TECHNICAL INFORMATION

SLT – Smart Light Tower

SICK Smart Device / IO-Link

Device configuration – Advanced operating instructions

SICK
Sensor Intelligence.

SMART SENSORS
IO-Link

Described product

IO Link - SLT – Smart Light Tower

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Legal information

Original document

This document is an original document of SICK AG.

Contents

1 About this document

1.1 Purpose of this document

The ISDU descriptions in this document apply to the IO-Link-capable SLT, the Smart Light Tower.

1.2 Intended use

Use IO-Link only as described in this documentation.

1.3 Symbols

! **NOTICE**
This symbol indicates important information.

2 Description of IO-Link

IO-Link and control integration

IO-Link is a non-proprietary internationally standardized communication technology, which makes it possible to communicate with sensors and actuators in industrial environments (IEC 61131-9).

IO-Link devices communicate with higher-level control systems via an IO-Link master. The IO-Link devices (slaves) are connected to these via a point-to-point connection.
Different variants of IO-Link master are available. In most cases, they are remote fieldbus gateways or input cards for the backplane bus of the control used.

To make it possible for an IO-Link device to communicate with the control, both the IO-Link master and this IO-Link device must be integrated in the hardware configuration in the control manufacturer's engineering tool.

To simplify the integration process, SICK provides sensor-specific device description files (IODD = IO-Link Device Description) for IO-Link devices.
You can download these device description files free of charge: www.sick.com/[device-part number].

Not all control system manufacturers support the use of IODDs. If third-party IO-Link masters are used, it is possible to integrate the IO-Link device by manually entering the relevant device parameters directly during the hardware configuration.

On the SICK YouTube channel, you can find some tutorials, which will help you to integrate SICK IO-Link masters: www.youtube.com/SICKSensors.

If you have any questions, SICK Technical Support is available to help all over the world.

3 Accessories for visualization, parameterization, and integration

Using the , you can easily connect IO-Link devices from SICK to a PC or a laptop via USB. You can then quickly and easily test or parameterize the connected devices using the SOPAS ET program (SICK Engineering Tool with graphic user navigation and convenient visualization).

The corresponding visualization files (SDD = SOPAS Device Description) are available for many devices so that you can operate the IO-Link devices using SOPAS ET.

You can download SOPAS ET and the device-specific SDDs directly and free of charge from the SICK homepage: www.sick.com.

Various IO-Link masters are available from SICK for integrating IO-Link devices using a fieldbus. For more details, see: www.sick.com.

4 Data storage

When the current IO-Link standard V1.1 was introduced, the automated data repository (Data Storage) was added to IO-Link's range of functions. The data repository allows the machine operator to replace defective IO-Link devices with corresponding replacement devices without having to re-parameterize these manually.

When the data repository is activated, the IO-Link 1.1 master always saves the last valid setting parameters of all connected IO-Link 1.1 devices in its local memory. If you replace one of the connected IO-Link devices with another device which is compatible with the function, the IO-Link master will automatically transmit the last valid parameter set of the previous device to the new device.

The data repository therefore means that devices can be replaced in a plug-and-play manner within a matter of seconds – without complex reconfiguration, special hardware or software tools, and specific specialist knowledge.

NOTE

- To use the data repository, you must activate it in the IO-Link master.
- When the conversion of one or several device parameters is initiated via the control, then the control in the IO-Link device must activate the **Data Storage Upload Request-Flag** as the final command in the sensor. Only this initiates the data repository.
- Uploading / downloading device parameters using the data repository function can take between a few hundred milliseconds and three seconds depending on the volume of data and the IO-Link master used (typical values; values can differ in practice).
- For details on using the data repository, see IO-Link Interface and System Specification, V1.1.2, chapter 10.4 Data Storage (DS) at www.io-link.com, Downloads menu item.

5 Physical layer

The physical layer describes the basic IO-Link device data. The device data is automatically shared with the IO-Link master. It is important to ensure that the used IO-Link master supports this performance data.

NOTICE
The maximum current consumption of the IO-Link device (including load at the outputs) must not exceed the permissible output current of the relevant port on the IO-Link master.

Table 1: Physical layer – System data

SIO mode	Yes
Min. cycle time	8 ms
Baud rate	COM 2 (38.4 kbit/s)
Process data length PD in (from device to master)	2 bytes Process Data Out; from IO-Link-Master to SLT
IODD version	V1.1
Supported IO-Link version	V1.1
IO-Link port type	Port Class A
Supports block-parametrization	Yes

6 Process data

Process data is transmitted cyclically. There is no confirmation of receipt.
The master determines the cycle time; however, this must not be less than the minimum cycle time of the device (see table 1, page 8).

Depending on the selected operating mode, the output process data has a different meaning.

NOTE
The service data (acyclic data) does not influence the cycle time.

Table 2: Process data structure – output process data – Signal light mode

Byte offset	Byte 1						
Bit offset	0	1	2	3	4	5	6…7
Data type	Bool	Bool	Bool	Bool	Bool	Bool	UInteger
Value	LED group 1	LED group 2	LED group 3	LED group 4	LED group 5	Buzzer	User alarm indica-tion
Length	1	1	1	1	1	1	2
Note	Group 1 on/off	Group 2 on/off	Group 3 on/off	Group 4 on/off	Group 5 on/off	Buzzer on/off	Show profile 1-3 0 = off

Table 3: Process data structure – Output process data – Level meter mode

Byte offset	Byte 0	Byte 1	
Bit offset	8…14	5	6…7
Data type	UInteger	Bool	UInteger
Value	Level value	Buzzer	User alarm indication
Length	7	1	2
Note	Level value 0-100%	Buzzer on/off	Show profile 1-3 0 = off

Table 4: Process data structure – output process data – Animation mode

Byte offset	Byte 0	Byte 1			
Bit offset	0…1	0	1	5	6…7
Data type	UInteger	Bool	Bool	Bool	UInteger
Value	Animation speed	Animation enable	Animation reset	Buzzer	User alarm indication
Length	2	1	1	1	2
Note	0 = Slow 1 = Medium 2 = Fast	Animation on/off	Animation on/off	Buzzer on/off	Show profile 1-3 0 = off

7 Service data

In addition to the process data, service data (parameters, identification data, and diagnostic information) can be transmitted to and from the SLT. A specific device description file (IODD) together with an IO-Link master can be used for this function (see previous chapter). A download package containing the IODD file and supplementary documentation for the SLT (IO-Link supplemental sheet) is available at www.sick.com.

The parameters in the index range 0 to 41 are specified in the IO-Link standard and are therefore valid for all devices. They are therefore not explained separately here. For additional information on these parameters, please refer to the IO-Link supplemental sheet or IO-Link specification 1.1. This chapter will instead explain the device-specific parameters (ISDUs) used to configure the SLT.

7.1 Device identification

Profile information

These parameters contain information on the supported IO-Link profile and the process data structure. For additional information, refer to the IO-Link common profile at www.io-link.com

Table 5: System-specific ISDUs – Profile property

ISDU			Name	Data type	Data stor-age	Length	Access	Default value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
13	0D	-	Profile characteristic	Array	-	2 bytes	ro	-	UInt 16 [1]	Support IO-Link profile characteristics
14	0E	-	PDInput descriptor	Array	-	3 bytes	ro	-	Octet String [1]	See IO-Link common profile
15	0F	-	PDOutput Descriptor	Array	-	6 bytes	ro	-	Octet String [1]	See IO-Link common profile

7.1.1 Device identification

Freely selectable designations (tags) can be assigned to the SLT here, which allow for easy identification of a specific device in the field.

Table 6: Device identification – specific mark

ISDU			Name	Data type	Data stor-age	Length	Access	Default value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
25	19	-	Function tag	String	-	32 bytes	rw	*******		Description of operation
26	1A		Location tag		-			*******		Installation site
64	40	-	Device specific tag		-			*******		Device-specific mark

7.2 Configuration

The ISDUs described below contain the parameters for configuration. A distinction can be made here between parameters specific to the operating mode and generally valid parameters.

General device settings

These settings are available in all three operating modes (Signal light, Level meter, Animation mode).

7.2.1.1 Sender configuration

Table 7: Sender configuration

ISDU			Name	Data type	Data stor-age	Length	Access	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
97	61	-	Sender configuration	Uint	-	8 bytes	rw	0	0 = LEDs activated 1 = LEDs deactivated	Main switch for LEDs

7.2.1.2 Process data selection – operating mode selection

Table 8: Process data selection – operating mode selection

ISDU			Name	Data type	Data storage	Length	Access	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
120	78	-	Process data select	Uint	-	8 bit	rw	0	0 = Signal Light mode 1 = Level Meter mode 2 = Animation mode	Operating mode selection

NOTE
Only the process data output can be adjusted. The process data input is unchangeable.

7.2.1.3 Find me

Table 9: Device identification – Find me

ISDU			Name	Data type	Data storage	Length	Access	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
204	CC	-	Find me	Uint	-	8 bit	rw	0	0 = Find me deactivated 1 = Find me activated	Front LED flashes with 1 Hz (50% off, 50% off)

A connected device can be uniquely identified using **Find me**. For machines with several identical devices, it is therefore possible to uniquely identify the device with which communication is currently taking place.

7.2.1.4 (De)activation of events

Table 10: General device settings – Notification handling

ISDU			Name	Data type	Data storage	Length	Access	Default value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
227	E3	-	Notification handling	Uint	-	8 bit	rw	0	0 = On 1 = Off	IO-Link events

With this ISDU, you can switch off the generation of sensor IO-Link events.

7.2.1.5 Brightness

Table 11: Brightness

ISDU			Name	Data type	Data storage	Length	Access	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
265	109	-	Brightness	Record	-	5 bytes	rw	100%	0-100%	Brightness, can be adjusted in 10% increments

7.2.1 User-defined light patterns

7.2.1.1 Color setting – user-defined light patterns

Table 12: Color setting – user-defined light patterns

ISDU			Name	Data type	Data storage	Length	Access	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
256	100	-	User color	Uint	Yes	8 bit	rw	7	0 = Off 1 = Red 2 = Orange 3 = Maroon 4 = Brown 5 = Yellow 6 = Yellow-green 7 = Lemon 8 = Light green 9 = Green 10 = Lime 11 = Cyan 12 = Azure 13 = Blue 14 = Dark blue 15 = Ultramarine 16 = Purple 17 = Slate blue 18 = Indigo 19 = Magenta 20 = Pink 21 = White	Selection of the user-defined color from the 21 available colors

7.2.1.2 User-defined light pattern

Table 13: User-defined light pattern – alarm indication

ISDU			Name	Data type	Data storage	Length	Access	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
257	101	-	User alarm indication 1	Record		20 bit	rw	0	-[1]	Configuration of user-defined light profile 1
258	102	-	User alarm indication 2	Record		20 bit	rw	0	-[1]	Configuration of user-defined light profile 2
259	103	-	User alarm indication 3	Record		20 bit	rw	0	-[1]	Configuration of user-defined light profile 3

1) Each byte controls the light pattern (color) of one of the 20 LED segments.

7.2.2 Signal light mode configuration

In Signal light mode, the following parameters can be used for configuration.

7.2.2.1 Color of LED group

Table 14: Color of LED group

ISDU			Name	Data type	Data storage	Length	Access	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
266	10A	-	Tier color	Record	-	5 bytes	rw	-	-[1]	Colors of the 5 LED groups

1) Each byte controls the color of an LED group, see above for color values.

7.2.2.2 Flashing pattern of LED group

Table 15: Flashing pattern of LED group

ISDU			Name	Data type	Data stor-age	Length	Acce ss	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
267	10B	-	Tier lighting style	Record	-	5 byte s	rw	-	Continuous light[1] Flashing light[1] Strobe light[1]	Flashing patterns of the 5 LED groups

1) Pulsating light, in three 3 speeds each

7.2.2.3 Number of LEDs per group

Table 16: Number of LEDs per group

ISDU			Name	Data type	Data stor-age	Length	Acce ss	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
268	10C	-	Tier size	Record	-	5 byte s	rw	-	-[1]	Number of LEDs per group

1) The total of the configured values must equal 20, e.g. 4, 4, 4, 4, 4 or 8, 4, 3, 3, 2.

7.2.2.4 Delimitation between LED groups

Table 17: Delimitation between LED groups

ISDU			Name	Data type	Data stor-age	Length	Acce ss	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
270	10E	-	Tier gaps	Record	-	1 bit	rw	False	False = Off True = On[1]	Delimitation between LED groups

1) If separation between the LED groups is activated, one LED is always switched off between the individual groups. The number of LEDs available is reduced accordingly.

7.2.3 Fill level mode configuration

7.2.3.1 Direction of fill level display

Table 18: Direction of fill level display

ISDU			Name	Data type	Data stor-age	Length	Acce ss	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
260	104	-	Direction of flow	Uint	-	8 bit	rw	0	0 = Bottom to top 1 = Top to bottom	Direction of fill level display

7.2.3.2 Limit values, switching of 20 LED segments

Table 19: Limit values, switching of 20 LED segments

ISDU			Name	Data type	Data stor-age	Length	Acce ss	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
261	105	-	Level meter thresholds	Record	-	20 byt es	rw	0, 5, 10, ..., 95, 100	0 - 100% per segment	Limit values from which each LED seg-ment is switched.

7.2.3.3 LED segment colors

Table 20: LED segment colors

ISDU			Name	Data type	Data stor-age	Length	Acce ss	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
262	106	-	Segment colors	Record	-	20 byt es	rw	-	0 - 21 per segment	Colors of the 20 LED segments

7.2.3.4 LED flashing pattern setting

Table 21: LED flashing pattern setting

ISDU			Name	Data type	Data stor-age	Length	Access	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
263	107	-	Segment lighting style	Uint	-	20 bytes	rw	0	Continuous light Flashing light Strobe light Pulsating light, in three 3 speeds each	Flashing pattern of the 20 LED segments

7.2.3.5 LED flashing pattern behavior

Table 22: LED flashing pattern behavior

ISDU			Name	Data type	Data stor-age	Length	Access	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
264	108	-	Scope of appearance	Uint	-	8 bit	rw	0	0 = All segments flash like the last one activated 1 = Each segment individually as configured 2 = Only the last activated segment	Behavior of the flashing pattern when the fill level changes

7.2.4 Animation mode configuration

In Animation mode, the following parameters can be used for configuration.

7.2.4.1 Periodic behavior of animation

Table 23: Periodic behavior of animation

ISDU			Name	Data type	Data stor-age	Length	Access	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
269	10D	-	Animation effect	Uint	-	8 bit	rw	1	0 = Loop (repeating) 1 = Bounce (reversing)	Periodic behavior of animation

7.2.4.2 Additional parameters

The following parameters, which are valid in Level meter mode and described above, can also be used in Animation mode to adjust the animation:

- Direction of flow
- Segment colors
- Segment lighting style
- Scope of appearance

7.2.5 Buzzer configuration

7.2.5.1 Buzzer volume

Table 24: Buzzer volume

ISDU			Name	Data type	Data stor-age	Length	Access	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
271	10F	-	Buzzer sound level	Uint	-	8 bit	rw	False	0 - 100%	Volume of buzzer in %

7.2.5.2 Buzzer sound effect

Table 25: Buzzer sound effect

ISDU			Name	Data type	Data stor-age	Length	Access	Standard value	Value/Range	Meaning
Index		Sub-index								
DEC	HEX									
272	110	-	Buzzer sound effect	Uint	-	8 bit	rw	0	0 = Off 1 = Effect 1 2 = Effect 2 3 = Effect 3 4 = Effect 4 5 = Effect 5 6 = Effect 6 7 = Effect 7 8 = Effect 8	Acoustic alarm signal of the buzzer.

8 List of abbreviations

Table 26: List of abbreviations

IODD	IO Device Description	Device description file of an IO-Link device
ISDU	Indexed Service Data Unit	Service data object in IO-Link
COM1 COM2 COM3	SDCI communication mode	COM1 = 4.8 kbit/s COM2 = 38.4 kbit/s COM3 = 230.4 kbit/s
SDCI	Single-drop digital interface	Official (specification) name for IO-Link technology
SDD	SOPAS ET Device Description	Device description file / driver for SICK SOPAS ET software

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