CANEO series4x – Firmware V5.x

Revision E | 2024-10-11

Overview

CANEO series4x SENSORswitches can be used in IO-Link and in non-IO-Link environments.

For non-IO-Link usage, the sensor features one standard Digital Output and up to two standard Digital Inputs (E1, E2), which can be used to control the sensor's LED (and text display).

The related parameters can be configured before/during deployment via IO-Link:

- Function of the Digital Output – PNP/NPN/PushPull, Normally Open/Closed
- Function of the up to two Digital Inputs (E1, E2)
  - LED and display control
  - Locking/release of Digital Output
- LED and display behavior for various states

IO-Link Communication

If the sensor detects IO-Link communication, it automatically switches to the IO-Link communication mode. The IO-Link standard offers different communication mechanisms:

- **Acyclic Data** (Indexed Service Data Units): Used to set the sensor configuration during commissioning.
- **Cyclic Process Data**: Used to receive the sensor's state and influence its behavior during runtime.
- **Events**: The sensor will report events in case of error.

In IO-Link applications the sensor always provides the same information (like actuation state) in its Process Data (PDin), but depending on the configured LED (and Display) Control Mode, different kind of Process Data to the sensor (PDout) can be used:

- **Automatic Scene Selection** – Use this mode if you don't want to use IO-Link to control the sensor's LED (and display).
- **Scene controlled by IO-Link Process Data** – This control mode is used to control the LED/Display scenes through IO-Link. It covers most applications which use IO-Link. It is limited to eight LED/Display scenes. A scene describes the behavior of the LED or display with a couple of parameters (e.g., color and effect, display text).
- **Advanced Control by IO-Link Process Data** – If you use IO-Link, but the eight LED scenes are not sufficient for your application, it is recommended to use this LED control mode. The advanced control mode lets you control every single LED and display digit individually, to e.g. implement a scrolling text display.

INFO

Process Data, ISDUs and events of the sensor, their respective numeric indices, offsets, and values, are described in the IODD file of the sensor. It is highly recommended to use this file when integrating the sensor in an application.

Device Variants

With Display

Product ID	Name	Description
CD40K-MSBN	CANEO series40 Puck Display	M12 connector, incl. 7-Segment display
CD41A-APBK	CANEO series41 Solid Display red	Mounting support aluminum, red cover ring (RAL 3020), M12 connector
CD41A-AQBK	CANEO series41 Solid Display gray	Mounting support aluminum, gray cover ring (RAL 7042), M12 connector
CD41A-ARBK	CANEO series41 Solid Display black	Mounting support aluminum, black cover ring (RAL 9017), M12 connector
CD41A-ASBK	CANEO series41 Solid Display yellow	Mounting support aluminum, yellow cover ring (RAL 1023), M12 connector
CD41A-ATBK	CANEO series41 Solid Display green	Mounting support aluminum, green cover ring (RAL 6024), M12 connector
CD41A-AUBK	CANEO series41 Solid Display blue	Mounting support aluminum, blue cover ring (RAL 5015), M12 connector
CD41A-AVBK	CANEO series41 Solid Display orange	Mounting support aluminum, orange cover ring (RAL 2009), M12 connector
CD41A-AWBK	CANEO series41 Solid Display white	Mounting support aluminum, white cover ring (RAL 9016), M12 connector
CD41A-AZBK	CANEO series41 Solid Display gray B	Mounting support aluminum, gray cover ring (RAL 7043), M12 connector
CD41K-CRBK	CANEO series41 Standard Display black	Black cover ring (RAL 9017), M12 connector
CD41K-DCBL	CANEO series41 Standard Display yellow	Yellow cover ring (RAL 1023), M12 connector
CD41K-DEBL	CANEO series41 Standard Display orange	Orange cover ring (RAL 2009), M12 connector
CD41K-DFBL	CANEO series41 Standard Display red	Red cover ring (RAL 3020), M12 connector
CD41K-DGBL	CANEO series41 Standard Display white	White cover ring (RAL 9016), M12 connector
CD41K-DHBL	CANEO series41 Standard Display gray B	Gray cover ring (RAL 7043), M12 connector
CD41K-DJBL	CANEO series41 Standard Display gray	Gray cover ring (RAL 7042), M12 connector

Product ID	Name	Description
CD41K-DKBL	CANEO series41 Standard Display green	Green cover ring (RAL 6024), M12 connector
CD41K-DLBL	CANEO series41 Standard Display blue	Blue cover ring (RAL 5015), M12 connector
CD41K-DMBL	CANEO series41 Standard Display black	Black cover ring (RAL 9017), M12 connector
CD41K-DNBQ	CANEO series41 Standard Display black strands	Black cover ring (RAL 9017), strands
CD41K-DPBQ	CANEO series41 Standard Display red strands	Red cover ring (RAL 3020), strands
CD41K-DQBQ	CANEO series41 Standard Display yellow strands	Yellow cover ring (RAL 1023), strands
CD41K-DRBQ	CANEO series41 Standard Display orange strands	Orange cover ring (RAL 2009), strands
CD41K-DSBQ	CANEO series41 Standard Display white strands	White cover ring (RAL 9016), strands
CD41K-DTBQ	CANEO series41 Standard Display gray B strands	Gray cover ring (RAL 7043), strands
CD41K-DUBQ	CANEO series41 Standard Display gray A strands	Gray cover ring (RAL 7042), strands
CD41K-DVBQ	CANEO series41 Standard Display green strands	Green cover ring (RAL 6024), strands
CD41K-DWBQ	CANEO series41 Standard Display blue strands	Blue cover ring (RAL 5015), strands
CD43G-JSBL	CANEO series43 Hygienic Display	Hygiene compliant, M12 connector
CD43G-JTBQ	CANEO series43 Hygienic Display strands	Hygiene compliant, strands
CD44F-EDBL	CANEO series44 Glass Display	For mounting behind glass, M12 connector
CD44F-EEBQ	CANEO series44 Glass Display strands	For mounting behind glass, strands

Without Display

Product ID	Name	Description
CS40K-MSBN	CANEO series40 Puck	M12 connector
CS41A-APBK	CANEO series41 Solid red	Mounting support aluminum, red cover ring (RAL 3020), M12 connector
CS41A-AQBK	CANEO series41 Solid gray	Mounting support aluminum, gray cover ring (RAL 7042), M12 connector
CS41A-ARBK	CANEO series41 Solid black	Mounting support aluminum, black cover ring (RAL 9017), M12 connector
CS41A-ASBK	CANEO series41 Solid yellow	Mounting support aluminum, yellow cover ring (RAL 1023), M12 connector
CS41A-ATBK	CANEO series41 Solid green	Mounting support aluminum, green cover ring (RAL 6024), M12 connector
CS41A-AUBK	CANEO series41 Solid blue	Mounting support aluminum, blue cover ring (RAL 5015), M12 connector
CS41A-AVBK	CANEO series41 Solid orange	Mounting support aluminum, orange cover ring (RAL 2009), M12 connector
CS41A-AWBK	CANEO series41 Solid white	Mounting support aluminum, white cover ring (RAL 9016), M12 connector
CS41A-AZBK	CANEO series41 Solid gray B	Mounting support aluminum, gray cover ring (RAL 7043), M12 connector
CS41K-CRBK	CANEO series41 Standard black	Black cover ring (RAL 9017), M12 connector
CS41K-DCBL	CANEO series41 Standard yellow	Yellow cover ring (RAL 1023), M12 connector
CS41K-DEBL	CANEO series41 Standard orange	Orange cover ring (RAL 2009), M12 connector
CS41K-DFBL	CANEO series41 Standard red	Red cover ring (RAL 3020), M12 connector
CS41K-DGBL	CANEO series41 Standard white	White cover ring (RAL 9016), M12 connector
CS41K-DHBL	CANEO series41 Standard gray B	Gray cover ring (RAL 7043), M12 connector
CS41K-DJBL	CANEO series41 Standard gray	Gray cover ring (RAL 7042), M12 connector
CS41K-DKBL	CANEO series41 Standard green	Green cover ring (RAL 6024), M12 connector
CS41K-DLBL	CANEO series41 Standard blue	Blue cover ring (RAL 5015), M12 connector

Product ID	Name	Description
CS41K-DMBL	CANEO series41 Standard black	Black cover ring (RAL 9017), M12 connector
CS41K-DNBQ	CANEO series41 Standard strands	Black cover ring (RAL 9017), strands
CS41K-DPBQ	CANEO series41 Standard red strands	Red cover ring (RAL 3020), strands
CS41K-DQBQ	CANEO series41 Standard yellow strands	Yellow cover ring (RAL 1023), strands
CS41K-DRBQ	CANEO series41 Standard orange strands	Orange cover ring (RAL 2009), strands
CS41K-DSBQ	CANEO series41 Standard white strands	White cover ring (RAL 9016), strands
CS41K-DTBQ	CANEO series41 Standard gray B strands	Gray cover ring (RAL 7043), strands
CS41K-DUBQ	CANEO series41 Standard gray A strands	Gray cover ring (RAL 7042), strands
CS41K-DVBQ	CANEO series41 Standard green strands	Green cover ring (RAL 6024), strands
CS41K-DWBQ	CANEO series41 Standard blue strands	Blue cover ring (RAL 5015), strands
CS43G-JSBL	CANEO series43 Hygienic	Hygiene compliant, M12 connector
CS43G-JTBQ	CANEO series43 Hygienic strands	Hygiene compliant, strands
CS44F-EDBL	CANEO series44 Glass	For mounting behind glass, M12 connector
CS44F-EEBQ	CANEO series44 Glass strands	For mounting behind glass, strands
CS46A-GABM	CANEO series46 Solid red	Mounting support aluminum, red cover ring (RAL 3020), M12 connector
CS46A-GBBM	CANEO series46 Solid yellow	Mounting support aluminum, yellow cover ring (RAL 1023), M12 connector
CS46A-GCBM	CANEO series46 Solid orange	Mounting support aluminum, orange cover ring (RAL 2009), M12 connector
CS46A-GDBM	CANEO series46 Solid white	Mounting support aluminum, white cover ring (RAL 9016), M12 connector
CS46A-GEBM	CANEO series46 Solid gray B	Mounting support aluminum, gray cover ring (RAL 7043), M12 connector

Product ID	Name	Description
CS46A-GFBM	CANEO series46 Solid gray	Mounting support aluminum, gray cover ring (RAL 7042), M12 connector
CS46A-GGBM	CANEO series46 Solid green	Mounting support aluminum, green cover ring (RAL 6024), M12 connector
CS46A-GHBM	CANEO series46 Solid blue	Mounting support aluminum, blue cover ring (RAL 5015), M12 connector
CS46A-GIBM	CANEO series46 Solid black	Mounting support aluminum, black cover ring (RAL 9017), M12 connector
CS46K-FABM	CANEO series46 Standard red	Red cover ring (RAL 3020), M12 connector
CS46K-FBBM	CANEO series46 Standard yellow	Yellow cover ring (RAL 1023), M12 connector
CS46K-FCBM	CANEO series46 Standard orange	Orange cover ring (RAL 2009), M12 connector
CS46K-FDBM	CANEO series46 Standard white	White cover ring (RAL 9016), M12 connector
CS46K-FEBM	CANEO series46 Standard gray	Gray cover ring (RAL 7043), M12 connector
CS46K-FFBM	CANEO series46 Standard gray	Gray cover ring (RAL 7042), M12 connector
CS46K-FGBM	CANEO series46 Standard green	Green cover ring (RAL 6024), M12 connector
CS46K-FHBM	CANEO series46 Standard blue	Blue cover ring (RAL 5015), M12 connector
CS46K-FIBM	CANEO series46 Standard black	Black cover ring (RAL 9017), M12 connector

LED (and Display) Control

series4x (Display) supports three modes for controlling its LEDs (and Display):

- Automatic Scene Selection
- Scene controlled by IO-Link-Process Data
- Advanced Control by IO-Link Process Data

The control mode can be selected via IO-Link parameter **LED Control Mode** (see ISDU Indices).

Automatic Scene Selection

The LEDs (and Display) behave like the selected Scene. Scene n is selected by the state of Touch (Sensor actuation) and the state of the input pins E1 and E2:

LED Scene	Actuation Flag	E1	E2	None	Pin2 (E1)	Pin2 (E1) and Pin5 (E2)
0	0	0	0	✓	✓	✓
1	1	0	0	✓	✓	✓
2	0	1	0		✓	✓
3	1	1	0		✓	✓
4	0	0	1			✓
5	1	0	1			✓
6	0	1	1			✓
7	1	1	1			✓

The number of applicable scenes depends on parameter **Active Inputs**:

Active Inputs	Applicable Scenes
None (3 pin mode)	0, 1
Pin2 (E1) (4 pin mode)	0 ... 3
Pin2 (E1) and Pin5 (E2) (5 pin mode)	0 ... 7

Scene Controlled by IO-Link Process Data

The active Scene is set to the value written to the **LED Scene** field of the Process Data. For **LED Scene** = 255, the active Scene is selected by inputs like "Automatic Scene Selection" (LED Control Mode = 0).

LEDs always act like described in the active Scene. The Display behavior depends on the **Display Mode** field of Process Data: It can show the Display Text of the selected Scene, or a number or a text given in the respective field of Process Data.

Advanced Control by IO-Link Process Data

The LED pattern, color, brightness, effect, and effect frequency is controlled by IO-Link process data. For more information see Process Data.

The LED indexing is clockwise starting from the top left LED (LED 1).

Output Locking

The "Output Locking" was designed for applications without IO-Link only. The sensor needs to be set to **LED Control Mode** "Automatic Scene selection". It locks the **Pin 4** output signal but has no impact on the **Actuation Flag**.

The "Output Locking" has no influence on the scene or scene change. This means touching/inputs on E1/E2 will change the scene accordingly.

For locking, the inputs must be set active (**Active Inputs** parameter).

Output locking can be used to interrupt an infinite timer / terminate an output signal.

Display Content

> **NOTE**
>
> Applies to series4x Display variants only.

Displayable Characters

The following table shows all displayable characters (ASCII codes 0x30–0x7F):

	_0	_1	_2	_3	_4	_5	_6	_7	_8	_9	_A	_B	_C	_D	_E	_F
3_	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4_	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5_	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
6_	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7_	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	DEL
8_	Bit 0 to 6 of ASCII code controls segment a to g															

Examples:

- Number "8": `0x38`
- Letter "B": `0x42`

Custom Display Patterns

To create custom display patterns, use `0x80` + (Bit 0 to 7). Bit 0 to 7 refers to segments a to g.

Example: Symbol `|–` (segments e, f, g): `0x80` + `0111 0000b` = `0xF0`

Segment Coding

Display Segment LEDs refer to segments a through g:

Timer

The timer functionality is designed for applications without IO-Link only. The **LED Control Mode** needs to be set to "Automatic Scene Selection" so the timer can be started by activation of the switch or the inputs E1/E2.

Activating a scene via IO-Link when "LED Control Mode" is set to "Scene controlled by IO-Link Process Data" will **not** activate the Timer. If you want to control a Timer via IO-Link, use the "LED Control Mode" "Advanced Control by IO-Link Process Data" and run the timer on the PLC and display the time.

> **NOTE**
>
> Timer overwrites LED effect of the scene; LED effects with prefix "Timer" are synchronized with the timer.

Use Case Example 1

The output signal shall come in the beginning, before the timer runs down/up.

1. Set **Sensor Mode** to "Static" or "Dynamic"
2. Set **Timer Function** to "1 - count down" / "2 - count up"
3. Set **Trigger Timer** to "0 - when entering Scene 0"
4. Set **Timer timeout** to e.g. "10" s
5. Set **Output Minimum Impulse Time**
6. Set **LED Effect** for Timer

> **NOTE**
>
> **Sensor Mode** needs to be "Static" or "Dynamic". If the sensor is in "Toggle" mode, the timer will start when the sensor is touched for a second time since it will be in "Scene 1" after the first touch and goes back to "Scene 0" after the second.

Use Case Example 2

The output signal shall come at the end.

1. Set **Sensor Mode** to "Static" or "Dynamic"
2. Set **Timer Function** to "1 - count down" / "2 - count up"
3. Set **Trigger Timer** to "1 - when entering Scene 1"
4. Set **Timer timeout** to e.g. "10" s
5. Set **Output Minimum Impulse Time** to e.g. "300" ms
6. Set **Output Activation Delay** to e.g. "9700" ms
7. Set **LED Effect** for Timer

> **NOTE**
>
> **Sensor Mode** needs to be "Static" or "Dynamic".
>
> **Output Activation Delay** = **Timer timeout** - **Output Minimum Impulse Time**.

Use Case Example 3

The timer shall count infinitely (display up to 9999 s).

1. Set **Sensor Mode** to "Toggle" (you will have an output signal as long as the timer counts)
2. Set **Timer Function** to "Count Up Infinite"
3. Set **Trigger Timer** to "1 - when entering Scene 1"
4. Set **Output Minimum Impulse Time** to e.g. "300" ms
5. Set **Output Activation Delay** to 0 ms
6. Set **LED Effect** for timer

> **NOTE**
>
> - **Sensor Mode** needs to be "Toggle" to get a continuous output signal as long as the counter is active.
> - The timer display / LED-ring stops counting up at 9999 s, the output signal stays until the switch is touched again.
> - The timer can be ended if "Output Locking" is active and you put an input signal on one of the inputs.

IO-Link Interface

IO-Link Specification: V1.1.2 (July 2013)

Property	series40/41/43 Display	series40/41/43/46	series44 Glass Display	series44 Glass
Vendor ID	1239	1239	1239	1239
Device Family	Capacitive Sensors	Capacitive Sensors	Capacitive Sensors	Capacitive Sensors
Device Name	CANEO series40/41/43 Display	CANEO series40/41/43/46	CANEO series44 Glass Display	CANEO series44 Glass
Device ID	1024	1280	1792	2048
IODD	IODDfinder	IODDfinder	IODDfinder	IODDfinder

Communication Interface

Property	Value
IO-Link Version	V1.1
Bitrate	COM2
Minimum Cycle Time	14800 µs
Process Data Input Bits	80
Process Data Output Bits	112
SIO Supported	Yes
ISDU Supported	Yes
Data Storage	Yes
Block Parameter	No

Process Data

> **NOTE**
> IO-Link Bit Offset counts from the last byte of the data array.

Process Data Input

80 bit / 10 bytes

Byte	0	1	2	3	4	5	6	7	8	9
Bit Offset		64	56		48	32	24	16	8	0
Data	unused	Surrounding Brightness	Actuation Strength		Actuation Count		Actuation Flag	Pin 5	Pin 4	Pin 2

Field Reference

Bit Offset	Name	Datatype	Values	Info
0	Pin 2	8-bit UIntegerT	4 - Input OFF, 5 - Input ON, 8 - Pin unused	E1 input pin state
8	Pin 4	8-bit UIntegerT	0 - Output OFF, 1 - Output ON	OUT pin state
16	Pin 5	8-bit UIntegerT	4 - Input OFF, 5 - Input ON, 8 - Pin unused	E2 input pin state
24	Actuation Flag	8-bit UIntegerT	0 - Idle, 1 - Actuated	Sensor actuation state
32	Actuation Count	16-bit UIntegerT	0 ... 65535	Number of actuation cycles since sensor has been turned on. Counter resets when sensor restarts and after count of 65535.
48	Actuation Strength	8-bit UIntegerT	0 ... 100 [%]	Damping of sensor in percent.
56	Surrounding Brightness	8-bit UIntegerT	0 ... 100 [%]	Ambient brightness in percent.
64	unused	16-bit UIntegerT	0 ... 65535	

Process Data Output

112 bit / 14 bytes

LED Control Mode "Automatic Scene Selection" (0)

Process Data Output is **unused**.

LED Control Mode "Scene controlled by IO-Link Process Data" (1)

Byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Bit Offset							64	56	48	40	32	16	8	0
Data	unused						Display Digit 4	Display Digit 3	Display Digit 2	Display Digit 1	Displayed Number		Display Mode	LED Scene

Bit Offset	Name	Datatype	Values	Info
0	LED Scene	8-bit UIntegerT	0...7, 255 - Automatic	Switch between LED scenes "0" to "7". For control by activation and input pins set value to "255".
8	Display Mode	8-bit UIntegerT	0 - Use text from Scene, 1 - Number given, 2 - Digits given	**0** : Displays the text predefined in scene. **1** : Displays the number set in "Displayed Number". **2** : Displays the digits set in "Display Digit 1" to "Display Digit 4".
16	Displayed Number	16-bit UIntegerT	0 ... 9999	Number between "0" and "9999".
32	Display Digit 1	8-bit UIntegerT	0 ... 255	Set digits as ASCII-code. See Display Content .
40	Display Digit 2	8-bit UIntegerT	0 ... 255	Set digits as ASCII-code. See Display Content .
48	Display Digit 3	8-bit UIntegerT	0 ... 255	Set digits as ASCII-code. See Display Content .
56	Display Digit 4	8-bit UIntegerT	0 ... 255	Set digits as ASCII-code. See Display Content .

> **NOTE**
>
> Display fields apply to Display variants only.

LED Control Mode "Advanced Control by IO-Link Process Data" (2)

Byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Bit Offset	104	96	88	80	72	64	56	48	40	32	24	16		0
Data	unused	Display Brightness	Display Digit 4	Display Digit 3	Display Digit 2	Display Digit 1	Effect Frequency	LED Effect	LED Color B	LED Color G	LED Color R	LED Brightness		Active LEDs

Bit Offset	Name	Datatype	Values	Info
0	Active LEDs	16-bit UIntegerT	0 ... 65535	Bitmask defining which LEDs are active. LED 1 is the top left LED, the index increases clockwise.
16	LED Brightness	8-bit UIntegerT	0...100, 255 - Automatic Control [%]	Brightness of LED ring in percent. Value of 255 means automatic brightness control by sensor.
24	LED Color R	8-bit UIntegerT	0 ... 255	Red component of LED color.
32	LED Color G	8-bit UIntegerT	0 ... 255	Green component of LED color.
40	LED Color B	8-bit UIntegerT	0 ... 255	Blue component of LED color.
48	LED Effect	8-bit UIntegerT	See LED Effects reference	
56	Effect Frequency	8-bit UIntegerT	1...60, 0 - Default Frequency [0.1 Hz]	Frequency of LED effect in 1/10 Hz, range: 0.1 ... 6 Hz.
64	Display Digit 1	8-bit UIntegerT	0 ... 255	Set digits as ASCII-code. See Display Content .
72	Display Digit 2	8-bit UIntegerT	0 ... 255	Set digits as ASCII-code. See Display Content .
80	Display Digit 3	8-bit UIntegerT	0 ... 255	Set digits as ASCII-code. See Display Content .
88	Display Digit 4	8-bit UIntegerT	0 ... 255	Set digits as ASCII-code. See Display Content .
96	Display Brightness	8-bit UIntegerT	0...100, 255 - Automatic Control [%]	Brightness of 7-segment display in percent. Value of 255 means automatic brightness control by sensor.

NOTE

Display fields apply to Display variants only.

Events & Commands

Events

Event Code	Type	Definition and recommended maintenance action
6144	Error	Output Overload – Output current too high – max. 200 mA
16912	Warning	Device temperature over-run – Clear source of heat
16928	Warning	Device temperature under-run – Insulate device
20496	Error	Component malfunction – Repair or exchange
20752	Warning	Primary supply voltage over-run – Check tolerance
20753	Warning	Primary supply voltage under-run – Check tolerance

Commands

ISDU Index 2 – System Command

Value	Name	Description
128	Device Reset	Reset the device
130	Restore Factory Settings	Restore Factory Settings
160	Trigger Self-Test	Self-Test will activate the switch; in Toggle mode the switch will remain activated

ISDU Indices

Access Rights: **ro** – Read Only, **rw** – Read/Write, **wo** – Write Only

System Command

Name	Index	Bytes	Access	Values	Description
System Command	2	1	wo	see Events & Commands	

Identification

Name	Index	Bytes	Access	Values	Description
Vendor Name	16	23	ro	CAPTRON Electronic GmbH	
Product Name	18		ro	CANEO series4x (Display)	
Product ID	19	10	ro	Cx4xX-xxxx	
Product Text	20	19	ro	Order-code	
Symbol	276	3	ro		
Hardware Identification Key	17342	9	ro		
Serial Number	21		ro		
Firmware Version	23		ro	V5.x	
Function Tag	25	32	rw	***	

Activation Parameters

Name	Index	Bytes	Access	Values	Description
Sensor Mode	261	1	rw	1 - Toggle, 2 - Dynamic, 3 - Static	**Toggle** : Touch to switch on, touch again to switch off. Can only be set back after "Output Minimum Impulse Time" is over. **Dynamic** : Output is on as long as "Output Minimum Impulse Time" is set; even though the user continues touching, the output will switch off. **Static** : Output is on until the user is no longer touching the sensor (but is at least on for the "Output Minimum Impulse Time").
Touch Sensitivity	260	1	rw	0 - High, 1 - Middle, 2 - Low	**High** : required "Actuation Strength" > 4%. **Middle** : required "Actuation Strength" > 14%. **Low** : required "Actuation Strength" > 24%.
Glass Thickness	292	1	rw	1 - glass below 4mm / plexiglass below 2mm, 2 - glass 4mm to 7mm / plexiglass 2mm to 3mm, 3 • glass 8mm to 10mm / plexiglass 4mm to 5mm	series44 Glass devices only.
Minimum Actuation Time	263	2	rw	0 ... 65535 [ms]	Time the sensor must be activated before output on Pin 4 switches, "Actuation Flag" is set to "Actuated" and "Actuation Count" goes up.
Minimum Actuation Time (Toggle OFF)	283	2	rw	0 ... 65535 [ms]	Time the sensor must be touched in "Toggle" mode before output on Pin 4 turns OFF and "Actuation Flag" is set to "Idle".
Output Activation Delay	324	2	rw	0 ... 65535 [ms]	Time the switching of the output is delayed when the sensor has been actuated.

I/O Parameters

Name	Index	Bytes	Access	Values	Description
Active Inputs	271	1	rw	3 - None (3 pin mode), 4 - Pin 2 (E1) (4 pin mode), 5 - Pin 2 (E1) and Pin 5 (E2) (5 pin mode)	Controls which input pins are monitored.
E1/E2 Mode	272	1	rw	0 - Active Low, 1 - Active High	**Active Low** : Accepts a low signal as input to turn on. **Active High** : Accepts a high signal as input to turn on.
Output Locking	337	1	rw	0 - No locking, 1 - Release by E1, 2 - Release by E2, 3 - Release by E1 and E2	Controls whether inputs E1/E2 must be active for the output signal on Pin4 to be ON when the sensor is touched.
Output Mode	273	1	rw	0 - NPN, 1 - PNP, 2 - PushPull	**NPN** : Output signal is pulled down to 0V when output is on. **PNP** : Output signal is pushed up to +VDC when output is on. **PushPull** : Output signal is pushed up to +VDC when output is on and is pulled down to 0V when it is off.
Output NO/NC	274	1	rw	0 - NO (Normally Open), 1 - NC (Normally Closed)	
Output Minimum Impulse Time	275	4	rw	10 ... 86400000 [ms]	The minimal time (ms) of the output signal when the sensor is activated. The output signal cannot be interrupted. In toggle mode the sensor can only be deactivated after the minimal output signal length is over.

LED Parameters

Name	Index	Bytes	Access	Values	Description
LED Control Mode	293	1	rw	0 - Automatic Scene selection, 1 - Scene controlled by IO-Link Process Data, 2 - Advanced control by IO-Link Process Data	See LED & Display Control for details on each mode.
Adaptive LED Brightness	270	1	rw	0 - Off, 1 - On	If turned "On" the sensor automatically adjusts the LED Brightness depending on the "Surrounding Brightness".
Manual LED Brightness	305	1	rw	0 ... 100 [%]	Brightness of LED Ring and 7-Segment Display. Sets minimal brightness if "Adaptive LED Brightness" is turned "On".
Rotate Button	304	1	rw	0 - 0°, 1 - 180°	Rotate LED Display – use if button is mounted upside down.
Boot Sequence	314	2	rw	0 - Off, 1 - Classic, 2 - CANEO	**Off** : Immediately available. **Classic** : Countdown sequence. **CANEO** : CANEO sequence.

Custom Colors

Custom Color 1 (Index 306)

Subindex	Component	Values
1	R	0 ... 255
2	G	0 ... 255
3	B	0 ... 255

Custom Color 2 (Index 307)

Subindex	Component	Values
1	R	0 ... 255
2	G	0 ... 255
3	B	0 ... 255

Timer Parameters

Name	Index - Subindex	Bytes	Access	Values	Description
Timer Function	322 - 1	1	rw	0 - disabled, 1 - count down, 2 - count up, 3 - count up infinitely	Controls timer behavior.
Trigger Timer	322 - 2	1	rw	0...7 - when entering Scene n	Trigger to start timer. The timer starts when sensor enters/falls back into a certain scene.
Timer Timeout	322 - 3	2	rw	0 ... 9999 [s]	Time after which the timer stops.
LED Color	323 - 1	1	rw	0 - CANEO, 1 - Red, 2 - Green, 3 - Blue, 4 - Yellow, 5 - Magenta, 6 - Cyan, 10 - Orange, 11 • Violet, 13 - Off, 14 - Clean Blue, 128 - Custom Color 1, 129 - Custom Color 2	LED color during timer.
Timer LED Effect	323 - 2	1	rw	See LED Effects reference . Additionally: 24 - Timer Circle Clearing Clockwise, 25 - Timer Circle Clearing Counter-Clockwise, 26 - Timer Circle Filling Clockwise, 27 - Timer Circle Filling Counter-Clockwise	Effects 24–27 are synchronized with the timer.
Effect Frequency	323 - 3	1	rw	1...60, 0 - Default Frequency [0.1 Hz]	Frequency of LED effect in 1/10 Hz, range: 0.1 ... 6 Hz. Applies only for animated effects.

Observation & Diagnosis

Name	Index	Bytes	Access	Values	Description
Sensor Temperature	257	2	ro	-32768 ... 32767 [0.1 °C]	
Supply Voltage	256	2	ro	0 ... 65535 [0.001 V]	
Input E1 voltage	277	2	ro	0 ... 65535 [0.001 V]	
Input E2 voltage	278	2	ro	0 ... 65535 [0.001 V]	
MCU Voltage	279	2	ro	0 ... 65535 [0.001 V]	
Charge Code	280	4	ro	0 ... 4294967295	
Error Code	282	2	ro	0 ... 65535	
Flash Erase Count	259	2	ro	0 ... 65535	
Device Access Locks	12		rw		

LED Scenes

Each scene is configured with the following parameters:

- **LED Color** – The color of the LED
- **LED Effect** – The behavior/animation
- **Effect Frequency** – Frequency of animated effects in 1/10 Hz (range: 0.1 ... 6 Hz)
- **Displayed Text** – Text shown on the display (Display variants only)

Available LED Colors

Value	Color
0	CANEO
1	Red
2	Green
3	Blue
4	Yellow
5	Magenta
6	Cyan
10	Orange
11	Violet
13	Off
14	Clean Blue
128	Custom Color 1
129	Custom Color 2

LED Effects

Value	Effect
0	Static Ring
1	Flash Ring
2	Pulse Ring
3	Throbber Clockwise
4	Solid Arrow Up
5	Solid Arrow Down
6	Solid Arrow Left
7	Solid Arrow Right
8	Flash Arrow Up
9	Flash Arrow Down
10	Flash Arrow Left
11	Flash Arrow Right
12	Animated Arrow Up
13	Animated Arrow Down
14	Animated Arrow Left
15	Animated Arrow Right
16	Circle Point Clockwise
17	Circle Point Counter Clockwise
18	Circle Fill Clockwise
19	Circle Fill Counter Clockwise
20	Static Ring Even
21	Static Ring Odd
22	Throbber Counter Clockwise

Timer-specific Effects

The following effects are synchronized with the timer:

Value	Effect
24	Timer Circle Clearing Clockwise
25	Timer Circle Clearing Counter-Clockwise
26	Timer Circle Filling Clockwise
27	Timer Circle Filling Counter-Clockwise

Scene ISDU Indices

Scene	Condition	LED Color	LED Effect	Effect Frequency	Displayed Text
Scene 0	no Touch, E1 off, E2 off	295 - 1	295 - 2	295 - 3	295 - 4
Scene 1	Touch, E1 off, E2 off	296 - 1	296 - 2	296 - 3	296 - 4
Scene 2	no Touch, E1 on, E2 off	297 - 1	297 - 2	297 - 3	297 - 4
Scene 3	Touch, E1 on, E2 off	298 - 1	298 - 2	298 - 3	298 - 4
Scene 4	no Touch, E1 off, E2 on	299 - 1	299 - 2	299 - 3	299 - 4
Scene 5	Touch, E1 off, E2 on	300 - 1	300 - 2	300 - 3	300 - 4
Scene 6	no Touch, E1 on, E2 on	301 - 1	301 - 2	301 - 3	301 - 4
Scene 7	Touch, E1 on, E2 on	302 - 1	302 - 2	302 - 3	302 - 4

> **NOTE**
>
> Displayed Text (subindex 4) applies to Display variants only.

Self-Diagnosis and Error Codes

The SENSORswitch includes the following diagnosis features:

- **Self-Test**: When triggered by the respective IO-Link System Command:
  - The capacitive measurement circuit is stimulated, producing an "actuation" for 200 ms
  - The RGB LED is checked electrically
- **Monitoring** of Supply Voltage and MCU Temperature
- **Output Overload Detection**

Detected errors are indicated via IO-Link Events and/or in the **Error Code** IO-Link Parameter, as well as by blinking patterns of the LED.

Error Codes

Blink Code	IO-Link Error Code	Description
1	0x0001	Internal error
5	0x0010	Test of capacitive sensor failed
8	0x0080	Memory error
12	0x0800	LED error
13	0x1000	Overload error on digital output

Revision History

Rev. A – 2021-07-09

- Initial release with HTML documents for each CANEO series4x variant

Rev. B – 2022-06-23

- Unified document for all CANEO series4x variants

Rev. C – 2023-08-07

- Added introduction, section Self-Diagnosis and Error Codes, and legal and trademark notice
- Added explanation for IO-Link Process Data bit indexing and length of ISDUs
- Document layout changed to A4 format

Rev. D – 2024-05-02

- More clear explanation of selection of LED Control Mode / IO-Link Process Data output
- Marked "o" as a Displayable Character
- Correct assignment of Device IDs to variants

Rev. E – 2024-10-11

- Added illustration of LED indexing
- Added illustration of each Process Data structure