IO-Link Product
User Manual

- Signal Lighting   : QDML-IOL
- Signal Columns : QDT50L-IOL
- Signal Lights   : QDB50-IOL

Qlight

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1. PRELIMINARY NOTE

Foreword | Purpose

This quick guide helps you with the initial commissioning process for Qlight QDx signal lighting and with using the USB IO-Link master to configure parameters. The quick guide is a supplementary document for the existing product documentation.

For more information, see: http://Qlight.com

2. OVERVIEW

1) Product overview: IOL signal lighting & signal lights

QDB50 1-segment IOL signal lights	QDB50-IOL-24
Segments	1
Operating mode	Trigger mode, Segment mode, Demo mode
Color	Red, green, yellow, blue, white, orange, pink, user-defined (IO-Link), RGB color spectrum
Brightness / intensity	10 to 100%, can be freely customized via IO-Link
Frequency / mode	Constant light, flashing light, blinking light

QDML multi-segment IOL signal lighting	QDML-IOL-125-24	QDML-IOL-250-24	QDML-IOL-480-24	QDML-IOL-700-24	QDML-IOL-910-24
Segments	2	3	6	9	12
Operating mode	Trigger mode, Segment mode, Level mode, Demo mode				
Color	Red, green, yellow, blue, white, orange, pink, user-defined (IO-Link), RGB color spectrum				
Brightness / intensity	10 to 100%, can be freely customized via IO-Link				
Frequency / mode	Constant light, flashing light, blinking light				

QDT50L multi-segment IOL signal columns with/without buzzer	QDT50L-IOL-3-24	QDT50L-IOL-5-24	QDT50L-IOL-BZ-3-24	QDT50L-IOL-BZ-5-24
Segments	3	3	5	5
Buzzer	Without	Without	With	With
Operating mode	Trigger mode, Segment mode, Level mode, Demo mode			
Color	Red, green, yellow, blue, white, orange, pink, user-defined (IO-Link), RGB color spectrum			
Brightness / intensity	10 to 100%, can be freely customized via IO-Link			
Frequency / mode	Constant light, flashing light, blinking light			

3. SIGNAL LIGHTING FOR INDUSTRIAL AND PUBLIC SAFETY

In both industrial and public environments, signal lighting is essential for safety, providing reliable visual alerts to safeguard not only employees but also anyone nearby. Particularly in manufacturing and other facility settings, signal lighting enhances operational safety by visually communicating machine and system statuses. Signal towers are versatile and adaptable, allowing them to support a range of environments. Through optical signal transmitters, operators can oversee machine performance and complex production flows, enabling timely responses to any emerging hazards that could threaten personnel, equipment, or products. Qlight's signal lights, with the flexibility of IO-Link configuration, are easily customizable to meet specific needs. They integrate seamlessly with machines or systems through practical accessories, ensuring a precise fit for each application.

Designed for a service voltage of 18 to 30V, Qlight's signal lighting solutions are compatible with both IO-Link systems and traditional setups. For machines equipped with IO-Link, devices connect through a class A port on the IO-Link master, using a 3 to 5-pin M12 connector. In non-IO-Link environments, devices use a 5-pin cable, with digital inputs managing preset activations. Signal lighting provides clear, highly visible indicators of system status, even from a distance, with its bright, attention-grabbing colors enhancing visibility.

4. ENHANCED SAFETY AND REDUCED DOWNTIME

Professional signaling solutions improve safety in various applications, reducing both response times and potential downtime. Multiple signaling levels allow staff to respond immediately to issues and resolve them quickly. For models with a buzzer, the loud audio alert integrated into the QDT50L tower cover ensures that critical signals capture attention.

Signal lighting has become indispensable in mechanical engineering and plant construction. It is also widely used in fields like intralogistics and building services engineering. Qlight's QDx lights, made for industrial use, offer protection levels depending on model, with IP20, IP65, and IP67 options available.

1) RELIABLY SIGNALING VARIOUS STATUSES

By using professional signaling, you ensure more safety in your applications and considerably reduce response and waiting times.

Due to the different signaling stages. employees can promptly react to faults and more quickly fix any existing problems.

Attention is additionally drawn by the loud buzzer integrated into the cover of the QDT50L signal towers.

2) SIGNAL LIGHTING: SUITABLE FOR A VARIETY OF USES

It is impossible to imagine mechanical engineering and plant construction without signal columns But signal lighting is also found in many other areas, such as intralogistics and building services engineering.

3) AMBIENT CONDITIONS [IP PROTECTION CLASSES]

The Qlight QDx lighting is typically suited for industrial applications; depending on the variants, they have the following IP protection types: IP20, IP 65 and IP 67.

5. FLEXIBLE OPERATING MODES WITH Qlight LED SIGNAL LIGHTING

The QDx LED signal lights can operate through IO-Link and integrated digital inputs, offering four distinct modes: External Trigger, Segment, Level, and Demo. The QDB50 model, due to its single-segment design, supports three modes: External Trigger, Segment, and Demo, without Level mode capability.

1) EXTERNAL TRIGGER MODE

Configured as the default, this mode activates up to eight preset color and lighting combinations via three digital trigger inputs, operating independently of IO-Link.

2) OPERATION VIA IO-LINK

Industrial Ethernet

PLC

Fieldbus

IOL MASTER

SIO
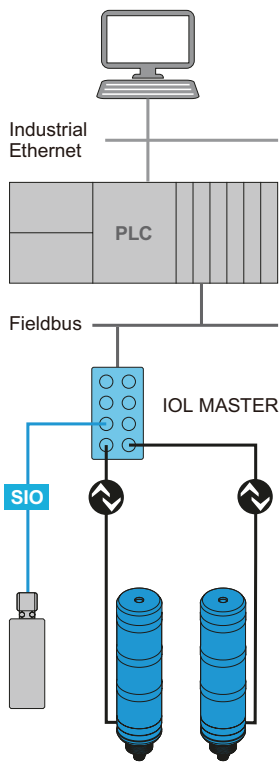
Possible system architecture

(1) IO-LINK COMMUNICATION
IO-Link, a global standard for I/O communication (IEC 61131-9), enables seamless interaction between control systems and sensors/actuators below the fieldbus level. Using familiar M12 cables, IO-Link allows bidirectional communication through a three-wire connection.

(2) SEGMENT MODE
In this mode, individual segments can be activated and customized on demand via IO-Link process data, allowing for unlimited color variations and easy adjustments to intensity (10-100%) and blinking/flashing settings.

(3) LEVEL MODE
Ideal for monitoring levels and process status, this mode uses an input from the control system (0-100%) to visually display fill levels or progression. Additional options allow users to set inactive segment colors (background) and active segment colors via IO-Link process data.

(4) DEMO MODE
This mode showcases the range of device functionalities, displaying color transitions, Level and Segment modes, blinking, flashing, and audio signals if included.

6. SETUP AND COMMISSIONING

For initial setup, users need either a control system with three digital outputs and a 5-wire M12 cable or a compatible IO-Link master and M12 connector to establish an IO-Link connection. Devices arrive preset in External Trigger mode, enabling users to activate factory-configured lighting presets via digital inputs. Each preset's corresponding display depends on the model specifications, which are detailed in the relevant product datasheet, such as for the QDB50 series.

1) OPERATION WITHOUT IO-LINK IN EXTERNAL TRIGGER MODE

The lighting and/or products arrive from the factory in External Trigger mode. The 3 digital inputs can be used to activate the predefined presets for the lights. The statuses that are displayed when the respective preset is activated depend on the product and are described in the data sheet for the respective product. As an example, here is an excerpt from a data sheet from the QDB50 series:
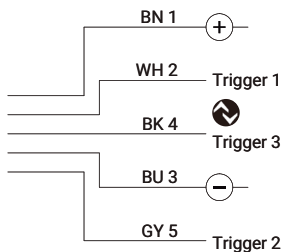
Operating mode: External trigger				
TRIG 1	TRIG 2	TRIG 3	Pre-set	Factory setting
0	0	0	1	Off
1	0	0	2	Red
0	1	0	3	Green
1	1	0	4	Yellow
0	0	1	5	Blue
1	0	1	6	Red blinking
0	1	1	7	Green blinking
1	1	1	8	Yellow blinking

BN 1 (+)
WH 2 Trigger 1
BK 4 Trigger 3
BU 3 (−)
GY 5 Trigger 2

All trigger inputs have a delay ~50ms.
Presets can be defined via IO-Link.

7. PARAMETERIZATION AND CONFIGURATION

1) BASIC FUNCTIONS

Among other things, Qlight signal lighting has 3 basic functions: color configuration, locator function and reset to factory settings. The colors are configured to indexes [650 to 657] by the "Color content" variable and to indexes [620 to 627] by the "Designation" variable.

The "Locator function" at index [126=Locator Start, 127=Locator Stop] and the Reset to the factory setting with the values [200 to 207] are at subindexes 16 and are located under the "Standard command" standard variable index=2 id=V_SystemCommand. The Locator function is at 126 for Locator Start and 127 for Locator Stop; it enables the integrated product to be quickly found in the system. The factory settings are restored through the allowed value 130 as the subindex.

(1) COLOR CONFIGURATION AND DESIGNATION

In the color configuration it is possible to configure 8 different colors; the "Color content" variables lie at the indexes=650 to 657 and have the id=V_ColorRGB0 to V_ColorRGB7. The colors red, green and blue lie at the subindexes=1,2,3 and are indicated with values 0 to 100.

The "Designation" variables lie at the indexes=620 to 627 and have the id=V_ColorDesignation0 to V_Color Designation7.

The color designations can be freely changed and have a data type of 32-octet string UTF-8.

"Color content" variable index=600 id=V_ColorRGB0
description: Color content
data type: 24-bit record
access rights: rw
dynamic

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	16	8-bit UInteger	0 to 100	0				Red	Red part
2	8	8-bit UInteger	0 to 100	0				Green	Green part
3	0	8-bit UInteger	0 to 100	0				Blue	Blue part

octet	0	1	2
bit offset	23-16	15-8	7-0
subindex	1	2	3
element bit	7-0	7-0	7-0

"Designation" variable index=620 id=V_ColorDesignation0
description: Designation can be freely selected
data type: 32-octet string UTF-8
default value: "Off (factory setting)"
access rights: rw
dynamic

octet	0	1	2	3	4	5	6	7
bit offset	255–248	247-240	239-232	231-224	223-216	215-208	207-200	199-192

octet	8	9	10	11	12	13	14	15
bit offset	191-184	183-176	175-168	167-160	159-152	151-144	143-136	135 128

octet	16	17	18	19	20	21	22	23
bit offset	127-120	119-112	11-104	103-96	95-88	87-80	79-72	71-64

octet	24	25	26	27	28	29	30	31
bit offset	63-56	55-48	47-40	39-32	31-24	23-16	15-8	7-0

Trigger preset 1 (TRIG1=0, TRIG2=0, TRIG3=0)

For example, for ColorDesignation0 the index lies at the value 620. At index=620 the color is off or dark by default(factory setting).

(2) STANDARD COMMANDS   For the Locator function and factory setting, the "Standard command" standard variable lies at index=2 with the id=V_SystemCommand. Restore the allowed values 126 for Locator Start and 127 for Locator Stop, as well as 130 for restoring to factory settings. For Reset to factory settings for ColorDesignation0 to 7, the allowed values lie between
[200 to 207].

"Standard command" standard variable index=2 id=V_SystemCommand
data type: 32-octet string UTF-8
allowed value: 126=Locator start, 127=Locator Stop, 130=Restore factory settings, 161=Function test, 162= Function test stop, 200=Reset to
factory settings, 201=Reset to factory settings, 202=Reset to factory settings, 203=Reset to factory settings, 204=Reset to factory settings, 205=Reset to factory settings, 206=Reset to factory settings, 207=Reset to factory settings, 240=IO-Link 1.1 system test command 240, Event 8DFF appears, 243=IO-Link 1.1 system test command 243, Event 8DFF appears access rights: wo
modifies other variables

octet	0
bit offset	7-0
element bit	7-0

The Locator function enables the integrated product to be quickly found in the system.
The factory settings are restored through the allowed value 130 as the subindex.

8. OPERATING MODES

The signal lighting of the QDML and QDT50L-RGB series have four operating modes, which can be set by means of the "device control" parameter:

• External Trigger mode (factory configuration)
• Segment mode (PD)
• Level mode (PD) [not available for the QDB50 lighting series]
• Demo mode

The operating modes can only be selected individually and cannot be combined. The operating mode is set by means of the "device control" parameter.

"Device control" variable index=602 id=V_DeviceControl
description: Device control
data type: 8-bit UInteger
allowed value: 1=External Trigger mode, 2=Segment mode (PD), 3=Level mode (PD), 4=Demo mode
default value: 1
access rights: rw

octet	0
bit offset	7-0
element bit	7-0

The device control has index=602, the allowed values are 1=External Trigger mode, 2=Segment mode (PD),
3=Level mode (PD), and 4=Demo mode. The default value or standard value is typically 1 (external trigger).

(1) EXTERNAL TRIGGER MODE [STANDARD MODE]

The signal lighting of the QDML, QDB50- and QDT50L-RGB series is delivered in Trigger mode. (factory configuration). This is the standard operating mode at delivery. In this operating mode, each color of each segment is represented as a separate switching signal.

Important note: Complete integration into IO-Link is possible only with the new Gen. 2 devices possible, and these are stipulated in this manual.
The delivery of Generation 2 lighting in Trigger mode enables backward compatibility with the devices of Generation 1.
Furthermore, Generatiom 1 devices differ from Geneation 2 devices in terms of voltage range (Gen. 1: 24 V DC +-5%, Gen. 2: 18 to 30 V DC).

Preset color for each segment simulation

"Preset selection" variable index=604 id=V_TriggerSimulation
description: Simulation of all eight selectable presets in External Trigger mode in parallel with an IO-Link connection
allowed value: 0=0 (simulattion off), 1=preset 1, 2=preset 2, 3=preset 3, 4=preset 4, 5= preset 5, 6=preset 6, 7=preset 7, 8=preset 8
data type: 8-bit UInteger
default value: 0
access rights: rw
excluded from data storage

octet	0
bit offset	7-0
element bit	7-0

For simulation of all eight selectable presets in Trigger mode, the index has the value 604 and the allowed base values
for the presets are [0-8]: 0=(simulattion off), 1=preset 1, 2=preset 2, 3=preset 3, 4=preset 4, 5= preset 5, 6=preset 6,
7=preset 7, 8=preset 8
The default value or base value is typically 0.

(1) PARAMETERIZATION [PARAMETER DATA]	Trigger mode means that customers can use digital inputs to switch predefined colors directly. Due to the 3 trigger inputs of the lighting, the 8 predefined trigger presets can be selected. For a trigger preset selection [preset 0 to 7], the following light functions (light color, intensity and mode) and buzzer function are preset at the factory for each segment [1 to 12] (depending on the variant). However, there is the option of simply using IO-Link to freely and individually parameterize the trigger presets.

Recommended procedure for commissioning:
1. Configure colors
2. Configure presets
3. Simulate presets

Buzzer function

For the variants that have a buzzer, a buzzer can also be configured in addition to the color configurations. Here, you can decide whether the buzzer should emit a continuous tone or a slow or fast intermittent tone.

"Buzzer" variable index=700 id=V_SegmentPre-Set1_Buzzer
description: slow intermittent (1 Hz) / fast intermittent (2.5 Hz)
data type: 8-bit UInteger
allowed value: 0=off, 1=on (continous), 2=slow intermittent, 3=fast intermittent
default value: 0
access rights: rw

octet	0
bit offset	7-0
element bit	7-0

Preset for each segment

In the preset segment configuration, the previously configured colors can be assigned to the individual presets or segments. In addition, you can configure the light intensity as well as have the active segment be lit continuously, blink or flash.

"Seg 1" variable index=701 id=V_SegmentPre-Set1_1
description: Segment preset
data type: 24-bit record
access rights: rw

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	16	8-bit UInteger	0=color 001, 2=color 010, 3=color 011, 4=color 100, 5=color 101, 6=color 110, 7=color 111	0				Color	Color
2	8	8-bit UInteger	0 to 100	100				Intensity	Intensity
3	0	8-bit UInteger	0=static, 1=blinking, 2=flashing	0				Color	Mode

octet	0	1	2
bit offset	23-16	15-8	7-0
subindex	1	2	3
element bit	7-0	7-0	7-0

(2) APPLICATION EXAMPLE	To activate the color red in Trigger mode, the following pin assignment is connected: Pin 2 (TRIG 1)=VDD, High level > 8.0 V Pin 5 (TRIG 2)=GND, Low le Pin 4 (TRIG 3)=GND, Low level < 5.0 Vel < 5.0 V

For the color green, the following pin assignment is required:
Pin 2 (TRIG 1)=GND, Low level < 5.0 V
Pin 5 (TRIG 2)=VDD, High level > 8.0 V
Pin 4 (TRIG 3)=GND, Low level < 5.0 V

(2) SEGMENT MODE

If the signal lighting or signal lights are completely integrated into the IO-Link communication, then it is advisable to operate the product in Segment mode.

In Segment mode, individual segments can be activated via IO-Link process data, which enables countless color configurations. IO-Link can be used on the fly to assign the previously configured colors and static, blinking or flashing lighting behavior to the segments.

(1) PARAMETERIZATION
[PARAMETER DATA]

Depending on the selected number of segments, the various color combinations can be displayed. The intensity [10 to 100] and Dynamic mode [blinking or flashing] can also be set up freely. The "Number of segments selection 1=1" setting applies the selected color to all the lighting. Important note: The index 610 is not available for the QDB50-RGB lighting.

Number of segments selection

"Number of segments selection" variable index=610 id=V_SelectionSegmentNumber
description: Selection of the number of segments in Segment mode (PD)
data type: 8-bit UInteger
allowed value: 1=1, 5=5
default value: 5
access rights: rw

Dynamic mode for each segment

In Segment mode, for example, for segment 1 the result is index=681 and for the intensity the result is subindex=1 and the values are [10 to 100]. The factory setting is usually 100.

For Dynamic mode, the subindex=2 and the possible values are 1=blinking and 2=flashing. For the factory setting, the value=1 is usually set.

"Seg 1" variable index=681 id=V_SegmentModus1
description: Segment
data type: 16-bit record
access rights: rw

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	16	8-bit UInteger	10 to 100	100				Intensity	Intensity
2	8	8-bit UInteger	1=blinking, 2=flashing	1				Dynamic mode	Dynamic mode

octet	0	1
bit offset	15-8	7-0
subindex	1	2
element bit	7-0	7-0

(2) PROCESS DATA AND
   APPLICATION EXAMPLE

The process data of the devices is transmitted cyclically in a data telegram; the device defines the process data size.

For each device it is possible to have process data from 0 to 32 bytes (for both the input and output). In Segment mode, the process data can be used to assign the 8 preconfigured colors to the individual segments or activate them.

Furthermore, the (static or dynamic) lighting mode can be selected for each segment. In addition, if products have a buzzer, this can be activated.

The ProcessDataOut "PD for Segment mode" is under the id=PDOUT_Segment at V_DeviceControl == 2. For example,

the color setting for Seg 3 is at subindex 6 and the buzzer is at subindex 7.

ProcessData id=PD_Segment (condition V_DeviceControl ==2)
ProcessDataOut "PD for Segment mode" id=PDOUT_Segment
bit length: 64
data type: 64-bit record (subindex access not supported)

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	63	Boolean	false=static, true=dynamic					Seg 1 mode	
2	60	3-bit UInteger	0=color 000, 1=color 001, 2=color 010, 3=color 011, 4=color 100, 5=color 101, 6=color 110, 7=color 111					Seg 1 color	
3	59	Boolean	false=static, true=dynamic					Seg 2 mode	
4	56	3-bit UInteger	0=color 000, 1=color 001, 2=color 010, 3=color 011, 4=color 100, 5=color 101, 6=color 110, 7=color 111					Seg 2 color	
5	55	Boolean	false=static, true=dynamic					Seg 3 mode	
6	52	3-bit UInteger	0=color 000, 1=color 001, 2=color 010, 3=color 011, 4=color 100, 5=color 101, 6=color 110, 7=color 111					Seg 3 color	
7	51	Boolean	false=static, true=dynamic					Seg 4 mode	
8	48	3-bit UInteger	0=color 000, 1=color 001, 2=color 010, 3=color 011, 4=color 100, 5=color 101, 6=color 110, 7=color 111					Seg 4 color	
9	47	Boolean	false=static, true=dynamic					Seg 5 mode	
10	44	3-bit UInteger	0=color 000, 1=color 001, 2=color 010, 3=color 011, 4=color 100, 5=color 101, 6=color 110, 7=color 111					Seg 5 color	
11	0	2-bit UInteger	0=off, 1=on (continuous), 2=slow intermittent 3=fast intermittent					Buzzer	

In Segment mode, the number of segments [1 to 12] of lighting (depending on variant) can be easily displayed and the preconfigured colors [000 to 111] selected for each segment can be optically visualized.

A variety of information can be clearly and optically displayed with the segments. The Segment mode setting causes the lighting to accept only the commands for color changes, activation via the I/O-Link connection.

In Segment mode, the signal lighting can be used to display process progress. Thus the machine operator can immediately determine the current status of manufacturing processes and act accordingly in case of error messages.

(3) LEVEL MODE

In Level mode, it is possible to use IO-Link process data to define a background color [inactive segment], which can be used, for example, as a corporate identity color. In addition, the fill levels and machine status can be displayed with the active segments [foreground color] with a pre-defined color selection.

(1) PARAMETERIZATION [PARAMETER DATA]

Important note: Level mode is not available for QDB50-RGB lighting because it has only one segment.

Segment behavior

"Mode" variable index=616 id=V_LevelMode
description: Mode
data type: 8-bit UInteger
allowed value: 0=segments increasing, 1=segment migrating
default value: 0
access rights: rw

octet	0
bit offset	7-0
element bit	7-0

For example, for Level mode the index=616 and the allowed values are 0=segments increasing, 1=segment migrating.

Level display direction
With the signal lighting Level mode, the display direction [Bottom>Top or Top>Bottom] can also be selected and optically displayed.

"Display direction" variable index=615 id=V_LevelDisplayDirection
description: Display direction
data type: 8-bit UInteger
allowed value: 0=Bottom > Top, 1=Top > Bottom
default value: 0
access rights: rw

octet	0
bit offset	7-0
element bit	7-0

Dynamic mode for each segment
Furthermore, it is possible to define a foreground color with the index=617 [active segment level] and a background color with the index 618 [inactive segment level]. For example, the background color can be set as a corporate identity color.

"Active segment dynamic mode" variable index=617 id=V_LevelActiveSegment
description: Active segment dynamic mode (foreground color)
data type: 8-bit UInteger
allowed value: 1=blinking, 2=flashing
default value: 1
access rights: rw

octet	0	
bit offset	7-0	
element bit	7-0	

"Inactive segment dynamic mode" variable index=618 id=V_LevelInactiveSegment
description: Inactive segment dynamic mode (background color)
data type: 8-bit UInteger
allowed value: 1=blinking, 2=flashing
default value: 1
access rights: rw

octet	0	
bit offset	7-0	
element bit	7-0	

(2) PROCESS DATA AND APPLICATION EXAMPLE

Process data (e.g. analog values) are transmitted cyclically. In Level mode, the process data transmits the analog 0value [0 to 100] as an input, for example, so that fill levels and process progress can be displayed. The 8 preconfigured
colors can be freely set for the active segments as well as for the inactive segments. Furthermore, the (static or dynamic) lighting mode can be selected.
In addition, the buzzer can be activated. The buzzer's tone mode [slow or fast intermittent] can also be freely selected.

ProcessData id=PD_Level (condition V_DeviceControl ==3)
ProcessDataOut "PD for Level mode" id=PDOUT_Level
bit length: 64
data type: 64-bit record (subindex access not supported)

subindex	bit offset	data type	allowed values	default value	acc. restr.	mod. other var.	excl. from DS	name	description
1	56	8-bit UInteger	0 to 100					Analog value	
2	51	Boolean	false=static, true=dynamic					Active segments mode	
3	48	3-bit UInteger	0=color 000, 1=color 001, 2=color 010, 3=color 011, 4=color 100, 5=color 101, 6=color 110, 7=color 111					Active segments color	
4	40	7-bit UInteger	10 to 100					Active segments intensity	
5	35	Boolean	false=static, true=dynamic					Inactive segments mode	
6	32	3-bit UInteger	0=color 000, 1=color 001, 2=color 010, 3=color 011, 4=color 100, 5=color 101, 6=color 110, 7=color 111					Inactive segments color	
7	24	7-bit UInteger	10 to 100					Inactive segments intensity	
8	0	2-bit UInteger	0=off, 1=on (continuous), 2=slow intermittent 3=fast intermittent					Buzzer	

The ProcessDataOut "PD for Level mode" is under the id=PDOUT_Level at V_DeviceControl == 3. As an example, the "intensity of active segments" is at subindex 4 with the allowed values [10 to 100].
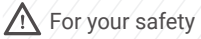
The fill levels and/or machine status are displayed with the active segments [foreground color] with preconfigured color selection for the respective process. In accordance with the color selection predefined by the user, fill levels in the process can be displayed more efficiently with lit LED segments. The allocation of the analog value depends on the available number of segments.

9. TROUBLESHOOTING

1) ERROR DISPLAY   Error types for the signal lighting of the SBx-RGB series

Code	Additional code	Name	Description
128 (0x80)	0 (0x00)	Application error in device - no details	Access was denied by device. No detailed information available
128 (0x80)	17 (0x11)	Index not available	Access to a nonexistent index
128 (0x80)	18 (0x12)	Subindex not available	Access to a nonexistent subindex
128 (0x80)	32 (0x20)	Service currently unavailable	Currently the parameter cannot be accessed. The device does not allow this in the current status.
128 (0x80)	35 (0x23)	Access denied	Write access to a write-protected parameter
128 (0x80)	48 (0x30)	Parameter value outside the valid range	Written parameter value lies outside the allowed value range.
128 (0x80)	49 (0x31)	Parameter value above the allowed limit	Written parameter value lies above the allowed value range.
128 (0x80)	50 (0x32)	Parameter value below the allowed limit	Written parameter value lies below the allowed value range.
128 (0x80)	51 (0x33)	Parameter length too large	Written parameter value is larger than allowed.
128 (0x80)	52 (0x34)	Parameter length too small	Written parameter value is smaller than allowed.
128 (0x80)	53 (0x35)	Function not available	Written command is not supported by the device.
128 (0x80)	54 (0x36)	Function currently unavailable	Written command is not supported by the device in the current status.
128 (0x80)	64 (0x40)	Invalid parameter set	Written individual parameter value collides with the other parameter settings.
128 (0x80)	65 (0x41)	Inconsistent parameter set	Inconsistencies were detected at the end of the block parameter transfer. The device plausibility check failed.
128 (0x80)	130 (0x82)	Application not ready	Access was denied because the device is not ready currently.