Baumer
Passion for Sensors

Description of functions and interfaces

EB200E

Bearingless encoders - incremental

EN-US

V1 | 10/16/2023

Table of contents

1 About this document

1.1 Purpose and scope of application

This document enables safe and efficient sensor parameterization using various interfaces. The manual describes the functions and is intended to support installation and software 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.

This manual applies to the following product families:

Device ID	Device name
40001 (0x009C41)	EB200E.IR

1.2 Applicable documents

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

1.3 Labels in this manual

Identifier	Usage	Example
Dialog element	Indicates dialog elements.	Click the ***OK*** button.
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 Product description

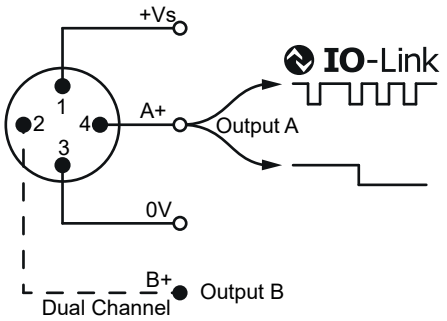
2.1 General functionality

The rotary encoder (comprising sensor and magnetic rotor) shall be used for angle and position feedback as well as speed measurement.

The sensor can be used in the following operating modes:

- *Incremental rotary encoder (HTL)*
- *Motion Monitor* (switching outputs, parameterizable)
- *Incremental rotary encoder IO-Link*

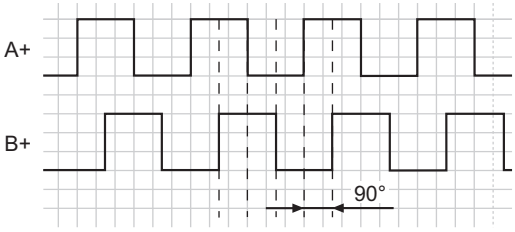
In each of the 3 operating modes, sensor parameterization is via IO-Link interface.



Ill. 1: Output signals

2.2 Operating principle

The sensor element delivers measurement signals for the magnetic rotor's relative motion. This position information is interpolated and output as square wave signals in operating mode *Incremental encoder (HTL)*.



Ill. 2: Output function: *Incremental encoder (HTL)*

In operating mode *Motion Monitor*, both position and speed information are monitored straight in the sensor and output as switching signals at output A+ and/or B+:

- Speed Monitor (SSC1)
- Direction Monitor (SSC2)
- Standstill Monitor (SSC3)

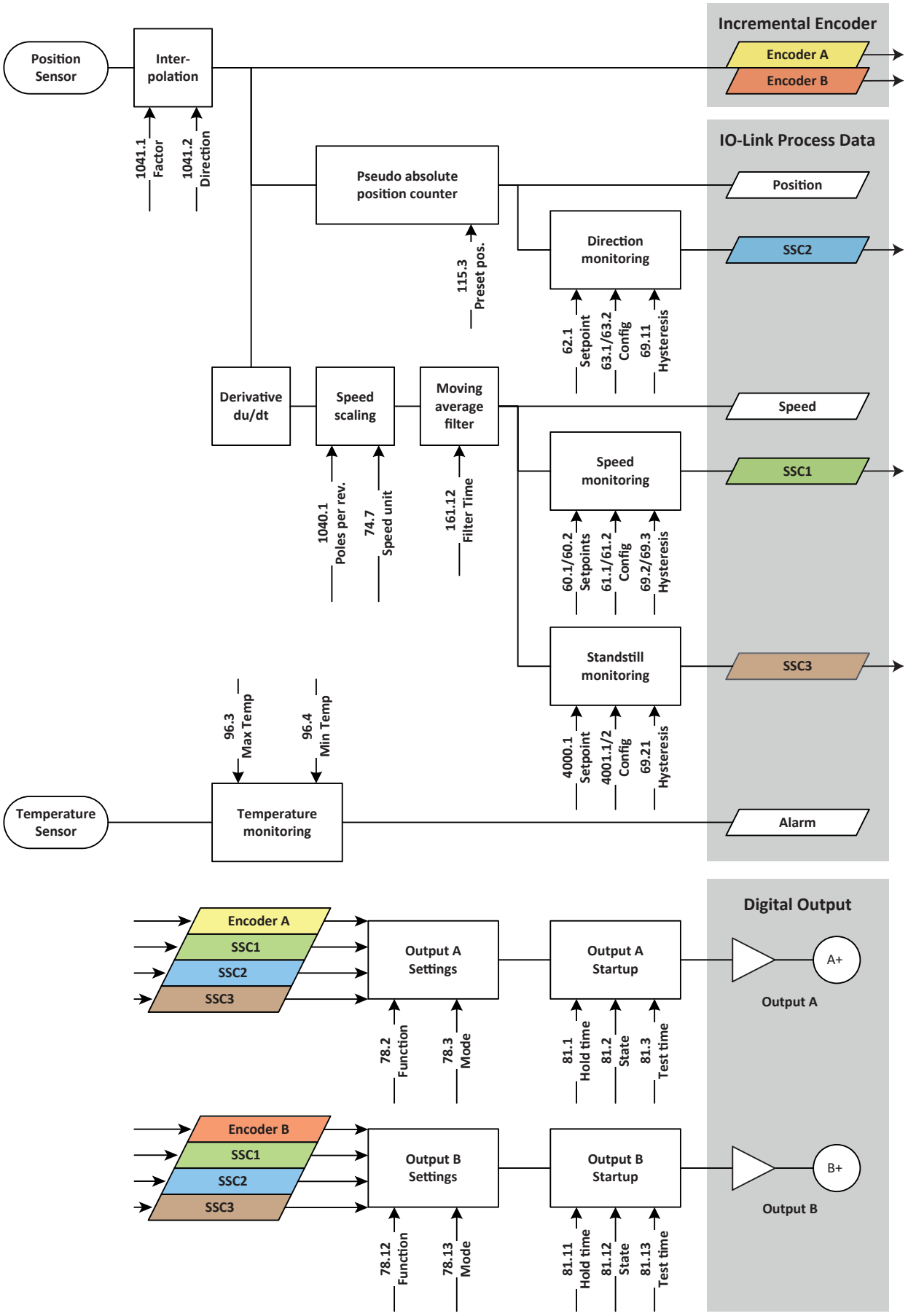
When used as *Incremental encoder IO-Link*, the interpolated position and speed information as well as the binary states of the integrated *Motion Monitor* are transmitted as IO-Link process data.

Octet	0 ... 3	4 ... 7	8			
Name	**Speed**	**Position**	**SSC3**	**Alarm**	**SSC2**	**SSC1**
Description	Speed [steps/s] or [rpm]	Position [steps]	Standstill Monitor	Alarm Monitor	Direction Monitor	Speed Monitor
Type	32-bit Integer	32-bit Integer	Boolean	Boolean	Boolean	Boolean
Bit offset	40	8	4	3	1	0
Sub index	1	2	3	4	5	6

Furthermore, IO-Link allows for retrieving secondary and statistical data such as:

- Device temperature
- Operating hours
- Number of revolutions

3 Block diagram



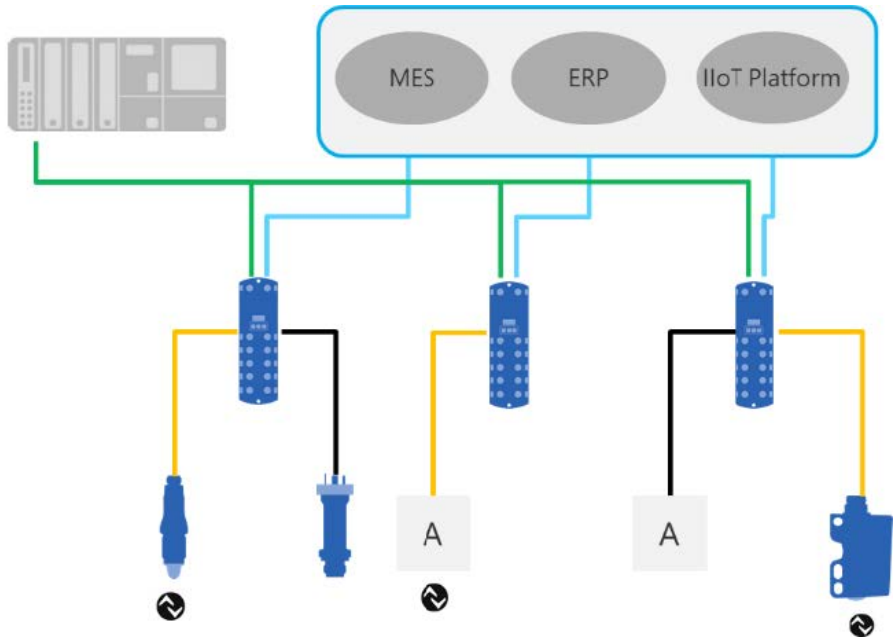
III. 3: Block diagram

4 Interfaces

4.1 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. 4: 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 evaluation, parameterization and use of IO-Link sensors, Baumer provides both IO-Link USB-C master and Baumer Sensor Suite. The IO-Link USB-C Master enables IO-Link devices to communicate with the computer without external power supply. Baumer Sensor Suite is a computer-based tool to understand and use IO-Link devices and to visualize sensor functions of different sensor brands. This allows for engineering both at the workplace and straight at the machine. Further information at baumer.com/bss.

5 Operating functions

5.1 Encoder settings

Pulse number and encoder resolution are defined in *encoder settings*. The following parameters can be defined:

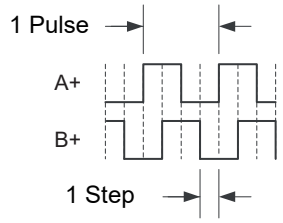
- Poles per revolution
- Interpolation factor
- Direction of rotation

INFO

To ensure the correct speed unit [rpm] is output, mandatory to specify the poles per revolution of the applied magnetic rotor. This can be seen in the magnetic rotor type reference *EBS.R-FNxxx*(poles per revolution = xxx).

The interpolation factor defines the pulse number output per each pole of the magnetic rotor applied, the resulting pulse number [pulses/rev], number of steps [steps/rev] of the (IO-Link) position value as well as the attainable angular resolution [°]:

Pulses per revolution = poles per revolution x interpolation factor
steps per revolution = pulses per revolution x 4
angle resolution = 360° / steps per revolution



INFO

Readout of number of steps per revolution is via Index 1041.3.

Example: Incremental encoder (HTL) with 512 pulses per revolution

EB200E.IR-FN.8L2GN.008L
Interpolation: parameterizable 8-fold (default)

EBS.R-FN064.S025.A15.P0056
Poles per revolution: 64

Ill. 5: Type reference number in the example

The number of pulses, number of steps and angular resolution can be determined by the encoder settings (example):

- Number of pulses = 64 x 8 = **512 pulses per revolution**
- Number of steps = 512 x 4 = **2048 steps per revolution**
- Angular resolution = 360° / 2048 = **0.176°**

The parameterized direction of rotation has an effect on the phase in operating mode *Incremental encoder (HTL)* and the counting direction applied to the digital position value in operating mode *Incremental encoder IO-Link*.

For more detailed information on the following please refer to chapter *Annex [▶ 29]*.

IO-Link access: encoder settings

Name	Index	Subindex	Description
Scale Settings			
Poles per Revolution	1040	1	Number of poles per revolution: 2...256 ▪ `32`: 32 poles per revolution (for EBS.R-FN032) ▪ `64`: 64 poles per revolution (for EBS.R-FN064) [default]
Interpolation Settings			
Interpolation Settings. Factor	1041	1	Interpolation factor: ▪ `1`: 1-fold ▪ `2`: 2-fold ▪ `3`: 3-fold ▪ `4`: 4-fold ▪ `5`: 5-fold ▪ `8`: 8-fold [default] ▪ `10`: 10-fold ▪ `12`: 12-fold ▪ `16`: 16-fold
Interpolation Settings. Direction	1041	2	Interpolation direction: ▪ `0`: A before B / up counting (CW) [default] ▪ `1`: A before B / up counting (CCW)
Interpolation Settings. Steps per revolution	1041	3	Number of steps per revolution (= Poles per Revolution x Interpolation Factor x 4)

Also see about this

Annex [▶ 29]

5.2 Speed unit

Function *Speed unit* defines the sensor's speed unit.

The *speed unit function* allows for the following parameters:

- Revolutions per minute
- Steps per second

For more detailed information on the following please refer to chapter *Annex [▶ 29]*.

IO-Link access: speed unit

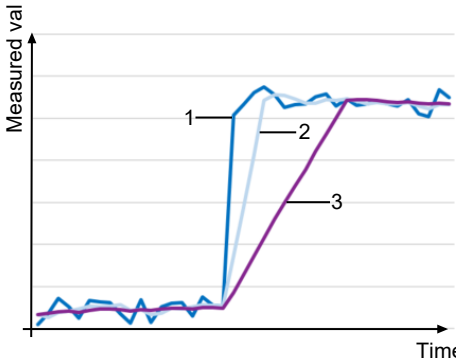
Name	Index	Subindex	Description
Unit.Speed	74	7	Choose physical unit for the measured speed: ▪ `1997`: steps/s [default] ▪ `1085`: rpm For correct rpm scaling, please set up also number of poles of the used magnetic rotor (Index 1040.1).

Also see about this

Annex [▶ 29]

5.3 Speed filter

The speed filter is smoothing the speed signal by help of a moving average filter. This will reduce speed noise according to the required dynamics. The filter characteristic can be modified via the filter time.



Ill. 6: Speed filter

1	Raw data	2	Data after filtering by Moving Average, filter time 20ms
3	Data after filtering by Moving Average, filter time 200ms		

For more detailed information on the following please refer to chapter *Annex [▶ 29]*.

IO-Link access: Speed filter

Name	Index	Subindex	Description
Moving Average Filter. Speed Filter	161	11	Enables or disables the speed filter: ▪ `0`: Disabled ▪ `1`: Enabled [default]
Moving Average Filter. Speed Averaging Time	161	12	Timebase for speed calculation [ms]: ▪ `5`: 5 ms ▪ `10`: 10 ms ▪ `20`: 20 ms [default] ▪ `50`: 50 ms ▪ `100`: 100 ms ▪ `200`: 200 ms

Also see about this

Annex [▶ 29]

5.4 Position value setting

This function is for setting the position value.

For more detailed information on the following please refer to chapter *Annex [▶ 29]*.

IO-Link access: Set position value

Name	Index	Subindex	Description
Preset Settings.Preset Position Value	115	3	Write to this Index sets the preset position value: ▪ 0: 0 steps [default]
Baumer Commands	1000	0	Write to this Index executes the command: ▪ 208: Preset Position

First, define the required position value in parameter *Preset Position Value*. Then the preset is executed by setting the parameter *Baumer Commands* to the command 208 (*Preset Position*).

Also see about this

Annex [▶ 29]

5.5 Position

This function reads out the encoder position.

The position is transmitted as part of the cyclic communication (process data). In addition, the position information is available via acyclic communication.

For more detailed information on the following please refer to chapter *Annex [▶ 29]*.

IO-Link access: Position

Name	Index	Subindex	Description
Measurement Values.Position	88	10	Value of actual position [steps]

Also see about this

Annex [▶ 29]

5.6 Speed

The speed information is transmitted as part of cyclic communication (process data). In addition, the speed information is available via acyclic communication.

For more detailed information on the following please refer to chapter *Annex [▶ 29]*.

IO-Link access: Speed

Name	Index	Subindex	Description
Measurement Values.Speed	88	20	Value of actual speed [unit according to Index 74]

Also see about this

Annex [▶ 29]

5.7 Speed monitor

Speed monitoring is watching the speed according to the set parameters and outputs the result as binary status information via IO-Link (SSC1: Speed Monitor) or, optionally, as switching output information via output A or B.

The function can be configured via the following parameters:

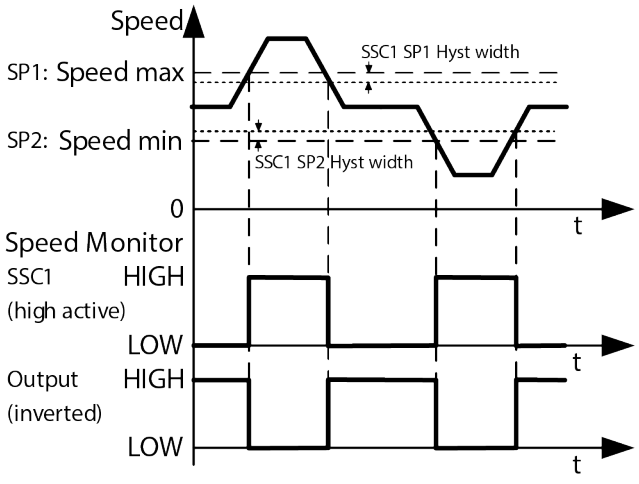
- Mode (*Deactivated*, *Single Point* or *Window Mode*)
- Logic (*high active* or *low active*)
- Setpoints (SP1 and SP2)
- Hysteresis (*Hysteresis SP1* and *Hysteresis SP2*)

Mode *Single Point* is for speed monitoring towards parameter *SP1 (Speed max)* in the specified direction of rotation. Mode *Window Mode* is for monitoring the speed range between *SP1 (Speed max)* and *SP2 (Speed min)*. Optional parameterization of hysteresis of SP1 and SP2 may prevent unwanted switching behavior when speed is close to the limits.

Logic can be used for inverting the switching behavior if required.

INFO

Switching thresholds and hysteresis must be specified in the speed unit (steps/s or rpm) configured according to index 74.



Ill. 7: Speed monitor

For more detailed information on the following please refer to chapter *Annex [▶ 29]*.

IO-Link access: Speed monitor

Name	Index	Subindex	Description
SSC1 Setpoints			
SSC1 Setpoints.SP 1	60	1	Speed max [Speed unit Index 74]: ▪ 0: zero speed [default]
SSC1 Setpoints.SP 2	60	2	Speed min [Speed unit Index 74]: ▪ 0: zero speed [default]
SSC1 Config			
SSC1 Config.Logic	61	1	Logic of SSC1: ▪ 0: high active [default] ▪ 1: low active
SSC1 Config.Mode	61	2	Mode of SSC1: ▪ 0: Deactivated (SSC1 state is "inactive") ▪ 1: Single Point [default] ▪ 2: Window Mode
Hysteresis.SSC1 SP1 Width	69	2	Speed SP1 Hysteresis [Speed unit Index 74]: ▪ 0: no hysteresis [default]
Hysteresis.SSC1 SP2 Width	69	3	Speed SP2 Hysteresis [Speed unit Index 74]: ▪ 0: no hysteresis [default]

Also see about this

Annex [▶ 29]

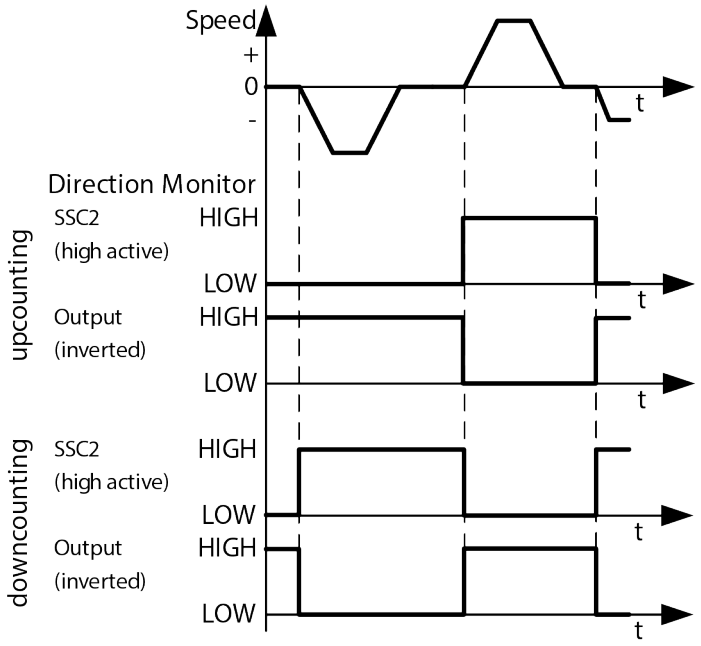
5.8 Direction monitor

The direction monitor is watching the direction of rotation according to the set parameters and outputs the result as binary status information via IO-Link (SSC2: Direction Monitor) or optionally as a switching output information via output A or B.

The function can be configured via the following parameters:

- Mode (*Deactivated* or *Single Point*)
- Logic (*high active* or *low active*)
- Switching direction of rotation (SP1)
- Position hysteresis

SP1 defines the direction of rotation to trigger the direction monitor. Optional parameterization of a position hysteresis can prevent unwanted switching behavior at minor movement close to standstill. Parameter *Logic* may be used to invert the switching behavior if required.



Ill. 8: Direction monitor

For more detailed information on the following please refer to chapter *Annex [▶ 29]*.

IO-Link access: Direction monitor

Name	Index	Subindex	Description
SSC2 Setpoints			
SSC2 Setpoints.SP 1	62	1	Monitoring Direction (activation of SSC2 in case of): ▪ `0`: upcounting direction [default] ▪ `1`: downcounting direction

Name	Index	Subindex	Description
SSC2 Config			
SSC2 Config.Logic	63	1	Logic of SSC2: ▪ 0: high active [default] ▪ 1: low active
SSC2 Config.Mode	63	2	Mode of SSC2: ▪ 0: Deactivated (SSC2 state is "inactive") ▪ 1: Single point [default]
Hysteresis.SSC2 Width	69	11	Direction Hysteresis in other direction [steps]: ▪ 0: no hysteresis [default]

Also see about this

Annex [▶ 29]

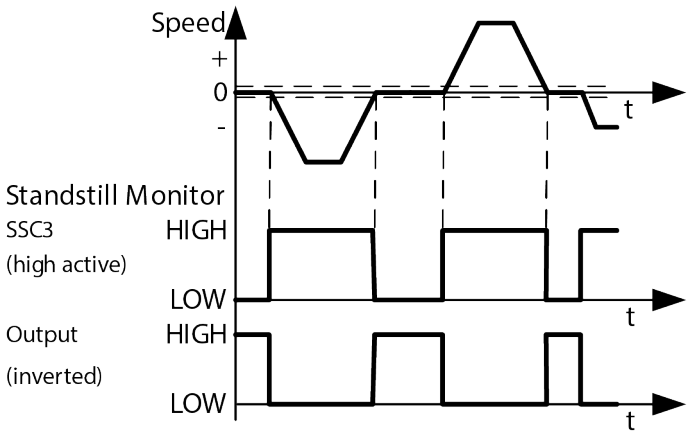
5.9 Standstill monitor

Standstill monitoring is watching movement according to the set parameters and outputs the result as binary status information via IO-Link (SSC3: Standstill Monitor) or optionally as a switching output information via output A or B.

The function can be configured via the following parameters:

- Mode (*Deactivated* or *Single Point*)
- Logic (*high active* or *low active*)
- Standstill threshold

Optional parameterization of a hysteresis will influence the sensitivity in detecting standstill. Parameter *Logic* may be used to invert the switching behavior if required.



Ill. 9: Standstill monitor

For more detailed information on the following please refer to chapter *Annex [▶ 29]*.

IO-Link access: Standstill monitor

Name	Index	Subindex	Description
SSC3 Config.Logic	4001	1	Logic of SSC3:

Name	Index	Subindex	Description
			▪ 0: high active [default] ▪ 1: low active
SSC3 Config.Mode	4001	2	Mode of SSC3: ▪ 0: Deactivated (SSC3 state is "inactive") ▪ 1: Single point [default]
Hysteresis.SSC3 Width	69	21	Standstill threshold [Speed unit Index 74]: ▪ 0: no hysteresis [default]

Also see about this

Annex [▶ 29]

5.10 Temperature monitoring

This function is for monitoring the device temperature. Once the set limits are exceeded or fallen below, alarm bit (AL) will be set in the process data.

For more detailed information on the following please refer to chapter *Annex [▶ 29]*.

IO-Link access: Temperature alarm settings

Name	Index	Subindex	Description
Max Temperature	96	3	If the current device temperature exceeds this value, alarm bit (AL) in process data will be set. ▪ `95`: +95 °C
Min Temperature	96	4	If the current device temperature is below this value, alarm bit (AL) in process data will be set. ▪ `-40`: -40 °C

Also see about this

Annex [▶ 29]

5.11 Output settings

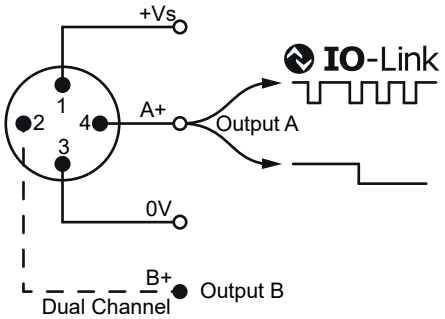
Output A is IO-Link capable. The following output functions are programmable:

- Encoder channel A
- Speed monitor
- Direction monitor
- Standstill monitor

Output functions of *Dual Channel* (output B):

- Encoder channel B
- Speed monitor
- Direction monitor
- Standstill monitor

If no encoder channel is output, the *Mode* parameter may be used to invert the switching behavior.



For detailed information on the access data listed see chapter *Annex [▶ 29]*.

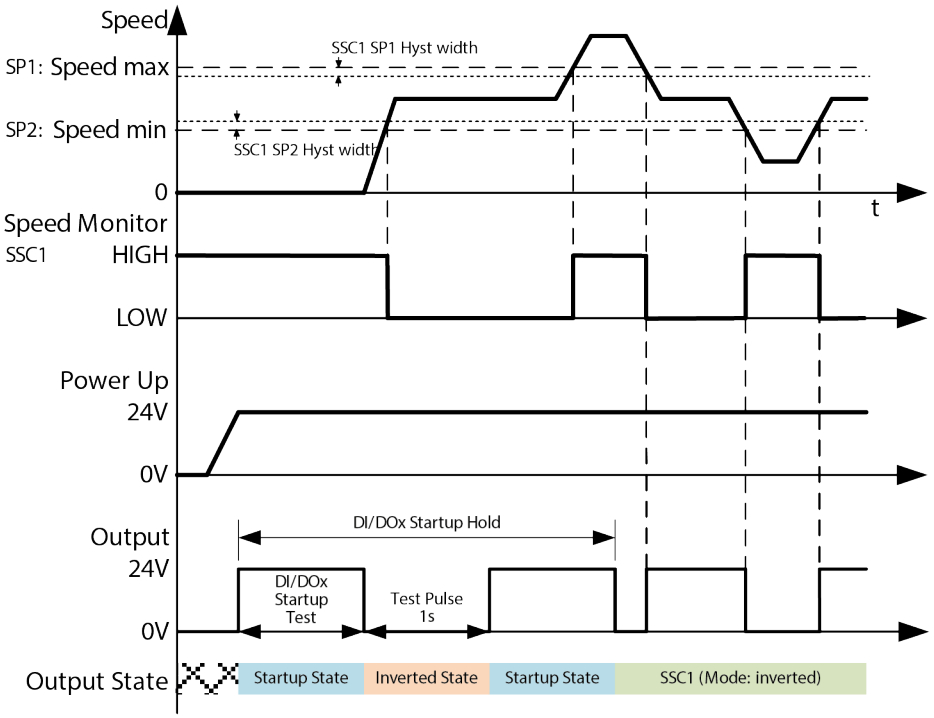
IO-Link access: Switching output settings

Name	Index	Subindex	Description
Output Settings.Output A Function	78	2	Defines the function of output A: ▪ `60`: Encoder channel A [default] ▪ `100`: SSC1 State (Speed Monitor) ▪ `200`: SSC2 State (Direction Monitor) ▪ `300`: SSC3 State (Standstill Monitor)
Output Settings.Output A Mode	78	3	Defines the logic of output A: ▪ `1`: Direct ▪ `2`: Inverted [default]
Output Settings.Output B Function	78	12	Defines the function of output B: ▪ `61`: Encoder channel B [default] ▪ `100`: SSC1 State (Speed Monitor) ▪ `200`: SSC2 State (Direction Monitor) ▪ `300`: SSC3 State (Standstill Monitor)

Name	Index	Subindex	Description
Output Settings.Output B Mode	78	13	Defines the logic of output B: ▪ 1: Direct ▪ 2: Inverted [default]

5.12 Behavior at startup

If EB200E is used as stand-alone motion monitor (speed, direction of rotation, standstill), various startup settings may be helpful to ensure correct startup behavior in the application.



For more detailed information on the following please refer to chapter *Annex [▶ 29]*.

IO-Link access: Behavior at power-on

Name	Index	Subindex	Description
Output Startup.Output A Startup Hold Time	81	1	Within this time [ms] after startup, the output is hold on the startup state: ▪ 0: startup hold disabled [default]
Output Startup.Output A Startup State	81	2	▪ 0: low ▪ 1: high [default]
Output Startup.Output A Test Time	81	3	After this time [ms] after startup, the output is set to its inverted startup state for 1 s: ▪ 0: startup test disabled [default]
Output Startup.Output B Startup Hold Time	81	11	Within this time [ms] after startup, the output is hold on the startup state: ▪ 0: startup hold disabled [default]
Output Startup.Output B Startup State	81	12	▪ 0: low ▪ 1: high [default]

Name	Index	Subindex	Description
Output Startup.Output B Test Time	81	13	After this time [ms] after startup, the output is set to its inverted startup state for 1 s: ▪ 0: startup test disabled [default]

Also see about this

Annex [▶ 29]

6 Diagnostic functions

6.1 Device status

Function *Device status* is for retrieving information on the device status.

For more detailed information on the following please refer to chapter *Annex [▶ 29]*.

IO-Link access: Device status

Name	Index	Subindex	Description
Device Status	36	0	▪ 0: Device is operating properly ▪ 4: Failure

Also see about this

Annex [▶ 29]

6.2 Operating hours

The operating time of the sensor is permanently recorded. This function reads out the total of the sensor's operating hours.

For more detailed information on the following please refer to chapter *Annex [▶ 29]*.

IO-Link access: Operating hours

Name	Index	Subindex	Description
Operation Time.Lifetime	211	3	Operating time [h] (since production)

Also see about this

Annex [▶ 29]

6.3 Device temperature

This function reads the sensor's temperature information.

For more detailed information on the following please refer to chapter *Annex [▶ 29]*.

IO-Link access: Device temperature

Name	Index	Subindex	Description
Device Temperature. Current	208	1	Current Device Temperature [°C]
Device Temperature. Lifetime Min	208	4	Minimum Device Temperature [°C] (over lifetime)
Device Temperature. Lifetime Max	208	5	Maximum Device Temperature [°C] (over lifetime)

Also see about this

Annex [▶ 29]

6.4 Revolution counter

The number of full rotations of the rotor is permanently recorded. This function is for reading out the number of revolutions completed in both directions of rotation.

INFO

Revolutions are only detected while in operation. Die korrekte Parametrierung der Polanzahl des verwendeten Magnetrotors ist zwingend erforderlich (siehe Encodereinstellungen). Otherwise, there might be a considerable discrepancy between number of revolutions output and the number of revolutions truly completed.

For more detailed information on the following please refer to chapter *Annex [▶ 29]*.

IO-Link access: Revolution counter

Name	Index	Subindex	Description
Revolutions Count. Lifetime	231	3	Number of full revolutions (over lifetime)

Also see about this

Annex [▶ 29]
Encoder settings [▶ 11]

7 Identification

These functions read or write sensor identification information.

For more detailed information on the following please refer to chapter *Annex [▶ 29]*.

IO-Link access: Identification

Name	Index	Subindex	Description
Vendor Name	16	0	Vendor name that is assigned to a vendor ID, e. g. Baumer.
Vendor Text	17	0	Additional information about the vendor, e. g. www.baumer.com
Product Name	18	0	Complete product name.
Product ID	19	0	Vendor-specific product or type identification (e.g., item number or model number).
Product Text	20	0	Additional product information for the device.
Application Specific Tag	24	0	Possibility to mark a device with user-or application-specific information.
Function Tag	25	0	Possibility to mark a device with function-specific information.
Location Tag	26	0	Possibility to mark a device with location-specific information.
Serial Number	21	0	Unique, vendor-specific identifier of the individual device.
Hardware Version	22	0	Current hardware version
Firmware Revision	23	0	Current firmware version

Also see about this

Annex [▶ 29]

8 Annex

8.1 IO-Link

8.1.1 PDI

Process Data mapping of Process Data Input

	Speed	Position	Status Bits
Type	Int32	Int32	4x Boolean
Bit Offset	71 ... 40	39 ... 8	7 ... 0
Subindex	1	2	6 ... 3

Subindex	Bit Offset	Name	Type	Range	Description
1	40	Speed	Int32	-2^31...2^31-1	Speed value [unit according Index 74]
2	8	Position	Int32	-2^31...2^31-1	Position value [steps]
3	0	SSC1	Boolean	0/1	State of Speed Monitor (SSC1)
4	1	SSC2	Boolean	0/1	State of Direction Monitor (SSC2)
5	3	Alarm	Boolean	0/1	▪ `0`: Device temperature within limit values ▪ `1`: Device temperature exceeds limit values
6	4	SSC3	Boolean	0/1	State of Standstill Monitor (SSC3)

8.1.2 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. EB200E.
19	0	Product ID	String	R	ASCII	Reference for IODD
20	0	Product Text	String	R	ASCII	Additional product information for the device.
21	0	Serial Number	String	R	ASCII	Serial number
22	0	Hardware Version	String	R	ASCII	Current hardware version
23	0	Firmware Revision	String	R	ASCII	Current firmware version
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.

8.1.3 Parameter

8.1.3.1 Encoder Settings

Index	Subindex	Name	Data type	Access rights	Value range	Description
Scale Settings						
1040	1	Poles per Revolution	Uint16	R/W	2...256	Number of poles of the used magnetic rotor: ▪ `32`: 32 poles per revolution (for EBS.R-FN032) ▪ `64`: 64 poles per revolution (for EBS.R-FN064) [default]
Interpolation Settings						
1041	1	Interpolation Settings. Factor	Uint16	R/W	1...16	Interpolation factor: ▪ `1`: 1-fold ▪ `2`: 2-fold ▪ `3`: 3-fold ▪ `4`: 4-fold ▪ `5`: 5-fold ▪ `8`: 8-fold [default] ▪ `10`: 10-fold ▪ `12`: 12-fold ▪ `16`: 16-fold
1041	2	Interpolation Settings. Direction	Uint8	R/W	0...1	Interpolation direction: ▪ `0`: A before B / up counting (CW) [default] ▪ `1`: A before B / up counting (CCW)
1041	3	Interpolation Settings. Steps per revolution	Uint32	R		Number of steps per revolution (= Poles per Revolution x Interpolation Factor x 4)

8.1.3.2 Unit

Index	Subindex	Name	Data type	Access rights	Value range	Description
74	7	Unit.Speed	Uint16	R/W	1085...1997	Choose physical unit for the measured speed: ▪ `1997`: steps/s [default] ▪ `1085`: rpm For correct rpm scaling, please set up also number of poles of the used magnetic rotor (Index 1040.1).

8.1.3.3 Signal Processing

Index	Subindex	Name	Data type	Access rights	Value range	Description
Moving average Filter						
161	11	Moving Average Filter. Speed Filter	Uint16	R/W	0...1	Enables or disables the speed filter: ▪ `0`: Disabled ▪ `1`: Enabled [default]
161	12	Moving Average Filter. Speed Averaging Time	Uint16	R/W	5...200	Timebase for speed calculation [ms]: ▪ `5`: 5 ms ▪ `10`: 10 ms ▪ `20`: 20 ms [default] ▪ `50`: 50 ms ▪ `100`: 100 ms ▪ `200`: 200 ms
Preset Settings						
115	3	Preset Settings.Preset Position Value	Int32	R/W	-2^31...2^31-1	Write to this Index sets the preset position value: ▪ `0`: 0 steps [default]
1000	0	Baumer Commands	Uint32	W	0...208	Write to this Index executes the command: ▪ `208`: Preset Position

8.1.3.4 Alarm Settings

Index	Subindex	Name	Data type	Access rights	Value range	Description
Temperature Alarm Settings						
96	3	Max Temperature	Float32	R/W	±1.4^-45 to ±3.4^38	If the current device temperature exceeds this value, alarm bit (AL) in process data will be set. ▪ `95`: +95 °C [default]
96	4	Min Temperature	Float32	R/W	±1.4^-45 to ±3.4^+38	If the current device temperature is below this value, alarm bit (AL) in process data will be set. ▪ `-40`: -40 °C [default]

8.1.3.5 Switched Signal Channel Settings

Index	Subindex	Name	Data type	Access rights	Value range	Description
SSC1 Setpoints						
60	1	SSC1 Setpoints.SP 1	Int32	R/W	-2^31...2^31-1	Speed limit max [Speed unit Index 74]: ▪ `0`: zero speed [default]
60	2	SSC1 Setpoints.SP 2	Int32	R/W	-2^31...2^31-1	Speed limit min [Speed unit Index 74]: ▪ `0`: zero speed [default]
SSC1 Config						
61	1	SSC1 Config.Logic	Uint8	R/W	0...1	Logic of SSC1: ▪ `0`: high active [default] ▪ `1`: low active
61	2	SSC1 Config.Mode	Uint8	R/W	0...2	Mode of SSC1: ▪ `0`: Deactivated (SSC1 state is "inactive") ▪ `1`: Single point [default] ▪ `2`: Window mode
69	2	Hysteresis.SSC1 SP1 Width	Int32	R/W	0...2^31-1	Speed SP1 Hysteresis [Speed unit Index 74]: ▪ `0`: no hysteresis [default]

Index	Subindex	Name	Data type	Access rights	Value range	Description
69	3	Hysteresis.SSC1 SP2 Width	Int32	R/W	0...2^31-1	Speed SP2 Hysteresis [Speed unit Index 74]: ▪ 0: no hysteresis [default]
SSC2 Setpoints						
62	1	SSC2 Setpoints.SP 1	Int32	R/W	0...1	Monitoring Direction (activation of SSC2 in case of): ▪ 0: upcounting direction [default] ▪ 1: downcounting direction
SSC2 Config						
63	1	SSC2 Config.Logic	Uint8	R/W	0...1	Logic of SSC2: ▪ 0: high active [default] ▪ 1: low active
63	2	SSC2 Config.Mode	Uint8	R/W	0...1	Mode of SSC2: ▪ 0: Deactivated (SSC2 state is "inactive") ▪ 1: Single point [default]
69	11	Hysteresis.SSC2 Width	Int32	R/W	0...2^31-1	Direction Hysteresis in other direction [steps]: ▪ 0: no hysteresis [default]
SSC3 Config						
4001	1	SSC3 Config.Logic	Uint8	R/W	0...1	Logic of SSC3: ▪ 0: high active [default] ▪ 1: low active
4001	2	SSC3 Config.Mode	Uint8	R/W	0...1	Mode of SSC3: ▪ 0: Deactivated (SSC3 state is "inactive") ▪ 1: Single point [default]
69	21	Hysteresis.SSC3 Width	Int32	R/W	0...2^31-1	Standstill threshold [Speed unit Index 74]: ▪ 0: no hysteresis [default]

8.1.3.6 Digital Output

Index	Subindex	Name	Data type	Access rights	Value range	Description
Output Settings						
78	2	Output Settings.Output A Function	Uint16	R/W	60...300	Defines the function of output A: ▪ `60`: Encoder channel A [default] ▪ `100`: SSC1 State (Speed Monitor) ▪ `200`: SSC2 State (Direction Monitor) ▪ `300`: SSC3 State (Standstill Monitor)
78	3	Output Settings.Output A Mode	Uint8	R/W	1...2	Defines the logic of output A: ▪ `1`: Direct ▪ `2`: Inverted [default]
78	12	Output Settings.Output B Function	Uint16	R/W	61...300	Defines the function of output B: ▪ `61`: Encoder channel B [default] ▪ `100`: SSC1 State (Speed Monitor) ▪ `200`: SSC2 State (Direction Monitor) ▪ `300`: SSC3 State (Standstill Monitor)
78	13	Output Settings.Output B Mode	Uint8	R/W	1...2	Defines the logic of output B: ▪ `1`: Direct ▪ `2`: Inverted [default]
Output Startup						
81	1	Output Startup.Output A Startup Hold Time	Uint32	R/W	0...2^32-1	Within this time [ms] after startup, the output is hold on the startup state: ▪ `0`: startup hold disabled [default]
81	2	Output Startup.Output A Startup State	Uint8	W	0...1	▪ `0`: low ▪ `1`: high [default]
81	3	Output Startup.Output A Test Time	Uint32	W	0...2^32-1	After this time [ms] after startup, the output is set to its inverted startup state for 1 s: ▪ `0`: startup test disabled [default]

Index	Subindex	Name	Data type	Access rights	Value range	Description
81	11	Output Startup.Output B Startup Hold Time	Uint32	W	0...2^32-1	Within this time [ms] after startup, the output is hold on the startup state: ▪ 0: startup hold disabled [default]
81	12	Output Startup.Output B Startup State	Uint8	W	0...1	▪ 0: low ▪ 1: high [default]
81	13	Output Startup.Output B Test Time	Uint32	W	0...2^32-1	After this time [ms] after startup, the output is set to its inverted startup state for 1 s: ▪ 0: startup test disabled [default]

8.1.4 Observation

Index	Subindex	Name	Data type	Access rights	Value range	Description
88	10	Measurement Values.Position	Int32	R	-2^31...2^31-1	Value of actual position [steps].
88	20	Measurement Values.Speed	Int32	R	-2^31...2^31-1	Value of actual speed [unit according Index 74].

8.1.5 Diagnosis

Index	Subindex	Name	Data type	Access rights	Value range	Description
Device Status						
36	0	Device Status	Uint8	R	0...4	▪ 0: Device is operating properly ▪ 4: Failure
Device Temperature						
208	1	Device Temperature. Current	Float32	R	±1.4^-45 to ±3.4^38	Current Device Temperature [°C]
208	4	Device Temperature. Lifetime Min	Float32	R	±1.4^-45 to ±3.4^38	Minimum Device Temperature [°C] (over lifetime)

Index	Subindex	Name	Data type	Access rights	Value range	Description
208	5	Device Tempera-ture. Lifetime Max	Float32	R	±1.4^-45 to ±3.4^38	Maximum Device Temperature [°C] (over lifetime)
Operation Time						
211	3	Operation Time.Life-time	Uint32	R	0...2^32-1	Operating time [h] (since production)
Revolutions Count						
231	3	Revolutions Count. Lifetime	Uint64	R	0...2^64-1	Number of full revolutions (over lifetime)

9 List of abbreviations

A+	Non-inverted connection of output A
AL	Alarm bit
B+	Non-inverted connection of output B
CCW	Counterclockwise
CW	Clockwise
HTL	High Threshold Logic
IODD	IO Device Description
MQTT	Message Queuing Telemetry Transport
OPC UA	Open Platform Communications Unified Architecture
OT communication	Operational Technology Communication
ppr	Pulses per revolution
rpm	Revolutions per minute
SP1	Setpoint 1
SP2	Setpoint 2
SPS	Programmable Logic Controller
SSC1	Switching Signal Channel 1
SSC2	Switching Signal Channel 2
SSC3	Switching Signal Channel 3

List of illustrations

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