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Operating manual

Flow monitor for use in railway vehicles

UB1, UBX, CRH

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Operating manual

Flow monitor for use in rail vehicles: UB1, UBX, CRH

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1 General safety instructions, use

This operating manual must be kept in a location where it is available for reference at all times.
Any processes described in this operating manual may only be carried out by trained, qualified personnel who are authorised by the owner and wearing protective clothing.

1.1 Safety signs and symbols

Danger signs and symbols are identified as described below for this operating manual:

	Warning! This symbol warns of imminent danger which can result in death, severe bodily injury or severe property damage in case of non-observance.
	Attention! This symbol warns of potential dangers or harmful situations which can cause damage to the device or to the environment in case of non-observance.
	Note! This symbol indicates processes which can have a direct influence on operation or can trigger an unforeseen reaction in case of non-observance.

Table 1

1.2 Safety instructions

	Read the product information before commissioning the device. Ensure that there are no limitations for use of the product for the relevant application. The owner is responsible for ensuring the fault-free operation of the device. The owner is obligated to ensure compliance and to observe the required work and safety measures of the current applicable regulations for the entire duration of use.

1.3 Product liability and warranty

This operating manual includes the instructions to install and operate the device safely in the intended manner. If difficulties which cannot be resolved using the operating manual and the product information arise, enquire with the manufacturer for further information. The manufacturer reserves the right to technical changes and improvements. Appropriate qualification of the user is prerequisite for use of this operating manual. The operating personnel must be instructed according to the operating manual.

1.4 Standards and directives[1]

- DIN EN 60947-5-1
- Low-Voltage Directive 2014/35/EU
- RoHS Directive 2011/65/EU

2 Product description

It is often necessary to ensure the provision of a minimum supply of lubricant or coolant, etc. for an application.
With the UB1, UBX and CRH flow monitors, a flow volume can be adjusted, wherein a status change of the microswitch takes place. A minimum supply safeguard can be achieved as a result. It is also possible to monitor increasing flow values.[2]

[1] The listed standards and directives apply for products with an electrical connection.
[2] If nothing different has been indicated, the switching points specified in the product information or during adjustment always apply for falling volume flow (minimum supply safeguard).

2.1 Paddle / folding bellows principle

The UB1, UBX and CRH flow monitors work according to the paddle / folding bellows principle (Fig. 1). The medium flowing through the line pushes the paddle and moves it in the direction of the flow against spring force. The metallic folding bellows (Pos. 2) provides a hermetic seal of the switch head from the medium. The paddle bar pushes the lever of a microswitch (Pos. 1) in the switch head. The switching takes place with an adjustable flow rate.

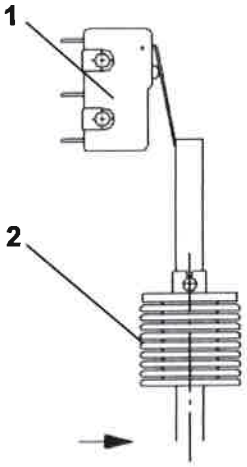

Figure 1: Schematic diagram

2.2 Scope of delivery[3]

- An operating manual and the relevant product information are included with the device.
- The devices are provided with thread plugs or protective bags to prevent transport damage.
- If the paddle is already mounted, it is protected with a protective tube.

3 Configuration of the devices UB1, UBX and CRH

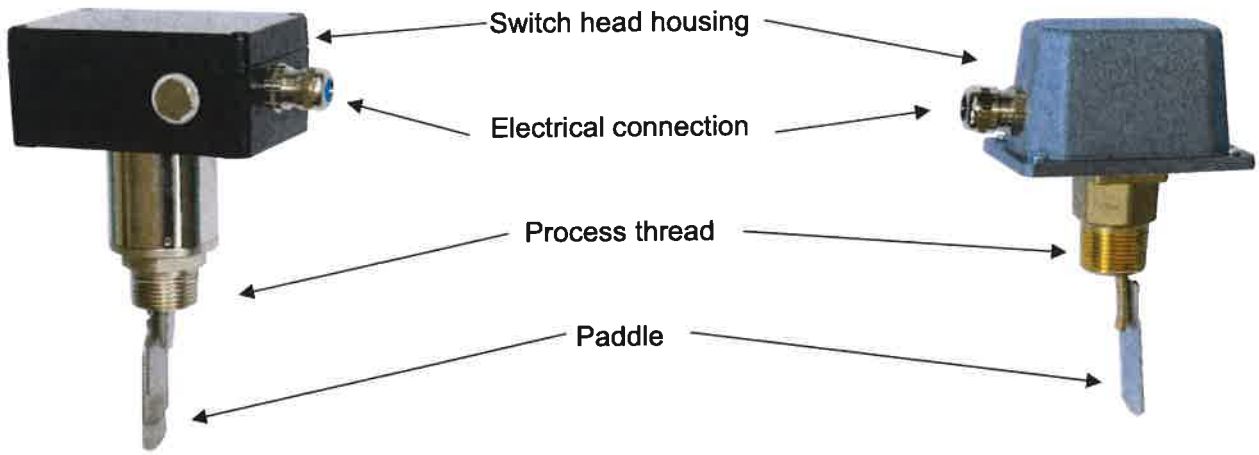

Figure 2: Schematic diagram for the devices UBX and CRH

3.1 Intended use

ⓘ	The flow monitor detects the volume flow in fluid media and actuates the microswitch according to the pre-adjusted rate. The device must be used exclusively for the medium specified in the product information. The device is not designed for operation with gaseous media. This product is intended for use in machines and systems and for use of media of Fluid Group II in accordance with Directive 2014/68/EU. The product does not fall under Directive 2014/68/EU and does not receive a CE mark as specified in this Directive. The specified limit values must never be exceeded (refer to the product information for the data).

[3] A different circuit diagram can accompany special devices.

4 Assembly and installation

In order to guarantee fault-free use of our devices, the following must be observed for assembly and installation:

4.1 Mechanical assembly

- Use suitable measures to prevent the medium from freezing. If the device is exposed to an environmental temperature below 4°C, operation must never take place with pure water. Water remaining in the device could cause frost damage.
- Observe the permissible installation position indicated in the product information.
- The device must not be used as a fastening point.
- The connection flanges/threads must match.
- A filter should be used in heavily contaminated media.
- The inflow and outflow line (upstream and downstream form the device) should ideally be 10 x DN, but at least[4] 5 x DN.
- The maximum permissible volume flow (Q_{max}) should not be exceeded; otherwise, increased wear will occur.
- Do not exceed the operating pressure specified in the product information and do not undercut/exceed the specified temperature range.
- Observe operating pressure, pressure stage and temperature range.
- Compensators must be used to account for thermal expansion of the pipelines.

It must also be ensured that

- the paddle does not strike against the pipe wall and can move freely,
- the paddle bar does not strike against the inside of the process connections,
- the device and all O-rings should be disassembled for soldering/welding of process connections in order to prevent damage,
- the device can be installed horizontally or vertically (see product information). The installation position has an influence on the switching point due to the mass of the paddle elements.
- With use of the UB1 in a pipe with diameter DN 25, the paddle (Fig. 3) must be shortened at the identified dividing line (Pos. 1).

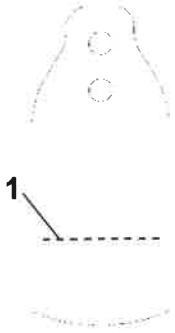

Figure 3

- The paddle is fastened with the supplied screws. With continuously heavily fluctuating flow rates, we recommend using liquid thread lock (ensure that it is resistant to the media).
- The flow direction is indicated by an arrow on the devices. The arrow points in the flow direction. In order to achieve high precision of the switching point, the paddle surface must be aligned at an angle of 90° to the flow. This can be achieved by aligning the long edge of the switch head housing / switching unit parallel to the pipe during assembly.[5]
- The alignment of the UB1/UBX can be adjusted after it is installed in the process connection. For this purpose, loosen the threaded pin with an Allen key (Pos. 1) until the device can be rotated freely (clockwise/anticlockwise) in the connection fitting (Fig. 4). Re-tighten the threaded pin with an Allen key (Pos. 1) when the desired position is reached (torque = 0.8 Nm).

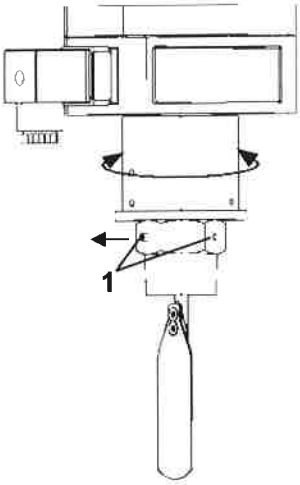

Figure 4

[4] See product information.
[5] Observe the installation recommendation in the product information.

4.2 Electrical installation

⚠	The device must be installed by an electrician only. Compliance with the national and international regulations for installation of electrical and electronic systems applicable in the respective country of use is mandatory.

- The circuit diagram must be used as the basis for the wiring of the device.[6]
- With connection of a switch, a consumer must be connected in series.
- The electrical details for switches apply to ohmic loads. Capacitive and inductive loads should be operated using a protective circuit (see 4.5).
- Always de-energise the electrical system before installing the connecting cable!

4.3 Electrical connection PG/cable screw fitting

- Unscrew the union nut Pos. 2.
- Guide the connecting cable Pos. 1 through the union nut Pos. 2, the moulded seal Pos. 3 and the intermediate support Pos. 4 (Fig. 10).
- Connect the connecting line to the terminal contacts according to the circuit diagram.
- Re-tighten the union nut Pos. 2.

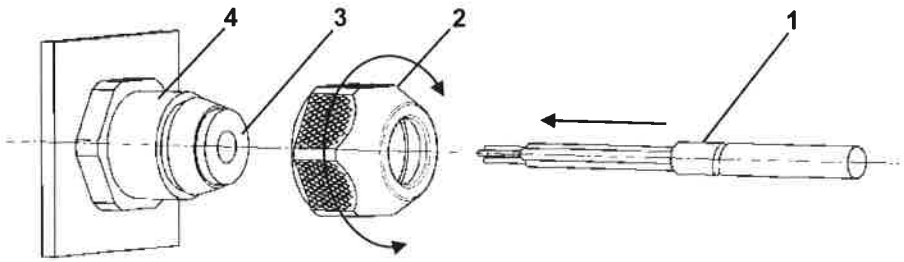

Figure 10: PG / cable screw fitting connection

4.4 Contact protection measures for devices with switches

Current or voltage peaks can influence the service life of the contacts with capacitive and inductive loads or the switching of filament bulbs. A suppressor circuit should be used in these cases in order to achieve a maximum service live or prevent damage to the contacts.

Contact protection with inductive load.

A break-off spark (electric arc) is generated when the Reed switch is opened. There are two ordinary protective circuits for reduction of the self-induction voltage:

- With AC voltage, the Reed switch is protected with an R-C link.
- With an inductive load and DC voltage, the Reed switch can be protected with a recovery diode (e.g. 1N4007).

Contact protection with capacitive load.

Capacitive loads are predominantly generated due to long cables (>50m). In order to counteract the loads, connection of a resistance in series is frequently adequate. The resistance value should correspond approximately to the voltage value (e.g. 24 V = 24 Ω).

Contact protection with a lamp load.

The resistance of a filament in the cold state is approximately one tenth of the resistance in the glowing state. The result is 10-fold activation current, even if temporarily, when switched on.
In order to circumvent the problem, we recommend using LEDs, etc. instead of filament bulbs.

[6] The circuit diagram is included with the device or provided in the corresponding product information.

5 Controls and functions

Our devices can be adapted to various process connections[7]. The flange connection is available as an accessory[8]. Various control and adjustment options are available depending on the application.

5.1 Function/adjustment

The switching point can be adjusted by adjusting the microswitch and changing the paddle length. Please refer to the product information for the number of paddles in use. The specification 'Paddle 1,2' indicates that both Paddle 1 and Paddle 2 are used[9]. Similar to a leaf spring, Paddle 1 supports Paddle 2, Paddle 2 supports Paddle 3, etc. In the case 'Paddle 1,2', both paddles are installed such that the larger paddle is arranged in the direction of the inflow and the small paddle is arranged in the direction of the outflow. With paddle combinations 1, 2, 3 and 1, 2, 3, 4, please proceed accordingly[10]. Fine-tuning of the switching point can be carried out by adjusting the microswitch. The desired switching value can be adjusted with an adjusting screw after removal of the housing cover for the devices UB1, UBX and CRH (Fig. 11 and 12). For the device UB1 (Fig. 13) unscrew the Allen screw (Pos. 1). Slide the switching unit (Pos. 2) until the desired switching point is reached. Re-tighten the Allen screw (Pos. 1). Replace the cover.

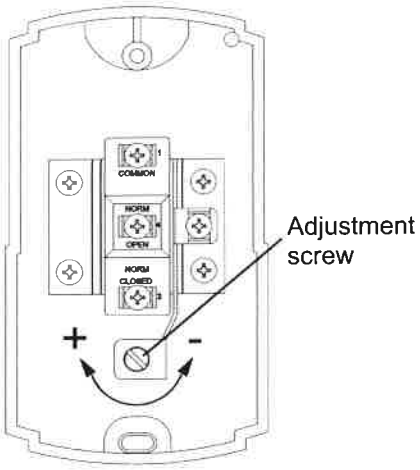

Figure 12: CRH/CRE

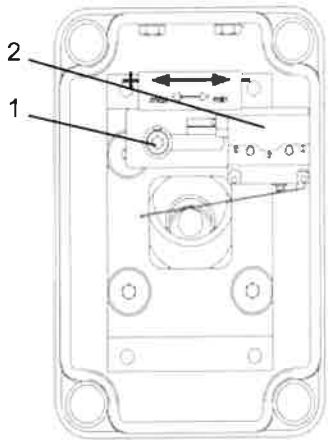

Figure 13: UB1/UBX

[7] Observe the notices of the accompanying product information for assembly of the process connections.
[8] See section 7 Accessories.
[9] 'Paddle 1' identifies the smallest paddle; 'Paddle 4' identifies the largest.
[10] For additional information about the paddles, refer to the product information.

6 Commissioning, operation and maintenance

6.1 Commissioning

Prior to commissioning, observe the limit values specified in the product information for current, voltage, pressure stage, temperature range, maximum permissible flow rate, etc.

- If provided, the transport lock must be removed.
- When protective caps are provided, they must be removed immediately before installation.
- Flush the pipe system in order to eliminate contamination prior to assembly.
- Observe the flow direction. This is normally indicated on the device with an arrow and must run parallel to the pipe axis after installation.
- Seal the device correctly during installation.
- Observe that the switching point / display value can change with a fluctuating viscosity.
- The media resistance must be checked when the device is used with aggressive media.
- A change of the medium and/or its composition can result in an incorrect display and/or incorrect switching point.
- In order to avoid heavy pressure surges, we recommend filling and bleeding the system prior to commissioning. Pressure surges must not exceed the value of PN/PS.
- The specified switching range is basically related to decreasing flow (minimum supply safeguard). Deactivation point + hysteresis[11]= activation point. Check whether the device switches on. The pump output must be sufficient to actuate the contact.
- The pressure upstream from the flow monitor must be above the value of the pressure loss caused by free outflow.
- Ensure that the assembly and electrical connection are carried out correctly.
- Ensure that protective devices are re-installed/recommissioned.

6.2 Operation

The housing cover must be removed to observe whether the paddle bar moves freely in case of a change of the volume flow during operation.[12]

6.3 Maintenance

The devices are maintenance free when used in a clean medium. When operated in dirty medium, we recommend checking the freedom of movement of the paddle regularly, as described in section 6.2.

[11] Hysteresis: All mechanical devices have a hysteresis (switching point, display difference between increasing and decreasing flow volume).
[12] The device must be de-energised for removal of the housing cover.

7 Technical data

The technical data is provided in the product information. It is provided with the device or can be downloaded from http://www.ghm-messtechnik.de/produkte/b-sensorik-und-messtechnik/b2-durchfluss.html.

8 Accessories

- FL-032 S/K flange with weld-on nozzle, bolts, nuts and flat seal
- Filter TYPE ZV
- Filter TYPE ZE[13]

9 Device transport and storage[14]

Storage

- Please observe the storage temperature.
- A desiccant or heating to prevent formation of condensate is recommended in damp rooms.

Transport

- Please observe the transport temperature.
- Protect the device against environmental influences such as jarring, impact, dust and vibrations.

10 Return to manufacturer

⚠	The legal regulations for protection of the environment and our personnel require that devices which are sent back which have come into contact with liquid are handled without risk to people or the environment. If you send a device back to us for inspection, repair or disposal, we request that you strictly observe the following requirements:

A return form can be downloaded on our home page under: www.ghm-messtechnik.de/downloads/ghm-formulare.html.
Acceptance of the device by GHM Honsberg can only take place if

1. a filled-in form is provided for each returned device,
2. packaging which prevents damage to the device is used,
3. the device is cleaned so that it does not pose a potential hazard,
4. the filled-in form and any necessary safety data sheet (hazardous material) for the measured medium are affixed on the outside of the packaging.

11 Disposal

Separation by material and recycling of device components and packaging must take place at the time of disposal. The valid legal regulations and directives applicable at the time must be observed. The device may not be disposed of with household waste. If the device should be disposed of, return it to us with the return shipment form filled in under section 10. We will then arrange for the proper disposal.

12 Imprint

Status: 20/04/2018

[13] Refer to the product information for more information about our filters.
[14] See product information: Environmental temperature / transport temperature