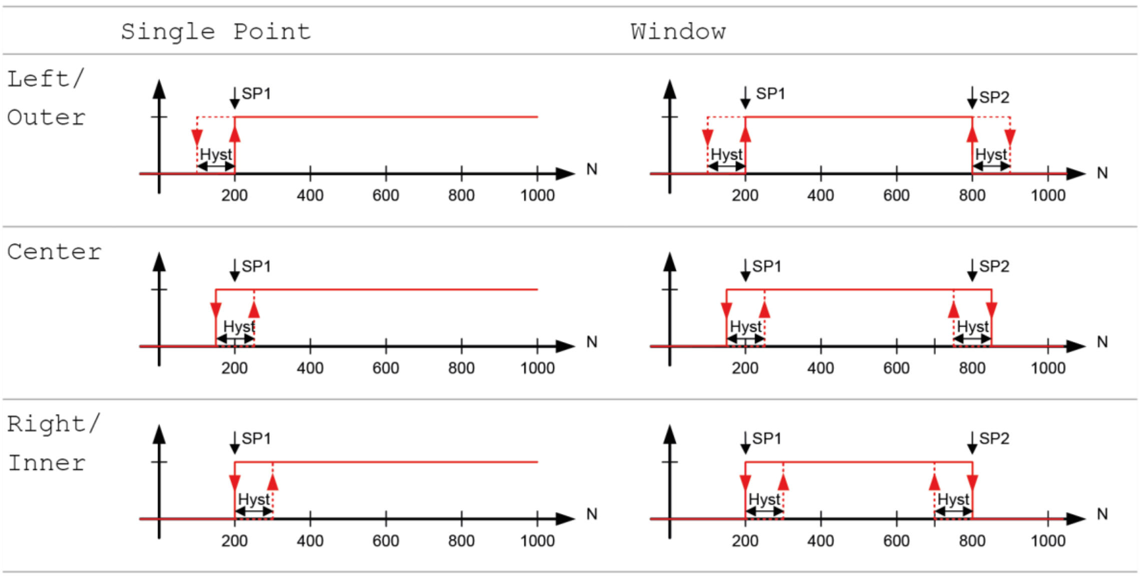


Figure 15: Hysteresis

Example 2: Hysteresis, inverted

The instrumentation amplifier is parameterized as follows:

- *Settings.SSC1 Logic:* `Inverted`
- *Settings.SSCx Mode:* `Single Point, Window`
- *Settings.SSCx Setpoint 1:* `200 N`
- *Settings.SSCx Setpoint 2:* `800 N`
- *Hysteresis.SSCx Alignment Mode:* `Left/Outer, Center, Right/Inner`
- *Hysteresis.SSCx Width:* `100 N`

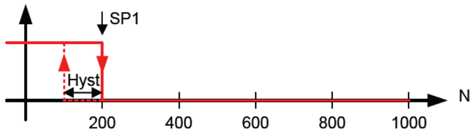
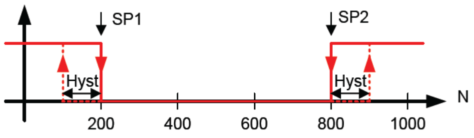
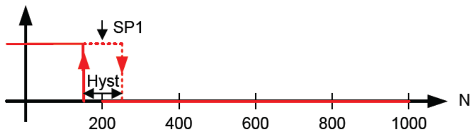
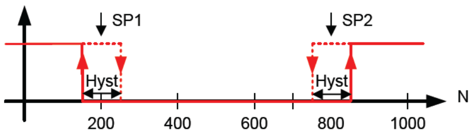
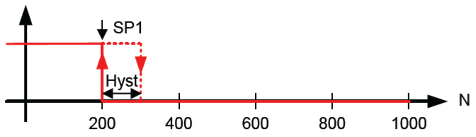
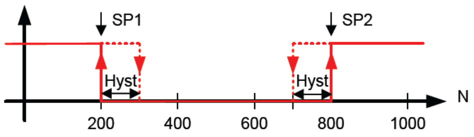
	Single Point	Window
Left/ Outer		
Center		
Right/ Inner		

Figure 16: Hysteresis

7.3.4.4 Timing SSCx

With the *Timing SSCx* function you can set the following time-related behavior:

- Switching on delay *(Response Delays)*
- Switching off delay *(Release Delays)*
- Min. pulse duration / pulse duration extension *(Minimum Pulse Duration)*

The individual functions must be activated. Response and release delays can be activated separately.

Example of response and release delay

- *Response Delay.SSCx Time:* 4 ms
- *Release Delay.SSCx Time:* 5 ms

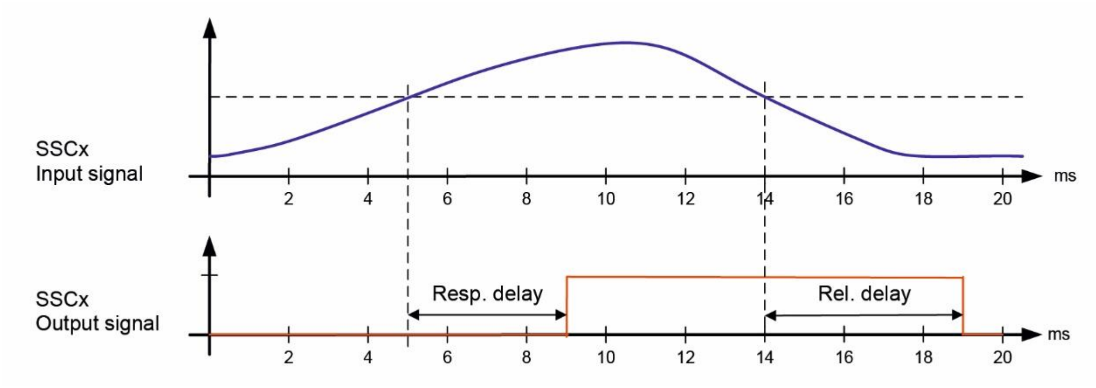


Figure 17: Response and release delay

Example of minimum pulse duration

- *Minimal Pulse Duration.SSCx Time:* 4 ms
- *Minimal Pulse Duration.SSCx Mode:* 1 (positive and negative)

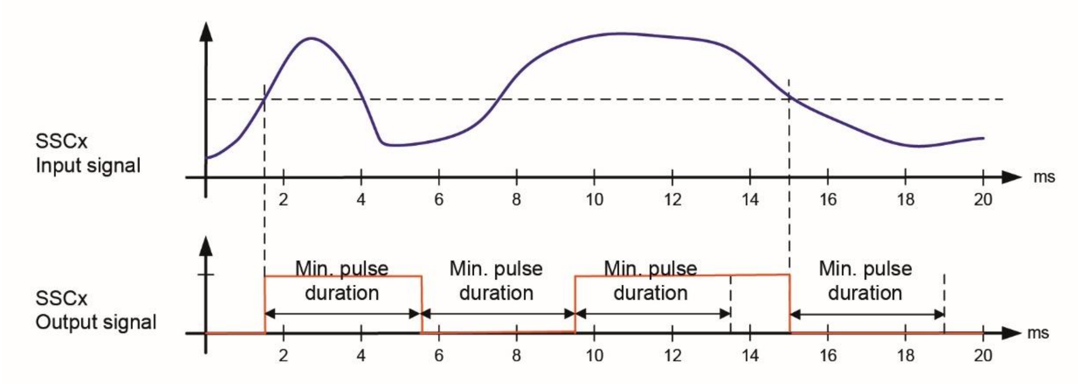


Figure 18: Minimum pulse duration

IO-Link parameters: Parameterization of the SSCx timing (SSCx delays)

Parameter name	Description
Response Delay.SSCx Enable	Enabling/disabling of the SSCx response delay. • 0: Disabled • 1: Enabled
Response Delay.SSCx Time	Setting the time span for the response delay (in ms).
Response Delay.SSCx Enable	Enabling/disabling of the SSCx release delay. • 0: Disabled • 1: Enabled
Release Delay.SSCx Time	Setting the time span for the release delay (in ms).
Minimal Pulse Duration.SSCx Enable	Enabling/disabling of the SSCx minimum pulse duration. • 0: Disabled • 1: Enabled
Minimal Pulse Duration.SSCx Time	Setting the minimum pulse duration (in ms).
Minimal Pulse Duration.SSCx Mode	Setting the pulse direction of the minimum pulse duration. • 1: Positive and negative • 2: Positive • 3: Negative

7.4 Diagnosis

On the *Diagnosis* tab you can activate remote operation and see various device status and warning messages.

7.4.1 Remote operation

Remote operation is used for test purposes and for easy setup of the instrumentation amplifier. In remote operation, a parameterizable input signal is simulated instead of the input signal from a loaded sensor (mV/V).

IO-Link parameters: Remote operation parameterization (Remote Signal):

Parameter name	Description
Remote Operation Signal.Enable	Activation/deactivation of remote operation (during activation, the current measured value is adopted as the remote signal): 0: Deactivated 1: Activated
Remote Operation Signal.Selection	Selecting a signal that can be set in the *Remote Operation Signal.Value* parameter: 1: Physical Input Signal (mV/V)
Remote Operation Signal.Value	Setting the parameter for the signal defined in *Remote Operation Signal.Selection*.

7.4.2 Device Status / Error Handling

With this function, you can access various device statuses and warning messages. Depending on the operating status, a quality bit or an alarm bit is set.

Parameter name	Description
Device Status	Operating status of the instrumentation amplifier: 0: Device is operating properly 1: Maintenance required 2: Out of specification 3: Functional check (remote mode) 4: Failure (highest priority)
Detailed Device Status	For details see the table in section 8.4.3 below.

7.4.3 Error Handling

Description	Condition	Device status				Cyclic Data		
		Value	Detailed Hex	Detailed Dec	Type	Quality Bit	Alarm Bit	Process Value
Process value outside of nominal range	>1· Nominal process value	1	0xE4, 0x18, 0x00	6144	Warning	1	Not affected (n. a.)	n. a.
	<-1· Nominal process value		0xE4, 0x18, 0x01	6145				
Process value out of measurable range	>2· Nominal process value	4	0xE4, 0x18, 0x02	6146	Error	n. a.	n. a.	Out of Range (+) (+21'001)
	<-2· Nominal process value		0xE4, 0x18, 0x03	6147				Out of Range (-) (-21'001)
Input signal out of range	Outside of ±3.8 mV/V	4	0xF4, 0x18, 0x06	6150	Error	n. a.	1	Out of Range (+) / Out of Range (-) (±21'001)
	Short / open wire		0xF4, 0x18, 0x07	6151				
Parameters are set, so that nominal process value range is outside of measurable input range.	120% Nominal value → >3.8mV/V	2	0xE4, 0x18,0x08	6152	Warning	1	n. a.	n. a.
	-120% Nominal value → <-3.8mV/V		0xE4, 0x18, 0x09	6153				
Primary supply voltage over-/underrun	>30V	2	0xE4, 0x51, 0x10	20752	Warning	1	n. a.	Potentially out of specification
	<18V		0xE4, 0x51, 0x11	20753				
Simulation active	Input signal is set remotely	3	0xE4, 0x8C,0x01	35841	Warning	1	Simulated	
Component malfunction		4	0xF4, 0x50, 0x10	20496	Error	n. a.	1	No Data (21'100)

8 Interface description

8.1 PDI (PDI48.INT32_INT8)

	Process Value	Scale	Status Bits
Type	Int32	Int8	8 x Boolean
Bit Offset	47 … 16	15 … 8	7 … 0
Subindex	1	2	10 … 3

Sub-index	Bit Offset	Name	Type	Range	Description
1	16	Process Value	Int32	-2^31 … 2^31 -1	• Displayed process value = process value * 10 ^ scale exponent • Fixed displayable ranges of process value: -20’000.00000 …20’000.00000 • Error codes: <-21’000 or >21’000
2	8	Scale Exponent	Int8	-5	
3	0	SSC1	Boolean	0 / 1	State of SSC1
4	1	SSC2	Boolean	0 / 1	State of SSC2
5	2	Quality	Boolean	0 / 1	0: All signal conditions are ok 1: A condition is outside of specified ranges (see detailed device status)
6	3	Alarm	Boolean	0 / 1	0: Signals are valid 1: No valid signals available
7	4		Boolean	0	Not used
8	5		Boolean	0	Not used
9	6		Boolean	0	Not used
10	7		Boolean	0	Not used

8.2 PDO (PDI8.BOOL1)

Sub-index	Bit Offset	Name	Type	Range	Description
1	0		Boolean	0	Not used
2	1		Boolean	0	Not used
3	2	Sample and Hold – Trigger	Boolean	0 / 1	Trigger for Sample and Hold, signals are held by the positive edge (change from “0” to “1”)
4	3	Teach-in Offset / Taring	Boolean	0 / 1	Activates teach-in offset, is active as long as this bit is set to “1”
5	4	Memory Reset	Boolean	0 / 1	Reset for max, min and peak-peak memory, signals are reset by the positive edge (change from “0” to “1”)
6	5	Teach-in Sensitivity	Boolean	0 / 1	Activates teach-in sensitivity, is active as long as this bit is set to “1”
7	6	-	Boolean	0	Not used
8	7		Boolean	0	Not used

8.2.1 Identification

Index	Subindex	Access	SPDU name	Number of bytes	Format	Default values	Description
16	0	RO	Vendor Name	64	String	burster Präzisionsmesstechnik GmbH	
17	0	RO	Vendor Text	64	String	www.burster.de	
18	0	RO	Product Name	40	String	n.a.	Specific sensor type within the sensor family
19	0	RO	Product ID	64	String	n.a.	Sensor family / Reference for IODD
86	1	RO	Part Number	8	String	n.a.	SAP material number
20	0	RO	Product Text	64	String	n.a.	
21	0	RO	Serial number	16	String	n.a.	burster serial number
22	0	RO	Hardware Version	11	String	n.a.	
23	0	RO	Firmware Version	11	String	n.a.	Current firmware version
24	0	RW	Application Specific Tag	32	String	n.a.	Tag for customer use
25	0	RW	Function Tag	32	String	n.a.	Tag for customer use
26	0	RW	Location Tag	32	String	n.a.	Tag for customer use

8.2.2 Observation

Index	Subindex	Access	SPDU name	Number of bytes	Format	Ranger of values	Default values	Description
Process Values								
216	1	RO	Process Value.Current	4	int32	±20'000	n.a.	Current process value after signal processing.
Memory Values								
216	2	RO	Process Value.Minimum	4	int32	±20'000	n.a.	Minimum process value since last memory reset.
216	3	RO	Process Value.Maximum	4	int32	±20'000	n.a.	Maximum process value since last memory reset.
216	6	RO	Process Value.Peak Peak	4	int32	0…20'000	n.a.	Peak to peak value since last memory reset. The peak to peak value corresponds to the difference of the maximum and minimum process values.
Sample and Hold Values								
88	7	RO	Process Value.Sample and Hold	4	int32	±20'000	n.a.	Held signal at the last "sample and hold" trigger.
88	8	RO	Process Value.Sample and Hold Delta	4	int32	±20'000	n.a.	Difference between the signal at the last "sample and hold" trigger and the current signal.

8.3 Parameters

8.3.1 Sensor Adjustment

Index	Subindex	Access	SPDU name	Number of bytes	Format	Range of values	Default value	Description
Customer Sensor Adjustment								
74	5	RW	Customer Sensor Adjustment.Process Value Unit	2	uint16		DAB: 1699 DST: 1698	Selection of the unit of the process value: 1088: kg 1092: t 1120: N 1121: MN 1122: kN 1698: µm/m 1699: mV/V
100 2	1	RW	Customer Sensor Adjustment.Nominal Process Value	4	int32	0.1…10'00 0	DAB: 1.0 DST: nominal strain	Nominal process value of the sensor.
100 2	2	RW	Customer Sensor Adjustment.Nominal Sensitivity	4	float	±3.0	1.0	Nominal sensitivity of the sensor in mV/V. This is the signal change of the sensor when it is loaded from 0 to nominal value defined in the register «Customer Sensor Adjustment. Nominal Process Value».
100 2	3	RW	Customer Sensor Adjustment.Offset	4	float	±3.8	0	Offset of the transducer in mV/V. This is the signal of the sensor corresponding to the process value 0.
		WO	burster Command					Restore Factory Adjustment. The values of section «Factory Sensor Settings» will be copied into the section «Customer Sensor Adjustment».

Index	Subindex	Access	SPDU name	Number of bytes	Format	Range of values	Default value	Description
Teach-in Offset / Taring								
115	3	RW	Teach-in.Offset Process Value	4	int32	±20’000	0	Teach-in offset (taring) will set the offset in such a way, that the current sensor input signal corresponds to this process value. Teaching-in offset just affects the register offset and will not change the sensitivity register.
115	2	RW	Teach-in.Moving Average Filter	1	uint8		4	To increase the accuracy of the teach-in offset (taring), a moving average is implemented. The number of samples to be averaged can be set in this register. The taring duration must be at least the period indicated below. During this period the input signal must be held stable. 0: Disabled 1: 2 samples (0.250 ms) 2: 4 samples (0.5 ms) 3: 8 samples (1 ms) 4: 16 samples (2 ms) 5: 32 samples (4 ms) 6: 64 samples (8 ms) 7: 128 samples (16 ms)
Teach-in Sensitivity								
115	4	RW	Teach-in.Sensitivity Process Value	4	int32	±20’000	1	Teach-in sensitivity will set the sensitivity in such a way, that the current sensor input signal corresponds to this process value without changing the previous taught-in offset. The sensitivity and the offset register will be affected.
115	1	RW	Teach-in.Sensitivity Enable	1	uint8		0	Enables/Disables the teach-in sensitivity function. 0: Disabled 1: Enabled

8.3.2 Signal Processing

Index	Subindex	Access	SPDU name	Number of bytes	Format	Range of values	Default value	Description
Input Low Pass Filter (8 kS/s)								
160	1	RW	Input Low Pass Filter.Enable	1	uint8		0	0: Disabled 1: Enabled
160	2	RW	Input Low Pass Filter.Frequency	1	uint8		3	Selection of cut-off frequency of input low pass filter. 0: 1 kHz 1: 500 Hz 2: 200 Hz 3: 100 Hz 4: 50 Hz 5: 20 Hz 6: 10 Hz 7: 5 Hz 8: 2 Hz 9: 1 Hz

8.3.3 MDC Settings

Index	Subindex	Access	SPDU name	Number of bytes	Format	Range of values	Default value	Description
MDC Selection								
83	1	RW	MDC Selection.Source	1	uint8		2	2: Current Process Value (2 kS/s) 3: Minimum Process Value (2 kS/s) 4: Maximum Process Value (2 kS/s) 5: Peak Peak Process Value (2 kS/s) 6: Sample and Hold Process Value (2 kS/s) 7: Sample and Hold Delta Process Value (2 kS/s)
MDC Descriptor								
16512	1	RO	MDC Descriptor. Lower Limit	4	int32	±20’000	DAB: -2.0 DST: -2* nominal strain	Lower limit of showable process value range. (Depends on register «Customer Sensor Adjustment. Nominal Process Value». Lower Limit is -2* «nominal process value»)
16512	2	RO	MDC Descriptor. Upper Limit	4	int32	±20’000	DAB: -2.0 DST: -2* nominal strain	Upper limit of showable process value range. (Depends on register «Customer Sensor Adjustment. Nominal Process Value» and is 2 * nominal process value.)
16512	3	RO	MDC Descriptor. Unit Code	2	uint16		DAB: 1699 DST: 1698	Unit Code of the selected process value.
16512	4	RO	MDC Descriptor. Scale Exponent	1	int8	-5	-5	Scale Exponent x

8.3.4 SIO Settings

Index	Subindex	Access	SPDU name	Number of bytes	Format	Range of values	Default value	Description
SIO 1 Setting								
78	2	RW	Settings.SIO1 Function Selection	1	uint8		10	Defines the function of SIO1 0: SSC1 (DI) 1: SSC2 (DI) 5: Quality Bit (DI) 6: Alarm Bit (DI) 10: Inactive (DO) 11: Teach-In Offset / Taring (DO) 12: Memory Reset (DO) 13: Sample / Hold (DO) 14: Teach-in Sensitivity (DO)
78	4	RW	Settings.SIO1 Input Delay	4	uint32	0...3'600'000	3	Input delay time in milliseconds (Minimum of 3 ms is recommended to guarantee an error-free establishment of the IO-Link communication)
SIO 2 Setting								
78	12	RW	Settings.SIO2 Function Selection	1	uint8		U: 11 I: 11 L: 10	Defines the function of SIO2 0: SSC1 (DI) 1: SSC2 (DI) 5: Quality Bit (DI) 6: Alarm Bit (DI) 10: Inactive (DO) 11: Teach-In Offset / Taring (DO) 12: Memory Reset (DO) 13: Sample / Hold (DO) 14: Teach-In Sensitivity (DO)
78	14	RW	Settings.SIO2 Input Delay	4	uint32	0...3'600'000	3	Input delay time in milliseconds

8.3.5 SSC 1 Settings

Index	Subindex	Access	SPDU name	Number of bytes	Format	Range of values	Default value	Description
SSC 1 Setting								
61	2	RW	Settings.SSC1 Mode	1	uint8		1	Selects the switching behavior of SSCx: 1: 1 Point 2: Window 3: 2 Point
60	1	RW	Settings.SSC1 Setpoint 1	4	int32	±20'000	0.0	Defines the process value at which SSCx is set to active.
60	2	RW	Settings.SSC1 Setpoint 2	4	int32	±20'000	0.0	Defines the process value at which SSCx is set to inactive.
61	1	RW	Settings.SSC1 Logic	1	uint8		0	Selects the logic of SSCx: 0: Normal 1: Inverted
SSC 1 Hysteresis								
69	5	RW	Hysteresis.SSC1 Alignment Mode	1	uint8		2	Selects the hysteresis alignment mode of SSCx: 1: Left/Outer 2: Center 3: Right/Inner
69	1	RW	Hysteresis.SSC1 Width	4	uint32	0...20'000	0.001	Hysteresis width of SSCx as a percent of the nominal process value or as absolute process value.
69	4	RO	Hysteresis.SSC1 Width Mode	1	uint8		1	1: Absolute
SSC 1 Delays								
120	1	RW	Release Delay.SSC1 Enable	1	uint8		0	Enables/Disables release delay of SSCx. 0: Disabled 1: Enabled
120	2	RW	Release Delay.SSC1 Time	4	uint32	0...86'400'000	0	Release delay time of SSCx in milliseconds
121	1	RW	Response Delay.SSC1 Enable	1	uint8		0	Enables/Disables release delay of SSCx. 0: Disabled 1: Enabled
121	2	RW	Response Delay.SSC1 Time	4	uint32	0...86'400'000	0	Response delay time of SSCx in milliseconds

Index	Subindex	Access	SPDU name	Number of bytes	Format	Range of values	Default value	Description
SSC 1 Minimum Pulse Duration								
122	1	RW	Minimal Pulse Duration.SSC1 Enable	1	uint8		0	Enables/Disables minimum pulse duration time of SSCx. 0: Disabled 1: Enabled
122	2	RW	Minimal Pulse Duration.SSC1 Time	4	uint32	0...86’400’000	0	Minimum pulse length of SSCx in milliseconds
122	3	RW	Minimal Pulse Duration.SSC1 Mode	1	uint8		1	Selects the affected pulse polarity for minimum pulse duration of SSCx: 1: Positive and negative pulses are prolonged 2: Only positive pulses are prolonged 3: Only negative pulses are prolonged

8.3.6 SSC 2 Settings

Index	Subindex	Access	SPDU name	Number of bytes	Format	Range of values	Default value	Description
SSC 2 Setting								
63	2	RW	Settings.SSC2 Mode	1	uint8		1	Selects the switching behavior of SSCx: 1: 1 Point 2: Window 3: 2 Point
62	1	RW	Settings.SSC2 Setpoint 1	4	int32	±20'000	0.0	Defines the process value at which SSCx is set to active.
62	2	RW	Settings.SSC2 Setpoint 2	4	int32	±20'000	0.0	Defines the process value at which SSCx is set to inactive.
63	1	RW	Settings.SSC2 Logic	1	uint8		0	Selects the logic of SSCx: 0: Normal 1: Inverted
SSC 2 Hysteresis								
69	15	RW	Hysteresis.SSC2 Alignment Mode	1	uint8		2	Selects the hysteresis alignment mode of SSCx: 1: Left/Outer 2: Center 3: Right/Inner
69	11	RW	Hysteresis.SSC2 Width	4	uint32	0...20'000	0.001	Hysteresis width of SSCx as a percent of the nominal process value or as absolute process value.
69	14	RO	Hysteresis.SSC2 Width Mode	1	uint8		1	1: Absolute
SSC 2 Delays								
120	11	RW	Release Delay.SSC2 Enable	1	uint8		0	Enables/Disables release delay of SSCx. 0: Disabled 1: Enabled
120	12	RW	Release Delay.SSC2 Time	4	uint32	0...86'400'000	0	Release delay time of SSCx in milliseconds
121	11	RW	Response Delay.SSC2 Enable	1	uint8		0	Enables/Disables release delay of SSCx. 0: Disabled 1: Enabled
121	12	RW	Response Delay.SSC2 Time	4	uint32	0...86'400'000	0	Response delay time of SSCx in milliseconds

Index	Subindex	Access	SPDU name	Number of bytes	Format	Range of values	Default value	Description
SSC 2 Minimum Pulse Duration								
122	11	RW	Minimal Pulse Duration.SSC2 Enable	1	uint8		0	Enables/Disables minimum pulse duration time of SSCx. 0: Disabled 1: Enabled
122	12	RW	Minimal Pulse Duration.SSC2 Time	4	uint32	0...86'400'000	0	Minimum pulse length of SSCx in milliseconds
122	13	RW	Minimal Pulse Duration.SSC2 Mode	1	uint8		1	Selects the affected pulse polarity for minimum pulse duration of SSCx: 1: Positive and negative pulses are prolonged 2: Only positive pulses are prolonged 3: Only negative pulses are prolonged

8.4 Diagnosis

8.4.1 Remote Operation Signal.Value

Index	Subindex	Access	SPDU name	Number of bytes	Format	Ranger of values	Default values	Description
Remote Signal								
248	1	RW	Remote Operation Signal.Enable	1	uint8		0	Enables the remote operation mode. If enabled the sensor signal is interrupted and replaced with a remote signal that can be set in register “Remote Operation.Signal Physical Input Signal” 0: Disabled 1: Enabled
248	2	RO	Remote Operation Signal.Selection	1	uint8		1	Selects the signal that can set in the register “Remote Operation Signal.Physical Input Signal”: 1: Physical Input Signal (mV/V)
248	3	RW	Remote Operation Signal.Physical Input Signal	4	float	± 3.8	0.0	If the remote operation is enabled, the selected signal can be set by writing the corresponding value into this register.

8.4.2 Auxiliary Signals

Index	Subindex	Access	SPDU name	Number of bytes	Format	Ranger of values	Default values	Description
Measured Temperatures								
209	1	RO	CPU Temperature.Current	4	float	-90…150°C		Current temperature of the CPU.
Internal Signal								
88	1	RO	Process Value.Physical Input Signal	4	float	±4.0	n.a.	Passive signal of the calibrated sensor in mV/V.

8.4.3 Device status

Index	Subindex	Access	SPDU name	Number of bytes	Format	Ranger of values	Default values	Description
Notifications / Warnings / Errors								
36	0	RO	Device status	1	uint8		n.a.	0: Device is operating properly 1: Maintenance-Required (lowest priority) 2: Out-of-Specification 3: Functional-Check (remote mode) 4: Failure (highest priority)
37	0	RO	Detailed Device Status [1…10]	10x3	uint8[3]			List of detailed warnings and errors
Device monitoring								
211	1	RO	Operation Time.Power-on	4	uint32	0…32²-1	n.a.	Operation time since power-on in seconds
211	3	RO	Operation Time.Lifetime	4	uint32	0…32²-1	n.a.	Operation time lifetime in seconds
224	2	RO	Number of power-on Cycles.Lifetime	4	uint32	0…32²-1	n.a.	Number of power-on cycles lifetime
226	3	RO	Number of Tarings.Lifetime	4	uint32	0…32²-1	n.a.	Number of tarings lifetime

8.4.4 Sensor Adjustment

Index	Subindex	Access	SPDU name	Number of bytes	Format	Ranger of values	Default values	Description
Factory Sensor Adjustment								
1001	4	RO	Factory Sensor Adjustment.Process Value Unit	2	uint16		DAB: 1699 DST: 1698	Value of the register «Customer Sensor Adjustment.Process Value Unit» during factory adjustment as reference and for reloading
1001	1	RO	Factory Sensor Adjustment.Nominal Process Value	4	int32	0.1…10'000	DAB: 1.0 DST: nominal strain	Value of the register «Customer Sensor Adjustment.Nominal Process Value» during factory adjustment as reference and for reloading.
1001	2	RO	Factory Sensor Adjustment.Nominal Sensitivity	4	float	±3.0	0.1	Value of the register «Customer Sensor Adjustment.Nominal Sensitivity» during factory adjustment as reference and for reloading.
1001	3	RO	Factory Sensor Adjustment.Offset	4	float	±3.8	0	Value of the register «Customer Sensor Adjustment.Offset» during factory adjustment as reference and for reloading.

9 Accessories

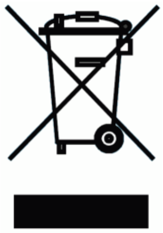
Item number	Description
9900-V147	M8 4-pin connector 90° angled, IP67
9900-V148	M8 4-pin connector straight, IP67
9900-V609	M8 4-pin connector straight, IP67

10 Customer service

For repair inquiries, please call our customer service department on +49 7224 645-53.

Please have the serial number to hand. The serial number is the only way to clearly identify the technical version of the instrument so that we can provide help quickly. You will find the serial number on the device’s type plate.

11 Disposal



Device disposal

If your device is no longer usable, please comply with your legal obligations by disposing of the device described here in accordance with statutory regulations. You will then be helping to protect the environment!