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Overview

- Introduction
- The need for indication signals and their requirements
- Technical Features of the signal lamp
- Various components that allow for different mounting options
- The different operating modes of the signal lamp
- LR Device software
- Question and answers







Introduction

The smooth operation of any process or machinery requires proper indication, but it can be challenging when a large number of machine statuses need to be differentiated.

Automated machinery and work cells today can be very fast-paced and may serve multiple functions at one time.

With operators performing multiple tasks in the same work area, the potential for error is high.

Machines or work stations may also have many different statuses, and without versatile indication options, correct identification by the operators could pose as a problem

To prevent errors, as well as streamline assembly processes, proper indication can elevate productiveness and increase overall efficiency.



Why do we need indication signals?

Lets look at a typical production line.....

The machine is equipped with sensors that inform the operator of various events



1. To know the current state of the machine



Red LED to indicate a fault or error Orange LED to indicate manual mode / maintenance Green LED to indicate healthy / run state

2. To alert the operator of warning conditions



Label not detected by a bar code scanner Incorrect size of packaging Drop in hydraulic pressure on the press

3. To alert all personnel of an emergency situation

E-stop is activated Obstruction sensed by the light curtains Any process value that goes beyond its critical range





What can we use to indicate these different conditions ?







What requirements should an indicating signal conform to?

- 1. Luminance (0 to 100%)
 - This should ideally be adjustable to conform to a high level of luminance in bright conditions and a decreased level in lower lighting environments
- 2. Blinking and flashing (slow/medium/fast)
 - Operators can link different sequencing of blinking/flashing to differentiate events
 - Eg . Blinking is used for unacknowledging events/ new faults
 - Flashing is used in safety breaches, or critical levels where a manual reset is required
- 3. Audible range of the buzzer(0 to 100%)
 - Sound of the buzzer should be able to adapt to the ambient noise in the environment
 - A higher volume will be required in noisy areas in the plant
 - A lower setting should be allowed for quieter areas so as not to reach damage levels of hearing

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Taking in consideration of the mentioned requirements











Buzzer with adjustable audible sound







Single segment signal lamp by IFM



Technical features of the signal lamp

- Highly visible in all ambient conditions
- Adjustable Loud Buzzer (90db) with selectable melodies
- 7 selectable colors
- Permanent light, 3 blinking modes, 3 flashing modes
- High ingress protection rating IP 67/65, making it suitable for wet areas
- Simple installation with M30 fixing nut / Pole mounting
- Integrated capacitive touch button on cap
- Three operating modes
 - 1. Basic On /Off mode
 - 2. RGB Mode
 - 3. IO Link mode









Various components & Mounting methods

Different variations of the lamp

1st mounting method : M30 connection



DV2120 – Standard

DV2121 – With touch input

DV2130 – With buzzer

DV2131 – with buzzer touch input







- Choose lamp 1.
- 2. Adapter
- Choose Pole 3.



E89067 - 800mm

E89061



Wall mount 4b

4a Base mount

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Operating modes of the lamp

• SIO / ON OFF Mode

- \checkmark In this mode, three colors can each be selected using a separate connection pin
- ✓ This makes it possible to easily replace conventional lamps that have more than one lighting segment.
- ✓ The buzzer and the pushbutton can be activated using a further pin of the M12 socket.

Wiring for on/off Mode



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Operating modes of the lamp

RGB Mode

In the "RGB mode", the three digital inputs have a fixed functionality.

Here every input is dedicated to one of the three basic colors "red, green, blue".

If LED-A is high, the segment is Red, if LED-B is high, light is Green and if C is high, light is Blue

If Input LED-A and LED-B are high, the combination of red AND green = yellow.

LED-	A (red) LED-E	3 (green) LED	-C (blue)	Colour			
	1	0	0	red	Wiring fo	r RGB Mode	
	0	1	0	green			
	1	1	0	yellow		LED-a (Pin-1)	
	0	0	1	blue		LED-b (Pin-2)	
	1	0	1	purple		LED-c (Pin-5)	
		0		puble		Buzzer (Pin-4)	
	0	1	1	cyan		Y (
	1	1	1	white		COM (Pin-3)	chinolog



Operating modes of the lamp

• IO Link Mode

IO Link allows for the use of the ON/OFF and RGB Modes using a single 3 wire connection

In the IO-Link mode, the single light can be configured and also controlled via the process-data communication between IO-Link master and the signal light.

The user can control the color of the light, the intensity and the flashing frequency, he can control the Buzzer style, can switch on and off the buzzer and can read the status of the feedback button on top of the single light.



Wiring for IO Link Mode



What is IO Link ?

Input Output – Link

Approved solution for the connection of sensors and actuators Is an IEC 61131-9 global standard digital communication protocol

Point- to-point bi-directional connection \rightarrow **not a bus system!**

IO-link allows the transfer of

- process data
- > parameters
- events / diagnostic data









What are the features and benefits of IO Link ?



Identification Identify what is connected and to where



Easy sensor replacement Sensor parameters are configured using a configuration software and are stored in the master

Wire break detection and diagnosis

Wire break , short circuit and diagnostic data is available.



Remote Parameterization

IO-Link allows remote parameterization from PLC or via configuration software



Multiple sensor values

IO-Link allows you to transmit multiple sensor values , eg : flow and temperature



Reduction in costs and time

IO-Link is based on digital binary signals , no analog functionality needs to be built into the sensors No need for conventional complex parallel hardwired technology





IO Link is an open vendor technology

IO-Link Consortium

Standardization

IO-Link an open vendor technology supported by many companies

For this reason a Consortium was created of major sensor manufacturers and industrial manufacturing companies to promote the IO-Link standard









What is required for IO Link communication to our signal light?

LR Device software



IO Link masters

IO Link interface



E30390



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What settings can be changed using LR device ?

Lets have a look at the software online ...



LR Device





How is the data transfer to and from the PLC identified ?

- Cyclic data comes through a 2 words
- 1st word: Pdin only 1 bit is used for the status of the capacitive button
- 2nd word: Data is represented in 2 ways depending if ON/OFF mode or RGB mode is chosen
- In ON/OFF mode, the controller switches the LED segment and the buzzer on and off via cyclic data. The signaling corresponds to the parameters previously defined for the LED segment and the buzzer (previous setting with LR device)

PD IN

7	6	5	4	3	2	1	0	PDin
0	÷ ,,		Device fau	It information	on		24	Byte 0
				c			Feedback button	Byte 1

PD OUT (on/off mode)

7	6	5	4	3	2	1	0	PDOut
					LED-c	LED-b	LED-a	Byte 0
							Buzzer	Byte 1





How is the data transfer to and from the PLC identified ?

PD OUT (RGB Mode)

7	6	5	4	3	2	1	0	PDOut
	L	ED propertie	es	Seg. 1 = yellow	Seg. 1 = red	Seg. 1 = green	Seg. 1 blue	Byte 0
	Buzzer sound (buzzer style 18)						Buzzer	Byte 1

The 1st 4 bits of byte 0 allows for the appearance of the segment to be various colors

Byte 0 Bit 3	Byte 0 Bit 2	Byte 0 Bit 1	Byte 0 Bit 0	Colour
0	0	0	0	off
0	0	0	1	red
0	0	1	0	green
0	0	1	1	orange
0	1	0	0	blue
0	1	0	1	violet
0	1	1	0	turquoise
0	1	1	1	white
1	0	0	0	yellow

Setting of the LED properties (RGB Mode)

The next 3 bits of byte 0 allows for the segment to flash /blink at different rates

Byte 0 Bit 6	Byte 0 Bit 5	Byte 0 Bit 4	Frequency
0	0	0	permanently on
0	0	1	low flash rate slow
0	1	0	low flash rate medium
0	1	1	low flash rate fast
1	0	0	high flash rate slow
1	0	1	high flash rate medium
1	1	0	high flash rate fast





How does the data come to the PLC ?

PD OUT (RGB Mode)

7	6	5	4	3	2	1	0	PDOut
	LED properties		Seg. 1 = yellow	Seg. 1 = red	Seg. 1 = green	Seg. 1 blue	Byte 0	
	Buzzer sound (buzzer style 18)						Buzzer	Byte 1

The 1^{st} bit of byte 1 is to switch the buzzer on / off

The buzzer style can be set in 8 different modes and this is achieved by the various bit combinations for positions 4,5 and 6 as shown in the adjacent table

Setting of the Buzzer properties (RGB Mode)

Buzzer style	Byte 1 Bit 6	Byte 1 Bit 5	Byte 1 Bit 4	Description
1	0	0	0	off
2	0	0	1	pulsating fast 2450 Hz
3	0	1	0	alternating fast 2450 Hz and 3080 Hz
4	0	1	1	rising from 1000 Hz to 4000 Hz, falling to 1000 Hz
5	1	0	0	continuous note 2450 Hz interrupted every 500 ms
6	1	0	1	pulsating fast 2450 Hz interrupted every 500 ms
7	1	1	0	alternating fast 2450 Hz and 3080 Hz interrupted every 500 ms
8	1	1	1	rising from 1000 Hz to 4000 Hz, falling to 1000 Hz interrupted every 500 ms





Summary

- Now that it has been established that there could be some intelligence in a simple light, it can be safe to say that this signal lamp could become a tool in increasing efficiency to some degree.....
 - Severity of a breakdown can be intensified by increasing the audibility and intensity of the light segment in the aim to shorten the time taken to attend to a breakdown.
 - IO Link communication allows for operators to be signaled during an event down to the sensor level before the process is interrupted or production could be affected.....this is allows for Real Time maintenance
 - Timeous acknowledgment of alarm/warning statuses via integrated touch button reduces the need for an extra sensor saving on cost
 - Utilizing the IO Link functionality allows for flexible signaling that is achievable with a 3 wire connection saving on cost of cabling as well as additional input modules to the PLC.
 - Flexibility of the signal lamp could also allow for reducing inventory part numbers , contributing to further cost saving







Webinar Schedule

26 August 2020 IO Link Precise Pressure Sensor with Temperature Monitoring

See the next webinars at the link below:

https://www.ifm.com/za/en/za/webinars/2020





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Thank you for participating

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