

OVEM-...-1P/-1N
Vacuum generator

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Operating instruction
8193478
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[8193480]

Translation of the original instructions
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1 Applicable documents

All available documents for the product -> www.festo.com/sp.

2 Safety

2.1 Safety instructions

- Only use the product in its original condition without unauthorised modifications.
- Only use the product if it is in perfect technical condition.
- Use the product only inside buildings.
- Take into account the ambient conditions at the location of use.
- The product is intended for use in industrial environments.
- The product may generate high frequency interference, which may require interference suppression measures in residential areas.
- Observe the identifications on the product.

2.2 Intended use

The vacuum generator is used to generate vacuum.

2.3 Training of qualified personnel

Work on the product may only be carried out by qualified personnel who can evaluate the work and detect dangers. The qualified personnel have skills and experience in dealing with pneumatic (open-loop) control technology.

2.4 UL certification

In combination with the UL inspection mark on the product, the information in this section must also be observed in order to comply with the certification conditions of Underwriters Laboratories Inc. (UL) for USA and Canada.

Table with 2 columns: UL approval information, Details. Rows include Product category code, File number, Standards taken into account, and UL symbol.

Tab. 1: Approval information

The unit shall be supplied by a power source which fulfils the requirements on a limited-energy circuit in accordance to IEC/EN/UL/CSA 61010-1 or on a Limited Power Source (LPS) in accordance to IEC/EN/UL/CSA 60950-1 or IEC/EN/UL/CSA 62368-1 or a Class 2 circuit in accordance to NEC or CEC.

3 Additional information

- Contact the regional Festo contact if you have technical problems -> www.festo.com.
- Accessories and spare parts -> www.festo.com/catalogue.

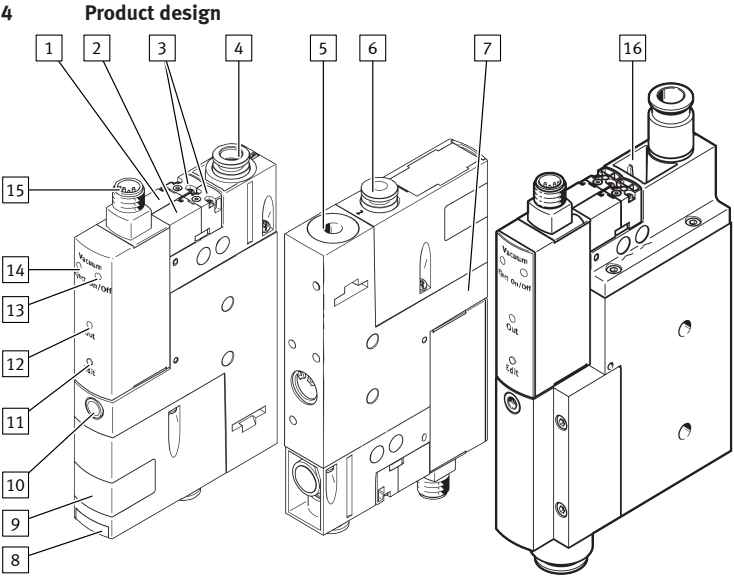


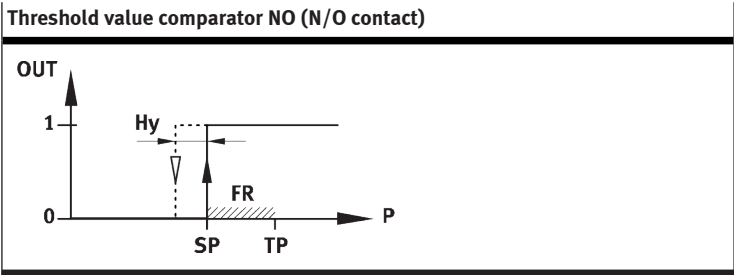
Fig. 1: Operating elements and connections

- 1 Solenoid valve for ejector pulse (Eject)
- 2 Solenoid valve for vacuum
- 3 Mechanical manual override
- 4 Supply port (1)
- 5 Exhaust port/silencer (3)
- 6 Vacuum port (2)
- 7 Housing with mounting hole
- 8 Slide for changing the filter element
- 9 Filter housing with inspection window, only with OVEM-...-B
- 10 Flow control screw for regulation of the ejector pulse
- 11 EDIT button, only for types with vacuum sensor
- 12 LED Out switching output, only for types with vacuum sensor
- 13 LED vacuum ON/OFF switching input
- 14 LED Eject ejector pulse switching input
- 15 Electrical connection
- 16 Size OVEM-...-20/-30-C

5 Function

5.1 Switching function

The solenoid valve for the vacuum generator switches as an N/C or N/O contact, depending on the version, when pressurised with compressed air. Switching output A is configured as a N/O contact and switches as a function of a threshold value comparator.



Tab. 2: Settings for switching points SP, hysteresis Hy and functional reserve FR

Table with 3 columns: OVEM-..., -OE/-ON/-OPE, -CE/-CN/-CPE. Row 1: Switching characteristics, Normally open (N/O), Normally closed (N/C).

Tab. 3: Switching characteristics

Table with 4 columns: OVEM-..., -1P, -1N, without vacuum sensor. Rows include Switching output A and Switching input.

Tab. 4: Switching outputs and switching inputs

Determination of switching point
The switching point (SP) is determined from the teach point (TP) and the function reserve (35%).
SP = TP - 0.35*TP
The hysteresis has a fixed value.

5.2 Valve controller

Signal-controlled ejector pulse/power ejector pulse

The ejector pulse is generated by a control signal at the ejector pulse switching input. The duration of the ejector pulse can be set via the duration of the control signal at the ejector pulse switching input. The vacuum solenoid valve or the ejector pulse solenoid valve is controlled as defined by the input signal.

Destruction of vacuum sensor by overpressure (-CPE/-OPE)

The exhaust duct is tightly sealed during the power ejector pulse. This can create excess pressure at the vacuum port and destroy the vacuum sensor.

- Use power ejector pulse only in open vacuum systems.

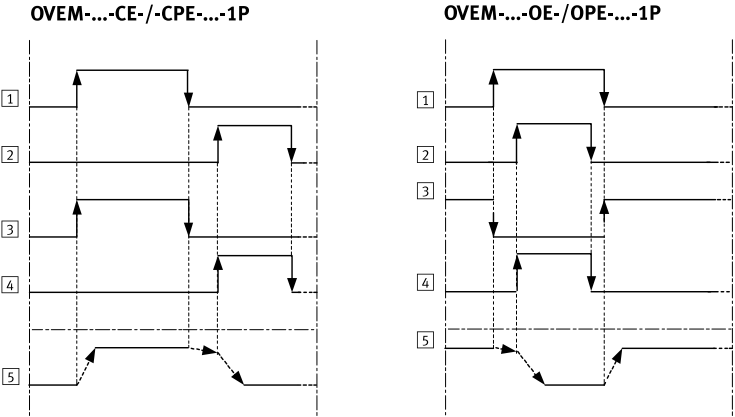


Fig. 2: Valve controller switching characteristics

- 1

Control signal at the vacuum switching input
- 2

Control signal at the ejector pulse/power ejector pulse switching input
- 3

Switching position of vacuum solenoid valve
- 4

Switching position of ejector pulse solenoid valve
- 5

Vacuum port

6 Mounting

An unfavourable mounting position may impair the function of the product.

- Avoid condensate accumulation in the device through a suitable mounting position.
- Exhaust air must be able to flow out unhindered.

6.1 Direct mounting on the side

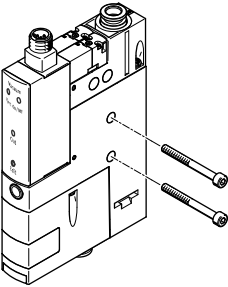


Fig. 3: Direct mounting on the side

Variant	Screws	Tightening torque
OVEM-...-05/-07/-10-...-B/-BN	M5	max. 2.5 Nm
OVEM-...-14/-20-...-B/-BN	M4	max. 2.5 Nm
OVEM-...-20/-30-...-C	M6	max. 2.5 Nm

Tab. 5: Tightening torque of the screws for direct mounting on the side

6.2 Direct mounting on the back

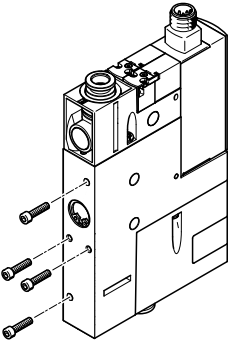


Fig. 4: Direct mounting on the back

Variant	Screw	Tightening torque
OVEM-...-05/-07/-10/-14/-20-...-B/-BN	M3	max. 0.8 Nm
OVEM-...-20/-30-...-C	M4	max. 0.8 Nm

Tab. 6: Tightening torque of the screws with direct mounting on the back

6.3 Mounting with mounting bracket

Type of mounting permissible only for sizes OVEM-...-05/-07/-10/-14/-20-...-B/-BN

Accessories for mounting bracket → www.festo.com/catalogue

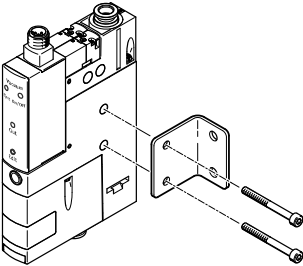


Fig. 5: Mounting with mounting bracket

Variant	Screws	Tightening torque
OVEM-...-05/-07/-10-...-B/-BN	M5	max. 2.5 Nm
OVEM-...-14/-20-...-B/-BN	M4	max. 2.5 Nm

Tab. 7: Tightening torque for the screws for mounting with a mounting bracket

6.4 Mounting on common supply manifold

OVEM-...-B/-BN: mounting is possible on a common supply manifold with a maximum of 8 places.
OVEM-...-C: mounting is possible on a common supply manifold with a maximum of 4 places.
Assembly instructions for common supply manifold OABM-P → www.festo.com/sp

6.5 H-rail mounting

This type of mounting is only permissible for sizes OVEM-...-05/-07/-10/-14/-20-...-B/-BN.

H-rail mounting accessories → www.festo.com/catalogue

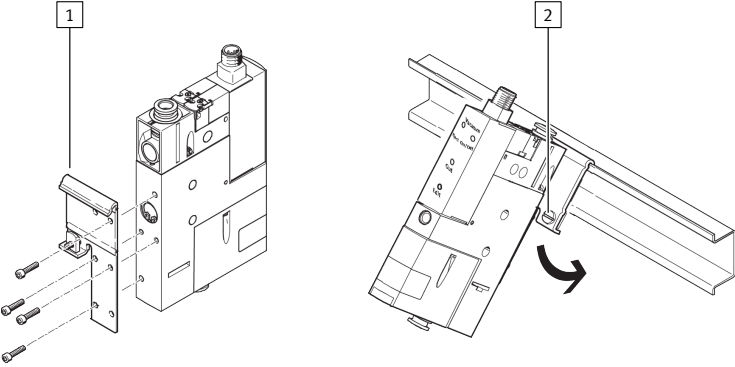


Fig. 6: H-rail mounting

- 1

H-rail mounting
- 2

Screw
1.

Mount the H-rail mounting on the product.
2.

Attach the vacuum generator with the mounted H-rail mounting on the H-rail.
3.

Fasten the vacuum generator to the H-rail with the screw.

7 Installation

7.1 Installation, pneumatic

Notes on the pneumatic port

- The maximum permissible tube length is 2 m.
- OVEM-...-GN/-GO: the minimum inside diameter of the connection tubes → Tab. 9 Minimum inside diameter of the connection tubes for connections with G-female thread.
- Do not seal the exhaust port.
- OVEM-...-07/-10/-14/-20/-30: extend the silencer with a silencer extension if necessary → www.festo.com/catalogue.
- Recommendation: use PUN type tubing → www.festo.com/catalogue.

OVEM-...	-1P/-1N	without vacuum sensor
-QO/-GO-CN-...		
-QS/-GN-CN-...		
-QO/-GO-ON-...		
-QS/-GN-ON-...		
-QO/-GO-CE-...		
-QO/-GO-CPE-...		
-QS/-GN-CE-...		
-QS/-GN-CPE-...		
-QO/-GO-OE-...		
-QO/-GO-OPE-...		
-QS/-GN-OE-...		
-QS/-GN-ON-OPE-...		

Tab. 8: Circuit symbols for the functions

OVEM-...	-05-... -G...	-07-... -G...	-10-...- G...	-14-...- G...	-20-...- G...	-30-...- G...
Tube length [m]	< 0.5					
Min. internal diameter of tubing for supply port [mm]	1	1.5	2	3	4	6
Min. internal diameter of tubing for vacuum port [mm]	2	3	4	5.5	6	9
Min. internal diameter of tubing for exhaust port [mm]	2	3	4	5.5	6	9
Tube length [m]	< 2.0					
Min. internal diameter of tubing for supply port [mm]	2	2	3	4	5	7
Min. internal diameter of tubing for vacuum port [mm]	3	4	5	6	7	11
Min. internal diameter of tubing for exhaust port [mm]	3	4	5	6	7	11

Tab. 9: Minimum inside diameter of the connection tubes for connections with G-female thread

7.2 Installation, electrical

⚠ WARNING

Risk of injury due to electric shock.

- Use exclusively PELV circuits in accordance with IEC 60204-1/EN 60204-1 for the electrical power supply (Protective Extra-Low Voltage, PELV).
- Observe the general requirements of IEC 60204-1/EN 60204-1 for PELV circuits.
- Use exclusively voltage sources that guarantee reliable electrical isolation from mains power in accordance with IEC 60204-1/EN 60204-1.

- Connect the vacuum generator to the electrical connection.
 - 5-pin plug, M12x1
 - Maximum tightening torque of M12 plug: 0.5 Nm
 - Maximum permissible cable length: 20 m

Plug	Pin	Wire colour ¹⁾	Function
	1	brown (BN)	+24 V
	2	white (WH)	Vacuum switching input
	3	blue (BU)	0 V
	4	black (BK)	Switching output (Out) ²⁾
	5	grey (GY)	Ejector pulse/power ejector pulse switching input

1) Use of the connecting cable in accordance with the accessories

2) Pin 4 not assigned for types without vacuum sensor

Tab. 10: Pin allocation

Circuit diagrams

OVEM-...-1P	OVEM-...-1N
OVEM without vacuum sensor	

Tab. 11: Circuit diagrams for vacuum generator

8 Commissioning

8.1 Factory setting

At initial commissioning the vacuum generator can be operated immediately with the factory settings.

Factory setting

- Switching characteristics of the electrical output: threshold value comparator
- Switching element function of the electrical output: N/O (normally open)
- Switching point (SP): -0.4 bar.
- Fixed hysteresis (HYS): 20 mbar



The factory settings cannot be restored.

8.2 Commissioning the vacuum generator

Requirements

- The vacuum generator is fully mounted and connected.
- Check the operating conditions and critical limits.

Commissioning the vacuum generator OVEM-...-OE/-OPE

- 1. Apply operating pressure to supply port (1).
 - ↳ Negative pressure is generated at the vacuum port (2).
- 2. Switch on operating voltage.
 - ↳ The current pressure is displayed and the vacuum generator is ready for operation.

Commissioning the vacuum generator OVEM-...-CE/-CPE

- 1. Apply operating pressure to supply port (1).
- 2. Switch on operating voltage.
- 3. Activate suction: apply input signal to pin 2.
 - ↳ Negative pressure is generated at the vacuum port (2). The current pressure is displayed and the vacuum generator is ready for operation.

Changing the operating pressure changes the power of the negative pressure at the vacuum port.

The functions and parameters can be specified:

- manually at the device
- by teach-in

8.3 Adjusting the intensity of the ejection pulse

Requirement: the vacuum generator is operating.

- 1. Screw in the flow control screw [10] completely
 - ↳ The channel for the ejector pulse is closed. An ejector pulse is not generated.
- 2. Switch off the vacuum generator.
- 3. Screw the flow control screw out to adjust the ejector pulse to the required intensity.
- 4. Test the settings before commissioning.

8.4 Reducing the vacuum

OVEM-...-CN/-ON

- Shut off the compressed air supply by switching the input voltage off (-CN) or on (-ON).
 - ↳ The vacuum port is pressurised. The workpiece is released by the suction gripper.

OVEM-...-CE/-OE/-CPE/-OPE

- Switching the ejector pulse solenoid valve generates an ejector pulse.
 - ↳ The vacuum port is pressurised. The workpiece is released by the suction gripper.

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When using large suction grippers, the flow resistance when releasing the workpiece can create a vacuum that is independent of the device. Set up the ejector pulse accordingly.

9 Operation

9.1 Teach-in switching point

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Change in switching pressure if the EDIT key is accidentally pressed (≤ 2 s).

- Prevent accidental pressing of the EDIT key.

The vacuum generator is preset at the factory → 8.1 Factory setting. These settings can be changed by teach-in of the switching point.

- 1. Apply operating voltage.
- 2. Set the desired teach-in pressure (e.g. object gripped).
- 3. Press and hold the EDIT key for > 2 s.
 - ↳ LED Out flashes.
- 4. Release the EDIT key.
 - ↳ The current teach point (TP) minus the functional reserve is saved as the switching point (SP) and is applied for the switching output.

9.2 Mechanical manual override

Both solenoid valves can be manually switched with the manual override.

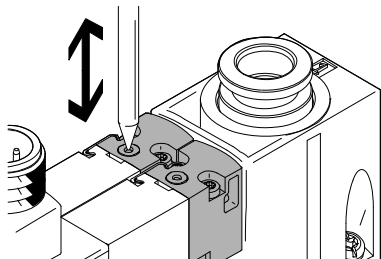


Fig. 7: Mechanical manual override

- 1. Press in the plunger of the manual override with a blunt pin.
 - ↳ The solenoid valve switches.
- 2. Remove the pin.
 - ↳ The manual override plunger is automatically reset. The solenoid valve returns to the initial position.

9.3 Vacuum generator status indicator

LED	Status	Meaning
Out	off	Switching point not reached
	on	Switching point is reached
	flashes	Teach-in procedure is started
Vacuum ON/OFF – Normal position of the vacuum generator NC	off	Solenoid valve for vacuum is not switched, vacuum is not generated
	on	Solenoid valve for vacuum is switched, vacuum is generated
Vacuum ON/OFF – Normal position of the vacuum generator NO	off	Solenoid valve for vacuum is not switched, vacuum is generated
	on	Solenoid valve for vacuum is switched, vacuum is not generated
Eject	off	Solenoid valve for ejector pulse is not switched, ejector pulse is not generated
	on	Solenoid valve for ejector pulse is switched, an ejector pulse is generated

Tab. 12: Vacuum generator status indicator

10 Maintenance

10.1 Replacing air filter

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The air filter cannot be replaced in the vacuum generator OVEM-...-20/-30-C.

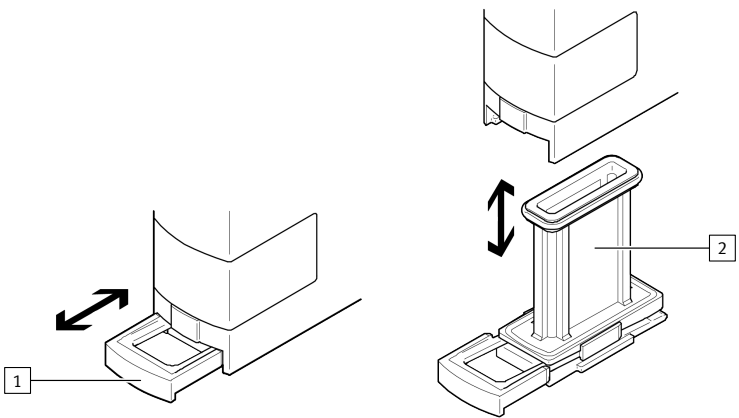


Fig. 8: Remove/install air filter

- 1 Slide
- 2 Filter

- 1. Exhaust the vacuum generator.
- 2. Carefully pull out the slide up to the first detent. The slide must stay in this position on the filter.
- 3. Pull out the filter. Clean with white spirit if necessary.
- 4. Push the filter into the housing.
- 5. Push the slide in.

10.2 Cleaning

- 1. Switch off energy sources:
 - Operating voltage
 - Compressed air
- 2. Clean the device with non-abrasive cleaning agents.
- 3. Check the air filter for contamination through the inspection window.

11 Fault clearance

Malfunction	Possible cause	Remedy
Workpiece is not released by the suction gripper	Device-independent vacuum between workpiece and suction gripper, ejector pulse not activated or sufficiently dimensioned	- Activate ejector pulse when lifting the suction gripper. - Increase duration and intensity of ejector pulse.
	Tubing dimensioned incorrectly	- Replace tubing (tubing dimensions → 7.1 Installation, pneumatic).
	Flow control screw closed	- Open flow control screw.
Switching output does not react in accordance with the settings	Short circuit or overload at output	- Eliminate short circuit or overload.
	Device faulty	- Replace device.
	Incorrect switching point taught (e.g. at 0 bar)	- Repeat teach-in procedure.
No LED display for switching inputs	Operating voltage faulty	- Apply permissible operating voltage.
	Electrical connections swapped	- Connect device correctly → 7.2 Installation, electrical.
	No control signal	- Check controller.
	Device faulty	- Replace device.

Tab. 13: Fault clearance

12 Disassembly

- 1. Switch off energy sources:
 - Operating voltage
 - Compressed air
- 2. Disconnect pneumatic and electrical connections from the device.
- 3. Loosen mountings and remove device.

13 Technical data

OVEM-...		-05-B	-07-B -10-B	-14-B/-BN -20-B/-BN	-20-C -30-C
General					
Certificates, declaration of conformity		➔ www.festo.com/sp			
Characteristic values					
Operating pressure OVEM-...-QS/-GN/-PL	[MPa]	0.2 ... 0.6			
	[bar]	2 ... 6			
	[psi]	29 ... 87			
Operating pressure OVEM-...-QO/-GO/-PO	[MPa]	0.2 ... 0.8			
	[bar]	2 ... 8			
	[psi]	29 ... 116			
Pressure measuring range	[MPa]	−0.1 ... 0			
	[bar]	−1 ... 0			
	[psi]	−14.5 ... 0			
Overload pressure at vacuum port	[MPa]	≤ 0.5			
	[bar]	≤ 5			
	[psi]	≤ 72.5			
Ready-state delay	[ms]	≤ 500			
Dead time (evacuation and ejection)	[ms]	≤ 12	≤ 22	≤ 35	≤ 60
Electronics					
Nominal operating voltage	[V DC]	24 ± 15 %			
Max. output current (per switching output)	[mA]	100			
Voltage drop (for all switching outputs)	[V]	≤ 1.5			
No-load current	[mA]	< 70			
Coil characteristics 24 V DC – low current phase	[W]	0.3			
Coil characteristics 24 V DC – high current phase	[W]	2.55			
Time until current reduction	[ms]	80			
Capacitive load maximum DC	[mF]	≤ 100			
Overload protection		available			
Inductive protective circuit		adapted to MZ, MY, ME coils			
Insulation voltage	[V]	50			
Surge resistance	[kV]	0.8			
Max. current consumption OVEM-...-1P/-1N	[mA]	180			
Max. current consumption OVEM without vacuum sensor	[mA]	30			
Accuracy	[% FS]	± 0.5			
Hysteresis fixed	[bar]	0.02			
Tolerance of fixed hysteresis	[% FS]	± 0.5			
Short circuit current rating		yes			
Reverse polarity protection		for all electrical connections			
Environment/surroundings					
Ambient temperature	[°C]	0 ... 50			
Temperature of medium	[°C]	0 ... 50			
Contamination level		3			
Operating medium		Compressed air in accordance with ISO 8573-1:2010 [7:4:4]			
Information on the operating medium		lubricated operation not possible			
Shock resistance in accordance with IEC 60068/EN 60068		30 g acceleration with 11 ms duration (half-sine)			
Vibration resistance in accordance with EN 60068-2		10...60Hz: 0.35 mm/60...150 Hz: 5g			
Protection class		III			
Degree of protection		IP 65 ¹⁾			
Relative humidity	[%]	5 ... 85			
Interference emission		in accordance with EN 61000-6-4			
Immunity to interference		in accordance with EN 61000-6-2			
Maximum permissible Signal line length	[m]	20			

OVEM-...	-05-B	-07-B -10-B	-14-B/-BN -20-B/-BN	-20-C -30-C
Materials				
Information on materials: Seals	NBR			HNBR
Information on housing materials	Die-cast aluminium, PA reinforced			Wrought aluminium alloy
Information on materials: housing	Brass, nickel-plated			

1) Degree of protection has not been evaluated by UL
Tab. 14: Technical data