

ICA-SL-9MCS-70MM-IO-V1

IO-Link Signal Light

Manual



 **IO-Link**

With regard to the supply of products, the current issue of the following document is applicable:
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1 Introduction

1.1 Content of this Document

This document contains information required to use the product in the relevant phases of the product life cycle. This may include information on the following:

- Product identification
- Delivery, transport, and storage
- Mounting and installation
- Commissioning and operation
- Maintenance and repair
- Troubleshooting
- Dismounting
- Disposal



Note

For full information on the product, refer to the further documentation on the Internet at www.pepperl-fuchs.com.



Note

For specific device information such as the year of construction, scan the QR code on the device. As an alternative, enter the serial number in the serial number search at www.pepperl-fuchs.com.

The documentation comprises the following parts:

- This document
- Datasheet

In addition, the documentation may comprise the following parts, if applicable:

- EU-type examination certificate
- EU declaration of conformity
- Attestation of conformity
- Certificates
- Control drawings
- Instruction manual
- Functional safety manual
- Other documents

1.2 Target Group, Personnel

Responsibility for planning, assembly, commissioning, operation, maintenance, and dismantling lies with the plant operator.

Only appropriately trained and qualified personnel may carry out mounting, installation, commissioning, operation, maintenance, and dismantling of the product. The personnel must have read and understood the instruction manual and the further documentation.

Prior to using the product make yourself familiar with it. Read the document carefully.

1.3 Symbols Used

This document contains symbols for the identification of warning messages and of informative messages.

Warning Messages

You will find warning messages, whenever dangers may arise from your actions. It is mandatory that you observe these warning messages for your personal safety and in order to avoid property damage.

Depending on the risk level, the warning messages are displayed in descending order as follows:



Danger!

This symbol indicates an imminent danger.

Non-observance will result in personal injury or death.



Warning!

This symbol indicates a possible fault or danger.

Non-observance may cause personal injury or serious property damage.



Caution!

This symbol indicates a possible fault.

Non-observance could interrupt the device and any connected systems and plants, or result in their complete failure.

Informative Symbols



Note

This symbol brings important information to your attention.



Action

This symbol indicates a paragraph with instructions. You are prompted to perform an action or a sequence of actions.

1.4 General Safety Notice



Danger!

Death or serious injury due to electric shock.

High electrical voltage in the machine/plant.

When working on the device, observe the five safety rules of electrical engineering.

According to DIN VDE 0105-100—Operation of electrical installations—Part 100: General requirements

Protect people and devices from high electrical voltage:

- Disconnect
- Secure against restart
- Make sure that all poles are de-energized
- Ground and short circuit
- Cover or shield adjacent live parts

The device is only approved for appropriate and intended use. Ignoring these instructions will void any warranty and absolve the manufacturer from any liability.

Electrostatic Charge

Avoid electrostatic charges which could result in electrostatic discharges while installing, operating, or maintaining the device.

Ensure adequate grounding of people and equipment.

Disconnect the device from the power supply before unplugging or plugging in connectors and cables.

When taking measurements on electrostatic-sensitive devices, observe the following points:

- Discharge volt-free measuring devices for a short time.
- Ground the measuring devices.

If you are modifying electrostatic-sensitive devices, use a grounded soldering iron.

Operation, Maintenance

Use the device only within the specified ambient and operating conditions.

Observe directives, standards, and national laws applicable to the intended use and the operating location.

Do not use the device outdoors, in potentially explosive atmospheres (explosion protection zones) or for permanent operation in liquids.

Only operate the device in a perfect technical condition.

Do not modify or manipulate the device.

If cleaning is required, do not use high pressure.

Storage, Transport, Disposal

Always store and transport the device in the original packaging.

The device, built-in components, packaging, and any batteries contained within must be disposed in compliance with the applicable laws and guidelines of the respective country.

2 Product Description

2.1 Intended Use

The device described in the manual is used for communication and process control. Use the device for general control and automation tasks.

The device is designed for industrial use up to the IP67/IP69K degree of protection.

The intended use also includes EMC-compliant electrical installation.



Caution!

Device interference is possible in mixed and residential areas!

This installation may cause radio interference in mixed and residential areas.

- Observe the applicable standards for the mixed or residential area.
- Take appropriate measures to prevent radio interference.

2.2 Functional Description

Operating Modes

The stack light offers four operating modes:

- Stack light mode
- Autoscale mode
- Level mode
- Individual mode

The operating modes can only be selected individually and cannot be combined. The operating mode is set via the "Operating Mode" parameter.

| Parameter | Value | Description |
|----------------|-------|------------------|
| Operating Mode | 0 | Stack light mode |
| | 1 | Autoscale mode |
| | 2 | Level mode |
| | 3 | Individual mode |

Table 2.1

Basic Functions

The following parameters apply to all four operating modes.

The parameters can be used to adjust the following settings for each segment:

- Color
- Light pattern
- Brightness

The exact options within these settings are described in the "Visual Parameters" table below. This allows the color to be selected freely for each segment and ensures maximum flexibility in terms of selecting the light patterns, since they can also be combined with each other.

There are therefore 24 bits of process data for versions with a siren and 16 bits for versions without a siren.

Visual Parameters

| Parameter | Value | Description |
|-------------------------|-----------|---------------------|
| Light effect: segment n | 0 | Continuous light |
| | 1 | Flashing 3 Hz |
| | 2 | Flashing 2 Hz |
| | 3 | Flashing 1 Hz |
| | 4 | Flashes 1x |
| | 5 | Flashes 2x |
| | 6 | Flashes 3x |
| | 7 | All-round |
| Proportion of red | 0 ... 255 | Proportion of red |
| Proportion of green | 0 ... 255 | Proportion of green |
| Proportion of blue | 0 ... 255 | Proportion of blue |
| Brightness: segment n | 0 | Minimum |
| | 1 | Low |
| | 2 | High |
| | 3 | Maximum |
| Standard color | 0 | Individual PWM |
| | 1 | Red |
| | 2 | Green |
| | 3 | Blue |
| | 4 | Yellow |
| | 5 | Light yellow |
| | 6 | Turquoise |
| | 7 | Violet |
| | 8 | White |

Table 2.2

Audio Parameters

| Parameter | Value | Description |
|----------------------|---|--|
| Type of sound | 0 | Sound off |
| | 1 | Continuous sound |
| | 2 | Pulse sound |
| | 3 | Rising |
| | 4 | Falling |
| | 5 | Alternating sound |
| | 6 | Wobble sound |
| Frequency 1, start | 245 ... 6000 | Start frequency in Hz |
| Frequency 2, stop | Mode 1: 0 Mode 2 ... 6: 245 ... 6000 | End frequency in Hz |
| Frequency 3, periods | Mode 1: 0 Mode 2 ... 6: 245 ... 10,000 | Frequency of the change between frequency 1 and frequency 2 in Hz*10 |

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| Parameter | Value | Description |
|-----------------------------|--------------|---|
| Volume | 0 | Quiet |
| | 1 | Medium |
| | 2 | Loud |
| | 3 | Very loud |
| Result/number | 0 ... 65,535 | Result/number |
| Pause until repetition | 0 ... 65,535 | Duration of the pause until the next repetition in ms |
| Pause between cycles | 0 ... 65,535 | Duration of the pause until the next cycle in ms |
| Holding period, frequency 2 | 0 ... 65,535 | Sets the holding period for the end frequency in ms |

Table 2.3

Global Parameters

| Parameter | Value | Description |
|----------------------------------|-------|--|
| Reduction in current consumption | 0 | Reduction in current consumption off |
| | 1 | Reduction in current consumption on ¹ |
| Installation direction | 0 | Normal ² |
| | 1 | Overhead ³ |
| Level mode | 0 | Use the settings of segment 1–9 |
| | 1 | Use the settings of segment 1 |

Table 2.4

1. Corresponds to a consumption of approx. 200 mA

2. Base aligned downward

3. e.g., ceiling mounting

Factory Reset

The "Reset to factory setting" command deletes the existing parameterization and resets it to the factory setting. The factory setting is "Autoscale mode" with three stages (RD/YE/GN), reduction in current consumption is on.

Activating the power reduction is intended to limit the current consumption from the master during commissioning. Please refer here to the note on IO-Link type/Class A and the possible need for an external auxiliary voltage in section 2.2 "Electrical Connection"XXXX. Once the power reduction has been deactivated, the LEDs are set to continuous light at 100 % brightness.

2.3 Status LED

The functional status of the stack light is indicated by two LEDs. In general, the following applies to the status LED:

| LED | Description |
|---------------------------------------|---|
| Flashing red: 500 ms on, 500 ms off | Supply voltage connected, no IO-Link communication |
| Flashing green: 900 ms on, 100 ms off | Supply voltage connected, IO-Link communication works |
| Yellow continuous light | Firmware update in progress |

Table 2.5

If none of the LEDs light up, please check the voltage supply and the connection line.

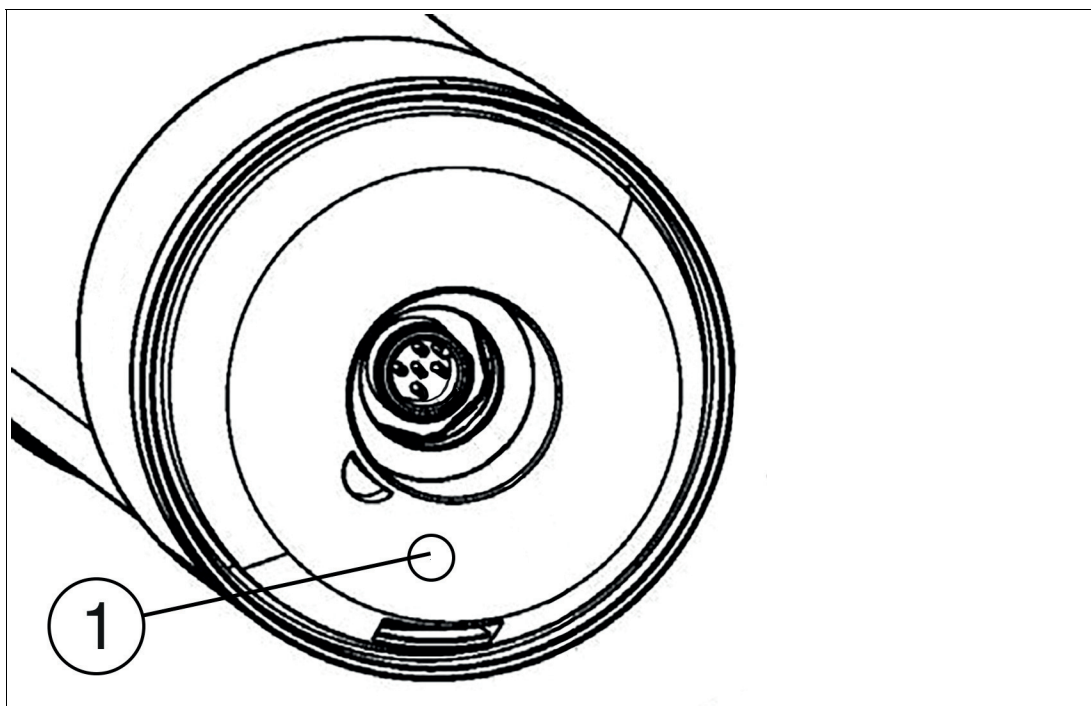


Figure 2.1

The status LED (1) is located in the base behind the nameplate.

3 Installation

3.1 Electrical Connection

IO-Link masters always have 5-pin sockets. There are two types of connections on the IO-Link master:

Port Class A, Type A



Figure 3.1

Pinout

| Pin | Function |
|-----|----------|
| 1 | L+ |
| 2 | DI/DQ |
| 3 | L- |
| 4 | C/Q |

Table 3.1

The functions of pins 2 and 5 are not specified for this type. These functions are defined by the manufacturer. Pin 2 is usually assigned an additional digital channel.

Port Class B, Type B



Figure 3.2

Pinout

| Pin | Function |
|-----|----------|
| 1 | L+ |
| 2 | 2L+ |
| 3 | L- |
| 4 | C/Q |
| 5 | 2M |

Table 3.2

This type provides an additional supply voltage and is suitable for connecting devices with an increased power requirement. An additional (galvanically isolated) supply voltage is provided via pins 2 and 5. A 5-wire standard cable is required to use this additional supply voltage.

Connecting the Light Column

The light column is connected via a 4-pin M12 plug with the following assignment:

IO-Link Standard Pinout

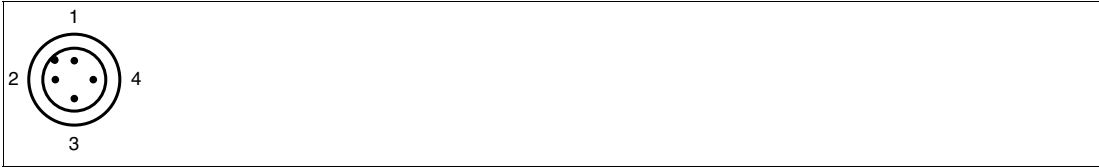


Figure 3.3

| Pin | Core Color | Function |
|-----|------------|----------|
| 1 | Brown | L+ |
| 2 | White | 2L+ |
| 3 | Blue | L- |
| 4 | Black | C/Q |

Table 3.3

IO-Link type/Class A: For current consumption > 200 mA, some IO-Link masters require external auxiliary voltage (2L+).

3.2

IODD

All functions and parameters of the device relevant to the machine control are described in a standardized IODD device description file.¹ This is available on our homepage at www.pepperl-fuchs.com and at ioddfinder.io-link.com.

After importing the IODD, search for new devices in the control panel. The stack light should then be detected automatically.

The procedure for importing the IODD and searching for devices depends on the manufacturer of the control panel. Please refer to the vendor documentation for more detailed information.

¹ IO Device Description

4 Operation

4.1 Visual Signals

Control in Stack Light Operating Mode

Individual segments can be interconnected to form one stage. This allows a classic stack light to be implemented in an electronically modular form. In this mode, the stages have fixed positions and can be turned off if the corresponding stage and the visual signal are not activated. This setting limits the illuminated area of a signal within the column to a specific area. There can be a maximum of three stages.

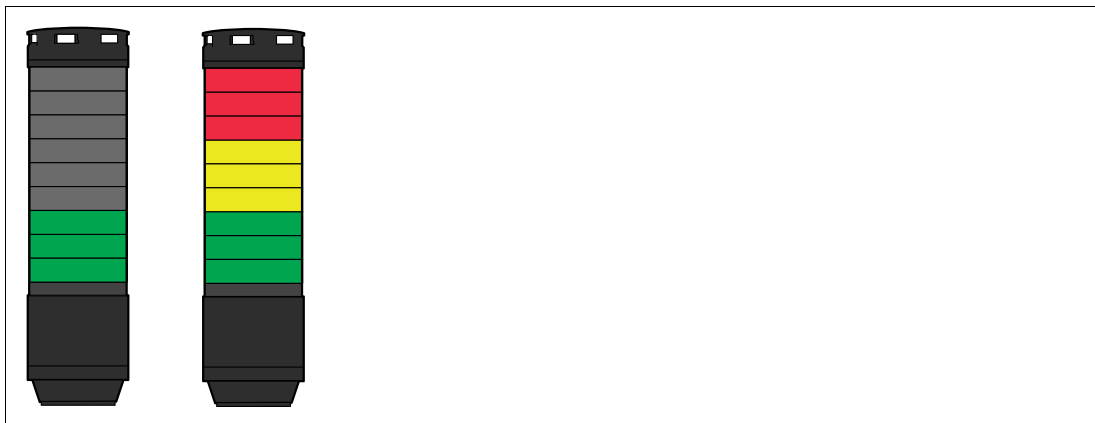


Figure 4.1

Stack Light Mode Process Data

| Byte | Bit | Description |
|------|-----|-------------|
| 0 | 0 | Segment 1 |
| | 1 | Segment 2 |
| | 2 | Segment 3 |
| | 3 | Segment 4 |
| | 4 | Segment 5 |
| | 5 | - |
| | 6 | - |
| | 7 | - |
| 1 | 0 | - |
| | 1 | - |
| | 2 | - |
| | 3 | - |
| | 4 | - |
| | 5 | - |
| | 6 | - |
| | 7 | - |

Table 4.1

Up to eight segments can be interconnected when forming stages. Up to five signal stages can be used.

Depending on the number of stages set, process data bits are used starting with segment 1.

Process Data Example

| Byte | Bit | Configured segments | | | | |
|------|-----|---------------------|-----------|-----------|-----------|-----------|
| | | 1 | 2 | 3 | 4 | 5 |
| 0 | 0 | Segment 1 | Segment 1 | Segment 1 | Segment 1 | Segment 1 |
| | 1 | | Segment 2 | Segment 2 | Segment 2 | Segment 2 |
| | 2 | | | Segment 3 | Segment 3 | Segment 3 |
| | 3 | | | | Segment 4 | Segment 4 |
| | 4 | | | | | Segment 5 |

Table 4.2

Control in Autoscale Operating Mode

This is the default operating mode on delivery.

In this operating mode, the segments are automatically and evenly divided into the number of pins (bits) and status messages. With this setting, the full potential of the light column can be exploited through full-surface signaling. For example, if only one status message is active, the entire area of the stack light is illuminated in one color to ensure maximum visibility.

If there are several signals, the illuminated area is divided proportionally. If the segments cannot be split evenly, the color with the highest priority will be assigned to the last segment or the remaining segments.

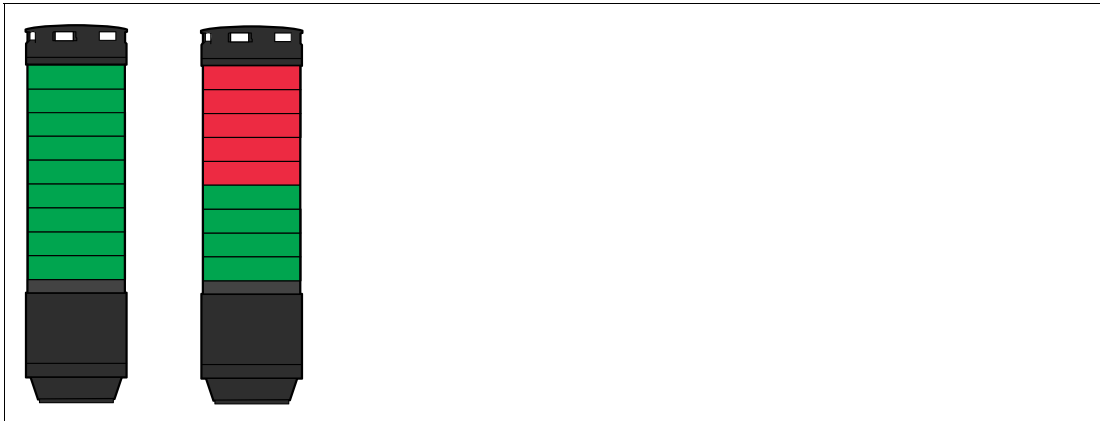


Figure 4.2

Autoscale Mode Process Data

| Byte | Bit | Description |
|------|-----|-------------|
| 0 | 0 | Segment 1 |
| | 1 | Segment 2 |
| | 2 | Segment 3 |
| | 3 | Segment 4 |
| | 4 | Segment 5 |
| | 5 | - |
| | 6 | - |
| | 7 | - |

| Byte | Bit | Description |
|------|-----|-------------|
| 1 | 0 | - |
| | 1 | - |
| | 2 | - |
| | 3 | - |
| | 4 | - |
| | 5 | - |
| | 6 | - |
| | 7 | - |

Table 4.3

In this operating mode, the process data is reduced to 5 bits. The parameters of segments 1 to 5 are used for the setting.

Process Data Example

| Byte | Bit | Autoscale mode |
|------|-----|----------------|
| 0 | 0 | Segment 1 |
| | 1 | Segment 2 |
| | 2 | Segment 3 |
| | 3 | Segment 4 |
| | 4 | Segment 5 |

Table 4.4

Control in Level Operating Mode

In this operating mode, an analog value is displayed via the stack light.

The segments are used as a level indicator. The bandwidth ranges from 0 % when all segments are switched off to 100 % when all segments are activated. This enables precise signaling of the order progress or material availability in machine processes in the form of a rising or falling light pattern. 8-bit process data is processed. The approved value range is between 0 and 100.

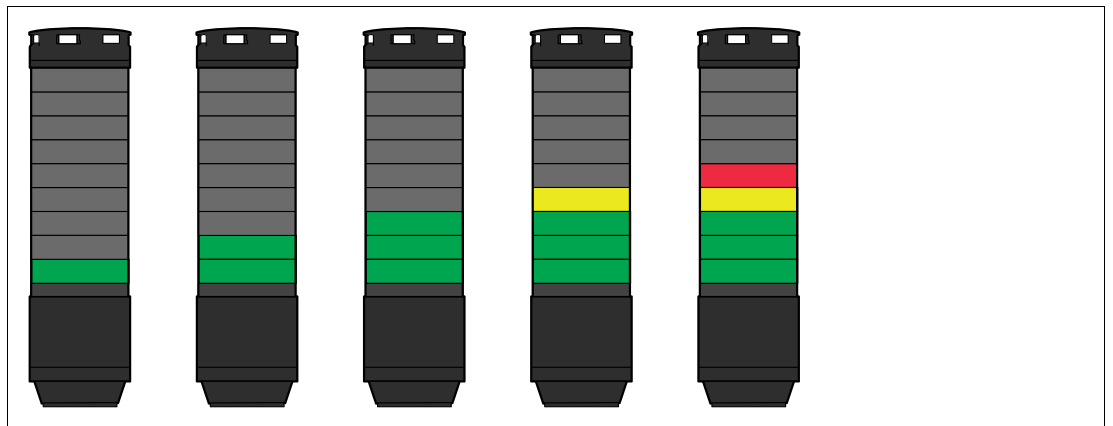


Figure 4.3

Autoscale Mode Process Data

| Byte | Bit | Description |
|------|-----|--------------------|
| 0 | 0 | - |
| | 1 | - |
| | 2 | - |
| | 3 | - |
| | 4 | - |
| | 5 | - |
| | 6 | % value fill level |
| | 7 | - |
| 1 | 0 | - |
| | 1 | - |
| | 2 | - |
| | 3 | - |
| | 4 | - |
| | 5 | - |
| | 6 | - |
| | 7 | - |

Table 4.5

The color setting is fixed via the global parameter "Level mode." A choice of two options is then available. Either the settings of segments 1–9 are applied or the setting of segment 1¹.

Process Data Example

| Byte | Bit | Level mode |
|------|-----|----------------------|
| 0 | 0 | A |
| | 1 | N |
| | 2 | A |
| | 3 | L |
| | 4 | O |
| | 5 | G |
| | 6 | Value; 0 % ... 100 % |
| | 7 | |

Table 4.6

Control in Individual Operating Mode

In this operating mode, each segment is mapped as a separate switching signal.

Each of the nine segments can be individually set and controlled, therefore providing the maximum number of individual signaling options.

This results in 15 bits of process data.

1. Selection value 0 or 1

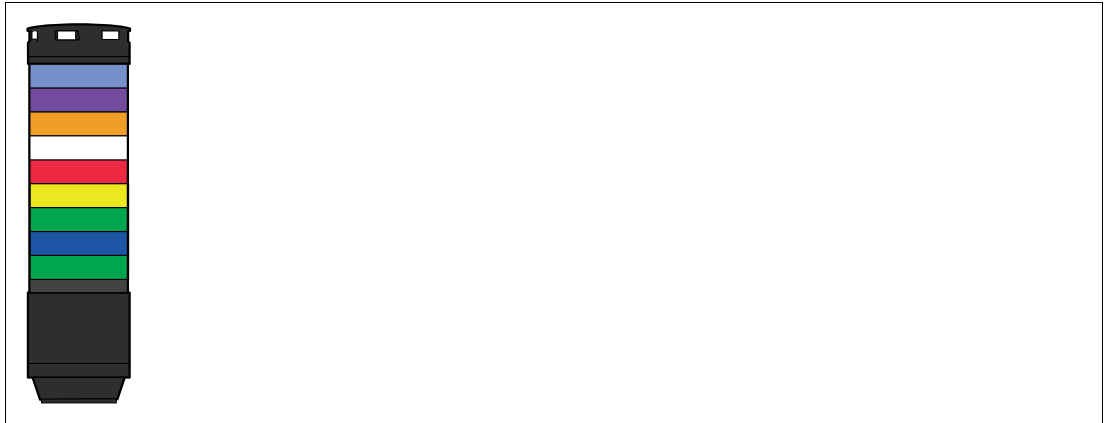


Figure 4.4

Autoscale Mode Process Data

| Byte | Bit | Description |
|------|-----|-------------|
| 0 | 0 | Segment 1 |
| | 1 | Segment 2 |
| | 2 | Segment 3 |
| | 3 | Segment 4 |
| | 4 | Segment 5 |
| | 5 | Segment 6 |
| | 6 | Segment 7 |
| | 7 | Segment 8 |
| 1 | 0 | Segment 9 |
| | 1 | - |
| | 2 | - |
| | 3 | - |
| | 4 | - |
| | 5 | - |
| | 6 | - |
| | 7 | - |

Table 4.7

Process Data Example

| Byte | Bit | Individual mode |
|------|-----|-----------------|
| 0 | 0 | Segment 1 |
| | 1 | Segment 2 |
| | 2 | Segment 3 |
| | 3 | Segment 4 |
| | 4 | Segment 5 |
| | 5 | Segment 6 |
| | 6 | Segment 7 |
| | 7 | Segment 8 |

| Byte | Bit | Individual mode |
|------|-----|-----------------|
| 1 | 0 | Segment 9 |
| | 1 | |
| | 2 | |
| | 3 | |
| | 4 | |
| | 5 | |
| | 6 | |
| | 7 | |

Table 4.8

The parameters of segments 1 to 9 are used for the setting.

4.2 Audible Signals

Controlling the Siren Functions

1 byte of process data is used for the siren. Numerical values of 1–10 can be used, which correspond to one of the pre-assigned sounds.

Pre-Assigned Sounds




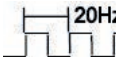
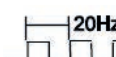
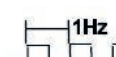
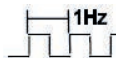
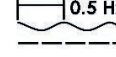


| Sound | Frequency | Description | Max. volume [dB (A)] |
|-------|--|-------------------|----------------------|
| 1 |  2.8 kHz [*] | Continuous sound | 104 |
| 2 |  0.9 kHz | Continuous sound | 96 |
| 3 |  2.8 kHz | Pulse sound | 97 |
| 4 |  0.9 kHz | Pulse sound | 93 |
| 5 |  2.8 kHz | Pulse sound | 103 |
| 6 |  0.9 kHz | Pulse sound | 96 |
| 7 |  2.8 kHz | Pulse sound | 104 |
| 8 |  2.3 kHz- 3.6 kHz | Wobble sound | 104 |
| 9 |  2.6 kHz | Continuous sound | 105 |
| 10 |  1200 Hz 800 Hz | Alternating sound | 92 |

Table 4.9

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Alternatively, the option to configure individual sounds is available. For the different parameters, see chapter 2.2.

The sound must first be selected. The following options are available:

- Continuous sound
- Pulse sound
- Rising
- Falling
- Alternating sound
- Wobble sound

The following graphic shows the respective effects of the parameters.

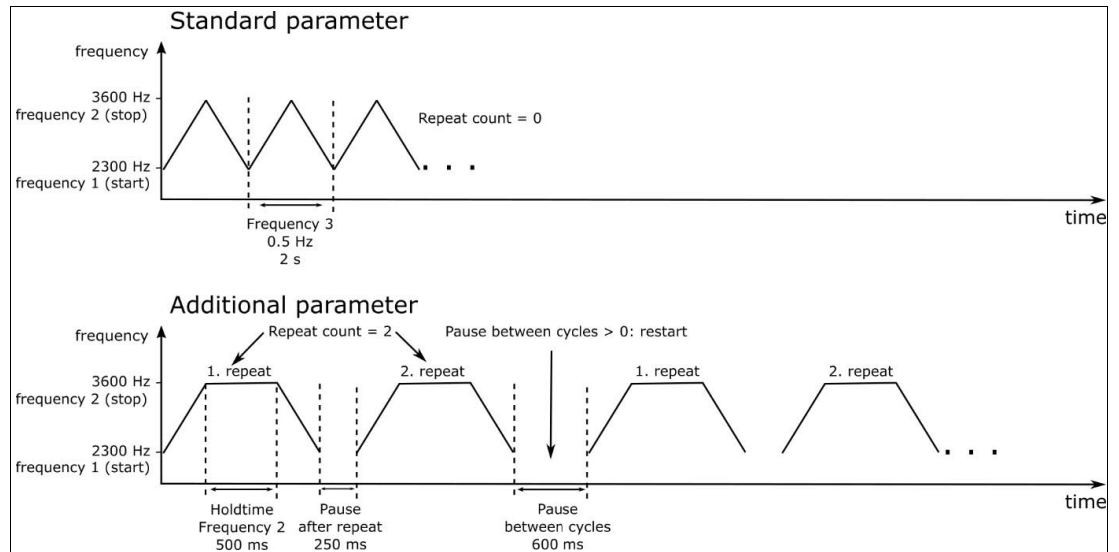


Figure 4.5



Example

| | | |
|-----------------------------|----|-------|
| Tone 8.Tone type | rw | Sweep |
| Tone 8.Frequency 1 (start) | rw | 2300 |
| Tone 8.Frequency 2 (stop) | rw | 3600 |
| Tone 8.Frequency 3 (period) | rw | 5 |
| Tone 8.Volume | rw | Low |
| Tone 8.Repeat count | rw | 0 |
| Tone 8.Pause after repeat | rw | 0 |
| Tone 8.Pause between cycles | rw | 0 |
| Tone 8.Holdtime Frequency 2 | rw | 0 |

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