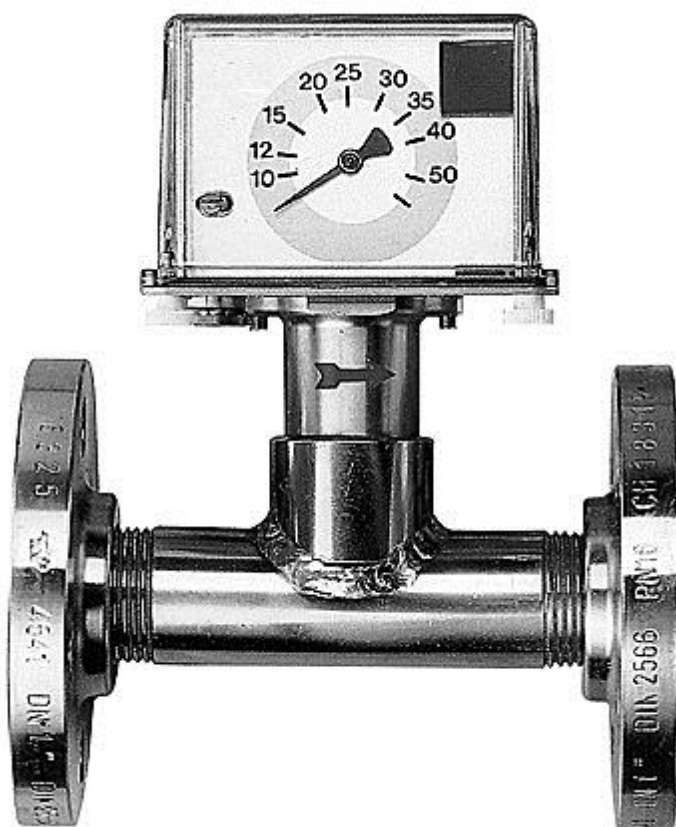




## Operation Manual

### Flowmeter / Flow Control DW-U

Flow monitor after the baffle plate principle for liquids



- Easy switch point adjustment in small scale steps
- Compulsive motion transfer to a micro-switch
- Hermetic separation from the medium by means of bellows
- High power handling capacity
- Insensitive to magnetic fields
- High resistance to dirt and high operational safety
- Available for all flow directions
- Very economical monitoring of large pipes
- Output signal 0/4-20 mA for type DW-U-AN
- Without flow indication for type DW-N



## Operation Manual Flowmeter / Flow Control DW-U

### Flow monitor after the baffle plate principle for liquids

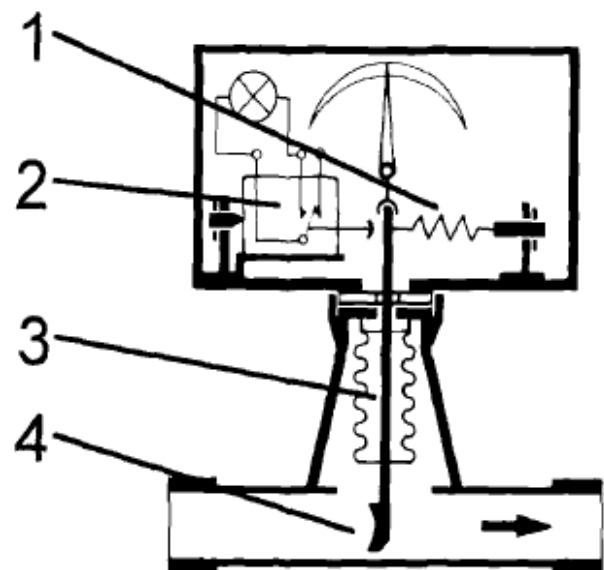
#### 1. Delivery and packing

All instruments delivered are ready for operation. Avoid rough handling in order to prevent damage to the sensitive built-in measuring and indication mechanism. The measuring unit is not locked in position during transport.

#### 2. Function

The Flow-Switches and Flow-Meters of the described types work on the principle of dynamic pressure. The flow medium works against a target plate (4), which causes the system to swing against a tension spring (1). A bellows system made from stainless steel (3) seals the indicator and switch equipment against the flowing liquid. Connection between the target plate and the evaluation system is made by a lever arm. A micro-switch (2) is activated whenever the preselected switch-point is exceeded or undershot.

In addition, depending on the type a control-lamp and a motion work with indicator of the actual flow will be actuated.



#### 3. Installation

##### 3.1 Mounting orientation

The Flow-Switches and Flow-Meters are to be installed directly into a pipe system. Make sure that the instruments are installed according to the information given on the type plate. The flow direction correlates to the direction of the pipe. Inaccuracy of the instrument will result from incorrect mounting.

##### 3.2. Flow direction

Due to the applied measuring principle, the devices are functional only, if for the installation attention is paid to the flow direction. This is indicated by arrows on the device.

##### 3.3 Selecting the mounting position

To avoid damage to the measuring system it is especially important to have the largest possible distance to magnet and ball valves. If this is not possible, the valves must be installed in flow direction after the flow monitor. To avoid pressure shocks it is very important to open the valves as slow as possible.

It is advantageous to install the unit in a straight piece of pipe and to choose a place of mounting which has a settling distance from elbows, valves etc.

In order to have an accurate function of the device we recommend a straight length of  $10 \times d$  at input side and  $5 \times d$  at the output side ( $d$  = internal diameter of pipe).



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### Flowmeter / Flow Control DW-U

Flow monitor after the baffle plate principle for liquids

#### 3.4 Types of installation

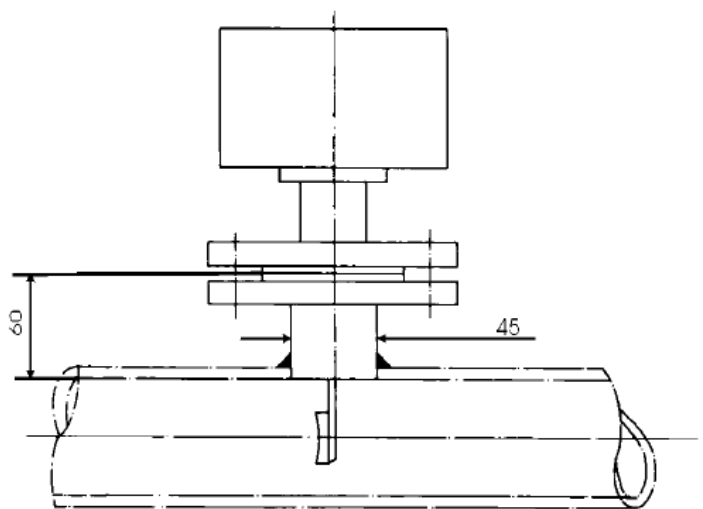
##### 3.4.1 Port with weld neck flanges

The complete flange type AU-FL includes screws and sealing at delivery.

The overall height of 60mm must not be exceeded as this represents the reference dimension for the calibration of the instrument.

The drill-hole to be made must be free of burrs. The screw holes must be offset by 90° to the pipe axis. To seal the flanges please use the attached flat gasket. Please keep the flow direction in consideration during the mounting procedure (arrow).

All pipes must be free of contaminants.



##### 3.4.2 Threaded connection

The tube is directly connected to the unit. We recommend sealing all threads with PTFE sealing tape. Ensure that no excess of tape is left protruding into the pipe.

##### 3.4.3 Flange connection

With a flange connection the sealing takes place between the device and flange by means of a suitable flat gasket (to be provided by the customer). Flat gasket and screws are not part of the delivery.

#### 4. Electrical connection

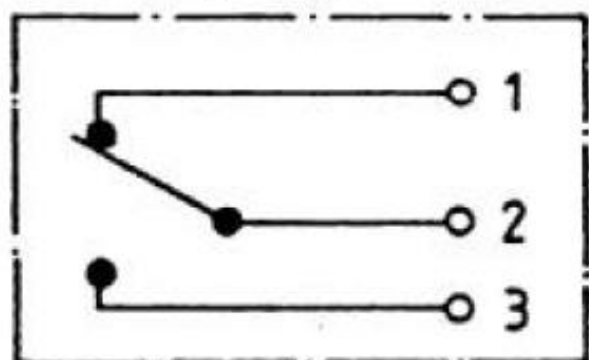
##### 4.1 Connecting type DW-P

Removing the device cover allows the connection of a micro-switch via the three-pole terminal block.

The max. switching capacity is up to 230V/5A AC.

The device is to be grounded to the housing using the designated screw.

Circuit diagram type DW-P





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Flow monitor after the baffle plate principle for liquids

### 4.2 Connecting Type DW-U and DW-N

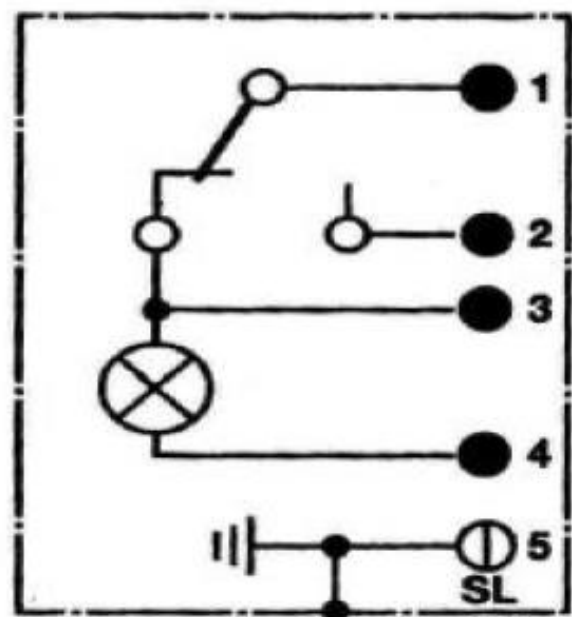
Removing the device cover allows access to the four-pole terminal block.

In addition to the micro-switch a control lamp is installed. This lamp is for optical control of the switch status of the micro-switch.

The required lamp voltage is indicated on the label. The max. switching capacity is 230V/10A AC.

Please connect the device to ground with help of the screw near cable entry .

Circuit diagram type DW-U/DW-N

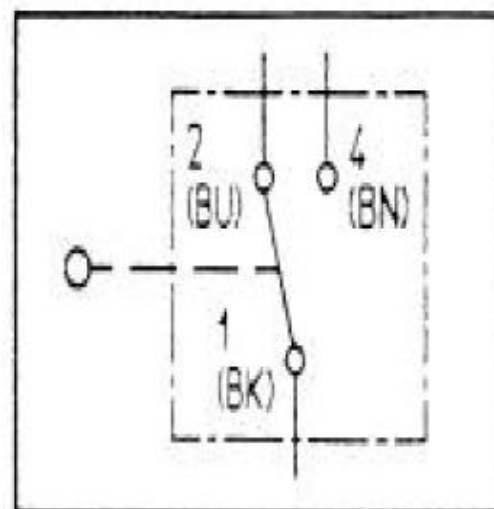


### 4.3 Connecting Type DW-U-EX and DW-N-EX

The device will be connected at the end of the cable. The connection must be done in an area not subject to explosion hazards (use EX cable gland) or in a special EX connection housing.

The max. switching capacity is 230V/5A AC.

Circuit diagram type DWU-EX/DW-N-EX





## Operation Manual Flowmeter / Flow Control DW-U

Flow monitor after the baffle plate principle for liquids

### 5. Calibration data

Calibration data, type of device and serial number are indicated on the label. Changes of medium, pressure and position of mounting will lead to measured value changes.

### 6. Switch-point

Type DW-P

The switch-point is fixed by the manufacturer according to customer's request. Changes can only be made by the supplier.

Type DW-N, DW-N-EX  
customer

Alterations/Adjustability of the switch-point can be made by the customer within the limits indicated on the small scale attached on the backside.

Type DW-U, DW-U-EX  
customer

Alterations/Adjustability of the switch-point can be made by the customer within the limits indicated on the small scale attached on the backside.  
The actual flow is indicated on the large round scale at the front of the unit.

### 7. Maintenance

The Paddle Flow Switch / Flow Meter DW-U are virtually maintenance free. In case of malfunction first of all check the pipe system for calcification or contaminations.

For cleaning do not use sharp-edged tools and proceed with extreme caution. Damaged instruments should be sent in for repair, as they have to be re-calibrated by the manufacturer. Adjustments of set screws or after for instance replacement of the tension spring or of the bellows system by the customer cause a change of the calibration.

All guarantee and warranty claims are forfeited hereby.

### 8. Further requirements for device with EX-switch

The measures specified here must always be applied according to valid technical rules.



## Operation Manual Flowmeter / Flow Control DW-U

Flow monitor after the baffle plate principle for liquids

### 8.1 Description of function

Type device DW-U-EX is a combination of a flow switch and meter with analogue display of the current flow and a flow switch with adjustable switch-point. However, the type device DW-N-EX is a flow-switch with adjustable switch-point without an additional flow indicator of the current flow. Each device, type DW-U and type DW-N, is also available with gold-plated contacts for intrinsic safe circuits without EX-switch. A model with two independent adjustable switches is also available.

The devices can be used as follows:

- a. In Zone 2 (Gas-Ex, Category 3G) in the Explosion group IIA und IIB
- b. In Zone 22 (Dust-Ex, Category 3D) at dusts with minimum ignition energy (MIE) > 3 mJ
- c. In Zone 1 (Gas-Ex, Category 2 G) in the Explosion group IIA und IIC
- d. In Zone 21 (Dust-Ex, Category 2D) at dusts with minimum ignition energy (MIE) > 3 mJ
- e. Usually there is no zone within the measuring tube. Here, Zone 1 may be set as maximum.

The qualification regarding the surface temperature is T4; for all gases, vapours, mists with an ignition temperature > 125°C, the mentioned devices are no ignition source.

In the dust-EX category, the reference temperature is 110°C. Other measures concerning the safety distance from glow temperature, etc. must be performed by the operator.

### 8.2 Assembly units

The devices Type DW-U and Type DW-N consist of following units:

Z	Description	Assessment of ignition risk	Remarks
1	Lower part with baffle plate, metal bellows, flanges	included	
2	Upper part with mechanics and indication	included	
3	Switch	Company Stahl	Manufacturer's declaration / BA
4	Switch as simple apparatus	arbitrary	500 volts to earth

### 8.3. Identification (label)

Type: DW-N-EX resp. DW-U-EX

TFR: 04ATEX 010 Nr./No.: ..... CE year of construction

Ⓔ II 2GD c IIB T4 IP65 T125°C

-20°C ≤ Ta ≤ 70°C



## Operation Manual Flowmeter / Flow Control DW-U

Flow monitor after the baffle plate principle for liquids

### 8.4 Installation and operation

The devices have to be installed in a higher-level assembly. Depending on the degree of IP protection, the time of cleaning the device (dust deposit) has to be defined. It is important to ensure that only the device ignition protection class according to the corresponding zone is installed! It is imperative to adhere to valid national device regulations (for example EN 60079-14) during installation.

Further important facts:

- Only experts may operate the devices.
- Fasteners are to be re-attached after opening.
- The operation of the device is permitted only with entirely mounted and undamaged housing.
- The potential equalisation is connected with its own screw on the metallic pipe system. National regulations have to be taken into consideration.
- The devices have to be protected against ingress of liquids and dirt.
- The devices mainly consist of stainless steel and brass. External impacts should be avoided.
- During operation the device may only be exposed to minor vibrations. Please ask the supplier if you are not sure.

### 8.5 Range of use

- The devices are approved only for appropriate use as directed. Non-compliance voids any claim on warranty and responsibility of the manufacturer!
- Only those equipment parts which fulfil all demands of the European guidelines and national legislation are allowed to be used in explosion endangered areas.
- The specified ambient conditions stated in the operation manual must be strictly adhered to.
- The devices are suitable for use in normal industrial atmospheres. If there are any aggressive substances in the air the manufacturer has to be consulted implicitly.
- Sticking parts, e.g. due to corrosion, are not allowed to be removed violently in an EX-atmosphere.
- Protection measures against lightning are to be ensured by the operator.

### 8.6 Repair and maintenance

#### Definition of terms according to IEC 60079-17:

*Service and repair:* A combination of all activities that are carried out in order to keep an object in a condition or to repair it, that it meets the demands of the corresponding specification and that guarantees the execution of the required functions.

*Inspection:* An occupation which includes the careful examination of an object in order to get a reliable statement about the condition of this object. This activity is carried out without dismantling or, if necessary, with partly dismantling, completed by measures as e.g. measuring.

*Visual examination:* A visual examination is an examination to locate viewable defects, e.g. missing screws, without the use of access installations or tools.



## Operation Manual Flowmeter / Flow Control DW-U

### Flow monitor after the baffle plate principle for liquids

*Close inspection:* An examination to identify such defects as e.g. loose screws which are only discernible by using access installations like a step or tools, in addition to the aspects of the visual examination. Usually, there is no need of opening the housing or switch-off the equipment's voltage.

*Detailed examination:* An examination additionally to the aspects of the close inspection in order to discover such defects as e.g. loose connections which are only discernible by opening housings and/or, if necessary, using tools and testing facilities.

- Maintenance measures are to be executed only by qualified persons.
- The exchange of components is only allowed with original spare parts which are also made accessible for the use in the ex-area, this is also valid for possible use of lubrication and assistance materials.
- The devices are to be cleaned and maintained regularly in the ex-area. The intervals are determined by the operator in accordance with environmental claims.
- After service and/or maintenance all removed barriers and advices must be attached in the initial position.

	Activity	Visual examination daily	Visual examination monthly	Proximity examination every 3 months or 2000 h	Detailed examination every 6 months or 4000 h
1	Visual control of the devices, disposal of dust		•		
2	Device in general			•	
3	Examination of the plant for leaking				•

#### Special measures:

- Observance of the operation manual of the delivered construction groups
- Realization of the manufacturer's conditions

#### 8.7 Troubleshooting

It is not allowed to make changes on devices operated in explosion endangered areas. Only legitimate technical personnel trained specially for this are authorized to carry out repairs on the device.

#### 8.8 Waste disposal

The disposal of packaging and used parts has to take place in accordance with the country's regulations where the device is installed.