#### Senseca Germany GmbH Tenter Weg 2-8 | 42897 Remscheid | GERMANY Phone +49 2191 9672-0 | Fax +49 2191 9672-40 www.senseca.com | info@senseca.com | WEEE Reg. No. DE 93889386



#### **Product Information**

## Flow switch LABO-HR2VE-S



- Optimized for use with oil
- Versatile, configurable switching output in
- Push-Pull model (small hysteresis possible)
- Programmable through teaching
- LED for status display
  All metal housing
- All metal housing
   Fully potted IP 67
- All parameters programmable via USB interface ECI-1

#### Characteristics

Mechanical flow switch, for oil , with spring-supported piston and magnetic triggering of Hall sensors. Robust construction in brass or stainless steel.

The LABO electronics fitted to the device 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 flow using "teaching". Models with analog or pulse output are also available (see separate data sheets).

In contrast to electromechanical switches (Reed contacts or microswitches), electronic switches are insensitive to impact and wear.

There is no galvanic separation from the supply circuit.

#### Technical data

Sensor       analog Hall sensors         Nominal width       DN 32 / 40 / 50         Process       female thread G 1 <sup>1</sup> / <sub>4</sub> G 2 (further process connections available on request)         Metering range       10160 l/min         Pressure loss       ~ 47 bar at Q <sub>max</sub> Qmax.       up to 160 l/min         Measurement       ±5 % of full scale value at constant viscosity         accuracy       ±10 % of full scale value         Viscosity-       ±10 % of full scale value         stability       (20-330 mm²/s)         Pressure       PS 200 bar         resistance       -20+85 °C, optionally -20+120 °C         Medium       -20+70 °C         temperature       -20+70 °C         Media       oil         Wiring       see section "Wiring"         Materials       Brass construction: CW614N nickelled, CW614N, 1.4305, 1.4310, hard ferrite       Stainless steel construction: 1.4571, 1.4310, hard ferrite         Non-medium- contact materials       CW614N nickelled       construction: 1.4571, 1.4310, hard ferrite         Supply voltage       1830 V DC       Power consumption         Switching output       transistor output "Push-Pull" (resistant to short circuits and reversed polarity protected) lout = 100 mA max.         for round plug connector M12x1, 4-pole
Process connection       female thread G 1 <sup>1</sup> /4G 2 (further process connections available on request)         Metering range       10160 l/min       for details see table "Ranges"         Pressure loss       ~ 47 bar at Q <sub>max</sub> for details see table "Ranges"         Qmax.       up to 160 l/min       for details see table "Ranges"         Measurement accuracy       ±5 % of full scale value at constant viscosity         Accuracy       ±10 % of full scale value (20-330 mm²/s)       pressure         Pressure resistance       PS 200 bar       meanue         Medium       -20+85 °C, optionally -20+120 °C       c         temperature       -20+70 °C       c         Media       oil       Brass construction: CW614N nickelled, CW614N, nickelled, CW614N, nickelled, CW614N, nickelled, CW614N nickelled, CW614N nickelled       Stainless steel construction: 1.4571, 1.4310, hard ferrite         Non-medium- contact materials       CW614N nickelled       construction: 1.4571, 1.4310, hard ferrite         Supply voltage       1830 V DC       polerity protected) lout = 100 mA max.         For round plug connector M12x1, 4-pole       for round plug connector M12x1, 4-pole         Mosterial       for round plug connector M12x1, 4-pole
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Pressure loss       ~ 4/ bar at Q_max       table "Ranges"         Qmax.       up to 160 l/min       table "Ranges"         Measurement accuracy       ±5 % of full scale value at constant viscosity         Viscosity-       ±10 % of full scale value       constant viscosity         stability       (20-330 mm²/s)       Pressure         Pressure resistance       PS 200 bar       Pressure         Medium       -20+85 °C, optionally -20+120 °C       C         Ambient       -20+70 °C       Pressure         Media       oil       Stainless steel         Media       oil       Stainless steel         Medium-contact       CW614N nickelled, CW614N nickelled, CW614N nickelled       Stainless steel         Non-medium-contact       CW614N nickelled       hard ferrite         Non-medium-contact       CW614N nickelled       construction: 1.4571, 1.4310, hard ferrite         Non-medium-contact       CW614N nickelled       construction: 1.4571, 1.4310, hard ferrite         Supply voltage       1830 V DC       Power         C<1 W       consumption       seitant to short circuits and reversed polarity protected) lout = 100 mA max.         Electrical connection       for round plug connector M12x1, 4-pole       polarity protected) lout = 100 mA max.         Display
Measurement accuracy       ±5 % of full scale value at constant viscosity         Viscosity- stability       ±10 % of full scale value (20-330 mm²/s)          Pressure resistance       PS 200 bar         Medium temperature       -20+85 °C, optionally -20+120 °C         Ambient temperature       -20+70 °C         Media       oil         Wiring       see section "Wiring"         Materials medium-contact       Brass construction: CW614N nickelled, CW614N, 1.4305, 1.4310, hard ferrite       Stainless steel construction: 1.4571, 1.4310, hard ferrite         Non-medium- contact materials       CW614N nickelled          Supply voltage       1830 V DC         Power consumption       CW614N nickelled          Switching output       transistor output "Push-Pull" (resistant to short circuits and reversed polarity protected) l <sub>out</sub> = 100 mA max.         Electrical connection       for round plug connector M12x1, 4-pole         Display       yellow LED (On = Normal / Off = Alarm /
accuracy       ±10 % of full scale value         Viscosity- stability       ±10 % of full scale value         stability       (20-330 mm²/s)         Pressure resistance       PS 200 bar         Medium temperature       -20+85 °C, optionally -20+120 °C         Ambient temperature       -20+70 °C         Media       oil         Wiring       see section "Wiring"         Materials medium-contact       Brass construction: CW614N nickelled, CW614N, 1.4305, 1.4310, hard ferrite       Stainless steel construction: 1.4571, 1.4310, hard ferrite         Non-medium- contact materials       CW614N nickelled       Image: CW614N nickelled         Supply voltage       1830 V DC       VMC         Power       < 1 W       Image: Consumption         Switching output       transistor output "Push-Pull" (resistant to short circuits and reversed polarity protected) lout = 100 mA max.         Electrical connection       for round plug connector M12x1, 4-pole         Display       yellow LED (On = Normal / Off = Alarm /
Viscosity- stability       ±10 % of full scale value (20-330 mm²/s)         Pressure resistance       PS 200 bar         Medium temperature       -20+85 °C, optionally -20+120 °C         Ambient temperature       -20+70 °C         Ambient temperature       -20+70 °C         Media       oil         Wiring       see section "Wiring"         Materials medium-contact       Brass construction: CW614N nickelled, CW614N, 1.4305, 1.4310, hard ferrite       Stainless steel construction: 1.4571, 1.4310, hard ferrite         Non-medium- contact materials       CW614N nickelled       CW614N nickelled         Supply voltage       1830 V DC       Power         Power       < 1 W       consumption         Switching output       transistor output "Push-Pull" (resistant to short circuits and reversed polarity protected) lout = 100 mA max.         Electrical connection       for round plug connector M12x1, 4-pole         Display       yellow LED (On = Normal / Off = Alarm /
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Pressure resistance       PS 200 bar         Medium temperature       -20+85 °C, optionally -20+120 °C         Ambient temperature       -20+70 °C         Ambient temperature       -20+70 °C         Media       oil         Wiring       see section "Wiring"         Materials medium-contact       Brass construction: CW614N nickelled, CW614N, 1.4305, 1.4310, hard ferrite       Stainless steel construction: 1.4571, 1.4310, hard ferrite         Non-medium- contact materials       CW614N nickelled       Image: CW614N nickelled         Supply voltage       1830 V DC       Power         Power       < 1 W       Image: Curve transistor output "Push-Pull" (resistant to short circuits and reversed polarity protected) lout = 100 mA max.         Electrical connection       for round plug connector M12x1, 4-pole         Display       yellow LED (On = Normal / Off = Alarm /
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Medium temperature       -20+85 °C, optionally -20+120 °C         Ambient temperature       -20+70 °C         Media       oil         Wiring       see section "Wiring"         Materials medium-contact       Brass construction: CW614N nickelled, CW614N, 1.4305, 1.4310, hard ferrite       Stainless steel construction: 1.4571, 1.4310, hard ferrite         Non-medium- contact materials       CW614N nickelled       Image: CW614N nickelled         Supply voltage       1830 V DC         Power consumption       1830 V DC         Switching output       transistor output "Push-Pull" (resistant to short circuits and reversed polarity protected) lout = 100 mA max.         Electrical connection       for round plug connector M12x1, 4-pole         Display       yellow LED (On = Normal / Off = Alarm /
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Ambient temperature       -20+70 °C         Media       oil         Wiring       see section "Wiring"         Materials medium-contact       Brass construction: CW614N nickelled, CW614N, 1.4305, 1.4310, hard ferrite       Stainless steel construction: 1.4571, 1.4310, hard ferrite         Non-medium- contact materials       CW614N nickelled       hard ferrite         Supply voltage       1830 V DC         Power consumption       CW614N nickelled         Switching output       transistor output "Push-Pull" (resistant to short circuits and reversed polarity protected) l <sub>out</sub> = 100 mA max.         Electrical connection       for round plug connector M12x1, 4-pole         Display       yellow LED (On = Normal / Off = Alarm /
temperature       Oil         Media       Oil         Wiring       see section "Wiring"         Materials       Brass construction: CW614N nickelled, CW614N, 1.4305, 1.4310, hard ferrite       Stainless steel construction: 1.4571, 1.4310, hard ferrite         Non-medium- contact materials       CW614N nickelled       Integer hard ferrite         Supply voltage       1830 V DC         Power       < 1 W         consumption       transistor output "Push-Pull" (resistant to short circuits and reversed polarity protected) lout = 100 mA max.         Electrical connection       for round plug connector M12x1, 4-pole         Display       yellow LED (On = Normal / Off = Alarm /
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medium-contact       CW614N nickelled, CW614N, 1.4305, 1.4310, hard ferrite       construction: 1.4571, 1.4310, hard ferrite         Non-medium- contact materials       CW614N nickelled       hard ferrite         Supply voltage       1830 V DC         Power       < 1 W         consumption       construction: 1.4571, 1.4310, hard ferrite         Switching output       transistor output "Push-Pull" (resistant to short circuits and reversed polarity protected) l <sub>out</sub> = 100 mA max.         Electrical connection       for round plug connector M12x1, 4-pole         Display       yellow LED (On = Normal / Off = Alarm /
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hard ferrite         Non-medium- contact materials         Supply voltage         1830 V DC         Power         < 1 W         consumption         Switching output         transistor output "Push-Pull" (resistant to short circuits and reversed polarity protected) lout = 100 mA max.         Electrical connection         Display       yellow LED (On = Normal / Off = Alarm /
Non-medium- contact materials       CW614N nickelled         Supply voltage       1830 V DC         Power       < 1 W         consumption       ************************************
contact materials         Supply voltage       1830 V DC         Power       < 1 W         consumption       transistor output "Push-Pull"         Switching output       transistor output "Push-Pull"         (resistant to short circuits and reversed polarity protected) lout = 100 mA max.         Electrical connection       for round plug connector M12x1, 4-pole         Display       yellow LED (On = Normal / Off = Alarm /
Supply voltage       1830 V DC         Power       < 1 W         consumption       ************************************
Power consumption       < 1 W         Switching output       transistor output "Push-Pull" (resistant to short circuits and reversed polarity protected) l <sub>out</sub> = 100 mA max.         Electrical connection       for round plug connector M12x1, 4-pole         Display       yellow LED (On = Normal / Off = Alarm /
consumption         Switching output       transistor output "Push-Pull" (resistant to short circuits and reversed polarity protected) l <sub>out</sub> = 100 mA max.         Electrical connection       for round plug connector M12x1, 4-pole         Display       yellow LED (On = Normal / Off = Alarm /
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(resistant to short circuits and reversed polarity protected) l <sub>out</sub> = 100 mA max.         Electrical connection         Display       yellow LED (On = Normal / Off = Alarm /
Electrical connection         for round plug connector M12x1, 4-pole           Display         yellow LED (On = Normal / Off = Alarm /
connection           Display         yellow LED (On = Normal / Off = Alarm /
Display yellow LED (On = Normal / Off = Alarm /
(On = Normal / Off = Alarm /
rapid flashing - Programming)
rapid flashing = Programming) Ingress protection IP 67
Weight see table "Dimensions and weights"
Conformity CE
Installation Standard: horizontal inwards flow: other
location installation positions are possible; the
installation position affects the metering and
switching range.

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#### **Product Information**

#### Ranges

For metering ranges, the details in the table correspond to horizontal inwards flow with increasing flow rate.

#### Standard type LABO-HR2VE

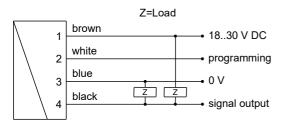
Switching range I/min oil 20-330 mm²/s	<b>Q</b> <sub>max.</sub> Recommended I/min	<b>Pressure loss</b> bar at Q <sub>max.</sub> oil
10 - 80	100	4
20 - 120	120	5
30 - 140	140	5
50 - 160	160	7

Special ranges are available.



Switching spaces of the flow switch HR2VK1

#### Wiring



Connection example: PNP NPN



Before the electrical installation, it must be ensured that the supply voltage corresponds to the data sheet.

It is recommended to use shielded wiring.

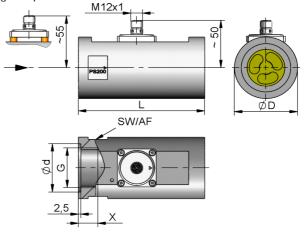
The Push-Pull output can as desired be  $% \left( {{\rm SW}} \right) = {\rm SW} \left( {{\rm SW}$ 

#### Dimensions and weights

..including LABO-electronics

DN	G	Types	L	ØD	SW	Ød	x	Weight kg
32	G 1¹/₄	HRVE-032GM	130	65	60	51	23	2.6
40	G 1 <sup>1</sup> / <sub>2</sub>	HRVE-040GM	170	65	60	56	24	3.2
50	G 2	HRVE-050GM	185	80	75	70	26	5.3

#### High temperature



#### Handling and operation

#### Note

The switching value can be programmed by the user via "teaching". If desired, programmability can be blocked by the manufacturer.

The ECI-1 device configurator with associated software is available as a convenient option for programming all parameters by PC, and for adjustment.

- Include straight calming section of 5 x DN in inlet and outlet.
- Include a filter if the media are dirty (use magnetic filter for ferritic components)
- Under unfavorable pressure conditions, e.g. with a free outlet, there is a risk of cavitation.

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#### **Product Information**

#### Operation and programming

The switching value is set as follows:

- Apply the flow rate to be set 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.

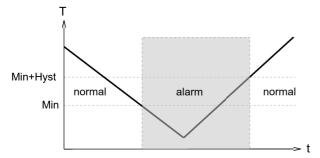
The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output.

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.

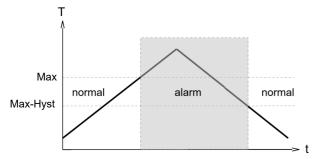
Example: The end of the metering range should be set to 80 %. However, only 60 % can be achieved without problem. In this case, the device would be ordered with a "teach-offset" of  $\pm 20^{\circ}$ %.. At a flow rate of 60 % in the process, teaching would then store a value of 80 %.

The LABO-HR2VE-S limit switch can be used to monitor minimal or maximal.

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.



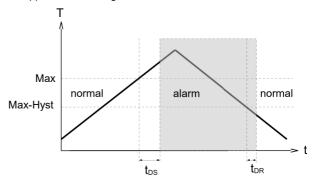
With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.



A switchover delay time ( $t_{DS}$ ) can be applied to the switchover to the alarm state. Equally, one switch-back delay time ( $t_{DR}$ ) of several can be applied to switching back to the normal state.

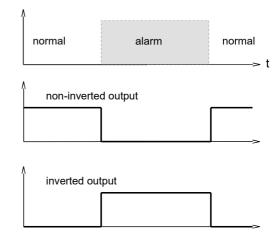
senseca

LABO-HR2VE-S



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 Power-On-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.

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### **Product Information**

#### Ordering code

elect		e is ordered e.g. HR2VE-032GM100 with LABO-HR2VE-SPLISD 2. 3. 4. <b>G</b>			
5.       6.       7.       8.       9.       10.         LABO - HR2VE -       S       S       S       D         O=Option       S       S       S       S       S					
1.	Nominal v	vidth			
	032	DN 32 - G 1 <sup>1</sup> / <sub>4</sub>			
	040	DN 40 - G 1 <sup>1</sup> / <sub>2</sub>			
	050	DN 50 - G 2			
2.	Process of	connection			
	G	female thread			

3.	Connection material			
	М	brass		
	K	stainless steel		
4.	HR2VE - Metering range H <sub>2</sub> O for horizontal inwards flow			
	080	10 80 l/min		
	120	20120 l/min		
	140	30140 l/min		
	160	50160 l/min		

Switching output (Limit switch)			
S	Push-Pull (compatible with PNP and NPN)		
Programming			
Р	programmable (teaching possible)		
N O	cannot be programmed (no teaching)		
Switching function			
L	minimum-switch		
Н	maximum-switch		
Switching signal			
0	standard		
0 I	inverted		
Electrical connection			
S	for round plug connector M12x1, 4-pole		
Optional			
D	medium temperature up to 120 °C (with spacers)		
	S Programm P N Switching L H Switching O I C Electrical S Optional		

#### **Options LABO**

Switching delay period (0.099.9 s)	
(from Normal to Alarm)	

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

Power-On delay period (099 s)
(After connecting the supply, time during
which the switching output is not activated)

Switching output fixed at

# I/min

%

. s

s

s

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

Teach-offset

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

Further options available on request.

#### **Options HR2VE**

Special values

Further options available on request.

#### Accessories

- Cable/round plug connector (KB...) see additional information "Accessories"
- Converter OMNI-TA
- Device configurator ECI-3