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Frequency switch LABO-D...S

- **Complete sensor with frequency switch in the housing of a proximity switch**
- **Switch signal depending on the input frequency**
- **Various sensors available**
- **16-bit microcontroller**
- **Numerous configurable parameters**
- **A parameter can be set locally**
- **Affordable**

Characteristics

The LABO-D...S frequency switch combines a primary sensor with evaluation electronics with a powerful 16-bit microcontroller in the housing of a proximity switch.
The evaluation electronics enable, for example, the speed measurement of rotating machine parts, turbines, spinners, etc. by means of the detection of the approach of metals or magnets in various environments and the evaluation of the resulting frequency.

The primary sensors are available in various technologies depending on the application:

- Magnetic field sensors are capable of detecting the approach of magnets. This is also possible through metallic surfaces.
- Pre-tensioned hall sensors detect the approach of ferromagnetic metal parts, even through metallic but non-ferromagnetic surfaces.
- Inductive sensors detect the approach of all types of metal parts and can therefore not be used behind metal surfaces.

The LABO electronics make available an electronic switching output (push-pull) with adjustable characteristics (minimum/maximum) and hysteresis, which responds when an adjustable limit is fallen short of or exceeded.

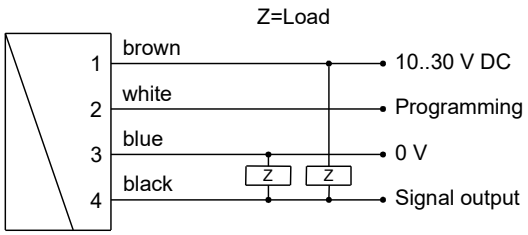
If desired, the switching value can be set to the currently existing frequency using "teaching". Switching and switch-back times can be adjusted dependent upon each other. The power-on-delay function makes it possible to keep the switching output in a defined state for a variable time after the supply voltage is switched on.

Models with analog or pulse output are also available.

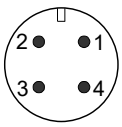
Technical data

Sensor	Magnetic field sensor (magneto-resistive) Pre-tensioned hall sensor Inductive sensor	
Detection distance	Magnetic field sensor	Depending on magnets used, signal threshold typ. 8 Gauss (= 0.8 milliTesla), switching distances over 25 mm possible
	Pre-tensioned hall sensor	Typ. 0.5..2.5 mm
	Inductive sensor	Typ. max. 4 mm based on 1 cm³ ST37
Metering range	0..10 kHz for hall sensor 0..1 kHz for inductive sensor	
Measurement uncertainty	±0.1 % measured value	
Pressure resistance	Pressureless application	
Operating temperature	0..+70 °C (other temperatures available on request)	
Storage temperature	-20..+80 °C	
Materials	Housing	CW614N nickelled
	Sensor flap	PA
	Plug insert	PC
	Contacts	CuZn, gold-plated
Supply voltage	10..30 V DC	
Power requirement	< 1 W (for no-load output)	
Switching output	Transistor output "push-pull" (resistant to short circuits and reversed polarity protected) I_{out} = 100 mA max.	
Display	yellow LED (On = Normal / Off = Alarm / rapid flashing = Programming)	
Electrical connection	For round plug connector M12x1, 4-pole	
Ingress protection	IP 67	
Weight	approx. 0.02 kg	
Conformity	CE	

Wiring



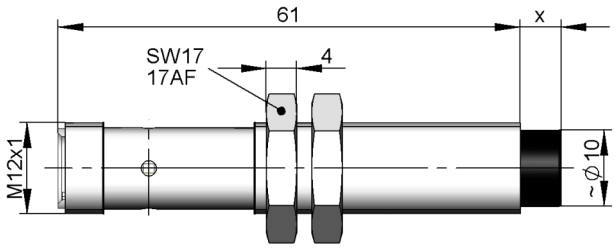
Connection example: PNP NPN



Before the electrical installation, it must be ensured that the supply voltage complies with the data sheet.
It is recommended to use shielded wiring.

The push-pull output of the frequency or pulse output version can as desired be switched as a PNP or an NPN output.

Dimensions



Types	X mm
LABO-D-H	5.5
LABO-D-V	0.5
LABO-D-I	3.5

Handling and operation

Installation

The sensors are screwed into a M12x1 threaded hole or fixed in a 12 mm hole by means of the supplied lock nuts.
The magnetic field sensor reacts to magnetic fields of both polarities perpendicular to the end face.

Note

The switching value can be programmed by the user via "teaching". If desired, programmability can be blocked by the manufacturer.
The ECI-3 device configurator with associated software is available as a convenient option for programming all parameters by PC, and for adjustment.

Operation and programming

The switching value is set as follows:

- The frequency value which is to be set is applied to the device.
- Apply an impulse of at least 0.5 seconds and max. 2 seconds duration to pin 2 (e.g. via a bridge to the supply voltage or a pulse from the PLC), in order to accept the measured value.
- When the teaching is complete, pin 2 should be connected to 0 V, so as to prevent unintended programming.

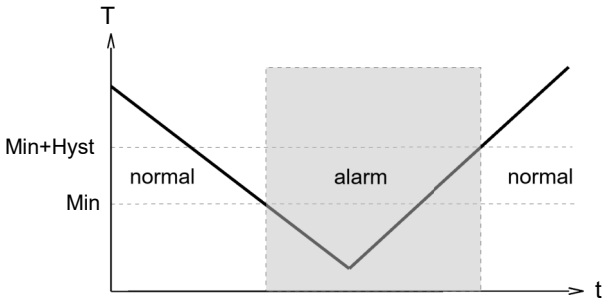
The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output.

To avoid the need to transit to an undesired operating status for the purpose of teaching, the device can be provided ex-works with a teach-offset. The teach-offset point is added to the currently measured value before saving. The offset point can be positive or negative.

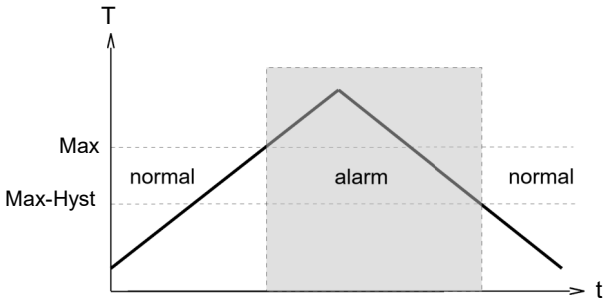
Example: The switching value should be set to 80 %. However, it is possible only to reach 60 % without problems. In this case, the device would be ordered with a "teach offset" of +20 %. At a flow rate of 60 % in the process, teaching would then store a value of 80 %.

The limit switch can be used to monitor minima or maxima.

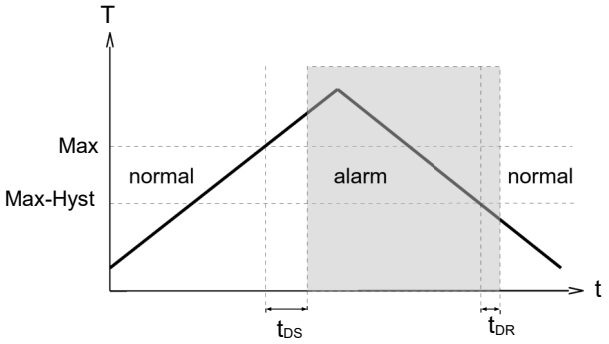
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is once more exceeded.
With a maximum-switch, exceeding the limit value causes a



switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.

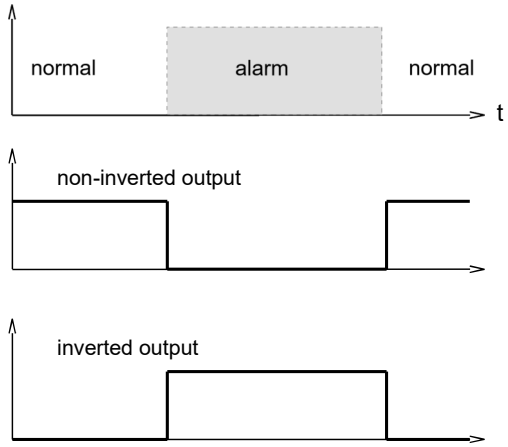


A changeover delay time (t_{DS}) can be applied to switching to the alarm state. One switch-back delay time (t_{DR}) of several can likewise be applied to switching back to the normal state.



In the normal state the integrated LED is on, in the alarm state it is off, and this corresponds to its status when there is no supply voltage.
In the non-inverted (standard) model, while in the normal state the switching output is at the level of the supply voltage; in the alarm state it is at 0 V, so that a wire break would also display as an alarm state at the signal receiver.

Optionally, an inverted switching output can also be provided, i.e. in the normal state the output is at 0 V, and in the alarm state it is at the level of the supply voltage.



A PowerOn delay function (ordered as a separate option) makes it possible to maintain the switching output in the normal state for a defined period after application of the supply voltage.

Ordering code

	1.	2.	3.	4.	5.	6.
LABO - D -		**S**				**S**

❍ = Option

1.	**Sensor**	
	H	Magnetic field sensor
	V	Pre-tensioned hall sensor
	I	Inductive sensor
2.	**Switching output (limit switch)**	
	S	Push-pull (compatible with PNP and NPN)
3.	**Programming**	
	P	Programmable (teaching possible)
	N ❍	Cannot be programmed (no teaching)
4.	**Switching function**	
	L	Minimum switch
	H	Maximum switch
5.	**Switching signal**	
	O	Standard
	I ❍	Inverted
6.	**Electrical connection**	
	S	For round plug connector M12x1, 4-pole

Options

Switching delay period (0.0..99.9 s) ☐☐,☐ s
(from Normal to Alarm)

Switch-back delay period (0.0..99.9 s) ☐☐,☐ s
(from Alarm to Normal)

PowerOn delay period (0..99 s) ☐☐ s
(After connecting the supply, time during which the switching output is not activated)

Switching output fixed at ☐☐☐ Hz

Switching hysteresis ☐☐ %
Standard = 2 % of the metering range

Teach offset (in percent of the metering range) ☐☐☐☐ %
Standard = 0 %

Further options available on request.

Accessories

- Round plug connector/cable
- Evaluation electronics OMNI-TA
- Device configurator ECI-3