

**Operating Instructions
for
Viscosity Compensated
Flow Meter / Monitor**

Model: VKM



1. Contents

1. Contents.....	2
2. Note	3
3. Instrument Inspection.....	3
4. Regulation Use.....	4
5. Use in Hazardous Areas	5
5.1. General	5
5.2. Contacts and Ex-Contact N/O (code F)	5
5.3. Potential Equalisation	6
6. Operating Principle.....	6
7. Mechanical Connection.....	7
8. Electrical Connection	7
8.1. Switching Output VKM-1.. and VKM-3.....	7
8.2. VKM-1... and VKM-3... with Ex-contact (cable connection).....	8
8.3. Example for Contact Protective Measures.....	9
8.4. ADI-Evaluation Electronics VKM-7..	9
8.5. Compact electronic VKM-8...	9
9. Commissioning.....	10
9.1. General	10
9.2. Switching Output VKM-1.. and VKM-3.....	10
9.3. ADI-Electronic Analyser VKM-7..	11
9.4. Compact electronic VKM-8...	11
10. Technical Information.....	12
11. Order Codes	14
12. Maintenance	16
13. Dimensions	16
14. Recommended Spare-Parts.....	18
15. Declaration of the Manufacturer (VKM).....	19
16. Declaration of the Manufacturer (Ex RC...)	21
17. EU Declaration of Conformance.....	22
18. EC-Type Examination Certificate Magnetic reed switch EEx RC	23

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2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

as per PED 2014/68/EU

In acc. with Article 4 Paragraph (3), "Sound Engineering Practice", of the PED 2014/68/EU no CE mark.

Diagram 8, Pipe, Group 1 dangerous fluids

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.

Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:

The standard delivery includes:

- Viscosity Compensated Flow Meter / Monitor model: VKM
- Operating Instructions

4. Regulation Use

The models VKM are used for measuring and monitoring of viscous liquid flows (max. 540 mm²/s). They are suitable for measuring clean and homogeneous fluids which are compatible with the instrument materials used.

If using higher viscosity media, large deviations will occur to the measured values.

Large dirt particles may impede the movement of the float and cause false alarm conditions.

Ferritic particles deposited on the float (with magnet) may lead to the same effects.

The instruments are provided as follows:


Flow measurement (only for Model VKM-2.. and VKM-3..)

The actual flow rate may be read off the magnetically operated pointer indicator mounted on the instrument. The scale indicates the flow rate directly in litres per minute.

Limit Value Switches (only for Model VKM-1.. and VKM-3..)

The instrument is fitted with one or two adjustable limit value switches for the monitoring of flow throughput values.

Type of contacts:

- N/O contact (standard)
- Changeover contact (standard)
- N/O (cCSAus)
 - Changeover (cCSAus)
- N/O  II 2G Ex r II 2G Ex mb IIC T6 Gb
II 2D Ex mb IIIC II 2D Ex mb IIIC T80°C Db IP67

5. Use in Hazardous Areas

5.1. General

The Flow Meter and Switch do not have a potential igniting source of its own as a mechanical operating device; it does not get any identification according to the guideline 2014/34/EU ("ATEX 100a").

The attachable contact at the sides, being a component of the whole unit, requires certificates and/or approvals.

The measurement units can be used as follows:

- a) In the Zone 2 (Gas-Ex, Cat. 3G) in explosion group IIA, IIB and IIC
- b) In the Zone 22 (Dust-Ex, Category 3D) with non-conductive dusts with a minimum igniting energy of > 3 mJ
- c) In the Zone 1 (Gas-Ex, Cat. 2G) in explosion group IIA, IIB and IIC
- d) In the Zone 21 (Dust-Ex, Category 2D) with non-conductive dusts with a minimum igniting energy of > 3 mJ

The Flow Meter and Switches are filled completely with medium in the normal operation. Zone 2 or zone 1 conditions may be obtained for a short time.

The ambient temperature limit area is fixed as follows:

Execution	Medium Temperature	Ambient Temperature	Pmax
NBR-seal	-20...+70 °C	-20...+60 °C	250 bar
FPM-seal	-10...+100 °C	-10...+90 °C	350 bar

5.2. Contacts and Ex-Contact N/O (code F)

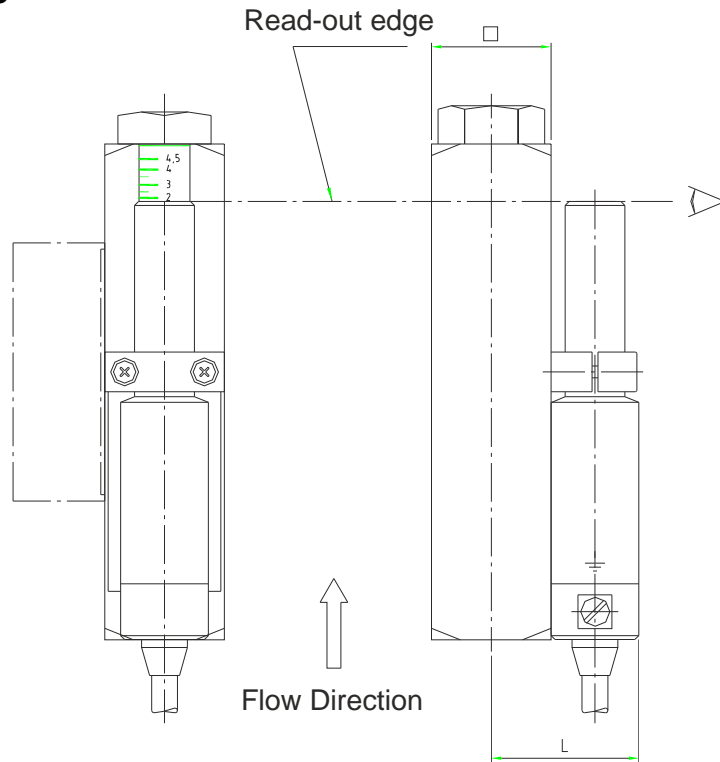
The VKM-1 and VKM-3 can be used in the Ex-area as follows:

- Ex-Contact N/O (code F) according Category 2 G, 2D Group II, Zone 1 and 21.
- Standard-contacts (Code R, U, C or D) according Category 2G and 2D, Group II, in zone 1 and 21 in connection with a switching amplifier for protection type Ex II (2)GD [EEx ia] IIC (intrinsically safe)

The VKM-2 (without switching contact) can be used according Category 2G and 2D for the Group II in Zone 1 and 21.

The electrical connection is explained in section 8. Electrical Connection.

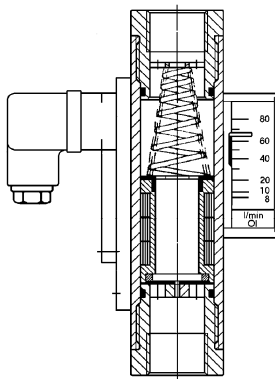
Read-out edge



5.3. Potential Equalisation

The All-metal Flow Meters have to be incorporated in the potential equalisation system of the plant. This is accomplished through connection tube made of metal.

6. Operating Principle



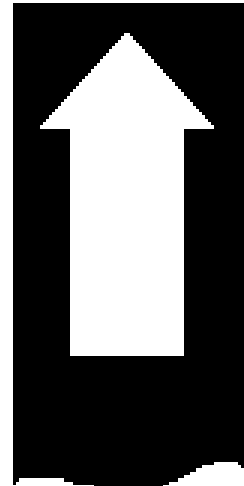
A hollow float with a sharp-edged orifice is located within a cylindrical bored metal housing. The flowing medium raises the float against the spring force. The position of the float corresponds to a particular flow rate which may be read from the needle indicator mounted on the instrument. Permanent magnets are fitted around the float which operate reed contact switches external to the flowing medium chamber.

The operation of the contacts is voltage free and works by means of magnetic force. i.e.: the contact is hermetically sealed from the flowing medium.

7. Mechanical Connection

Before installation:

- It should be confirmed that the maximum allowed operating pressures and operating temperatures of the equipment are not exceeded.
- (see table: standard material combinations).
- The instruments may be mounted in any flow direction. No recalibration is required when changing position. The flow must always take place in the direction of the arrow (see label).
- Remove all transport packing and ascertain that no packing material is left in the instrument.
- Sealing of the connection threads should be carried out with Teflon tape or similar.
- The instruments must not be installed within an induction field.
- if possible, after the mechanical installation, it should be checked that the connection thread to pipe is fully sealed (see section 9 Commissioning).

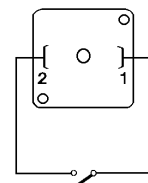


8. Electrical Connection

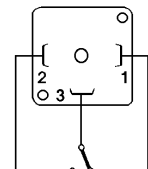
8.1. Switching Output VKM-1.. and VKM-3..

- Make sure that the supply wires are de-energized.
- Loosen the holding screw of the plug and pull out the cap from the socket.
- Make connection inside the plug-cap according to the wiring diagram.
- If the contact switchpoint has not been adjusted yet, it would be appropriate to do so at this point.
- (see section 9 Commissioning).
- Push the plug onto the socket, secure by using the locking screw. (see section 9 Commissioning).

N/O contact



Changeover contact



8.2. VKM-1... and VKM-3... with Ex-contact (cable connection)

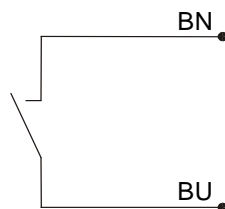
Special requirements for a safety application

- The connection of the magnetic switch has to take place in a housing's, which is in accordance with a norm ignition protection cat. acc. to EN 50014, 1.2.
- The short-circuit current (Ik) of the supply source may not exceed 5 A.
- The switch is suitable for an ambient temperature area of $-20..+70$ °C.

General

- Make sure that the supply wires are de-energized.
- Plug in the system according to the connecting diagrams.
- If the contact switchpoint has not been adjusted yet, it would be appropriate to do so at this point. (see section 9 Commissioning).

Ex-contact N/O



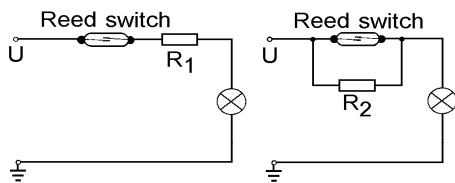
Attention! The given electrical specifications of reed switches must never be exceeded, even for a short time. For higher switching capacities we recommend the use of contact protection relays (e.g. or model MSR) or any other contact protection device.

After your designated external units are connected to the limit contact and adjustment of desired switching points is accomplished, then all the work regarding connections is completed.

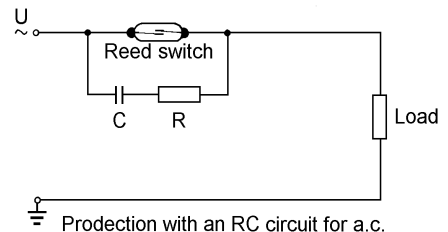
The unit can now be set in operation.

8.3. Example for Contact Protective Measures

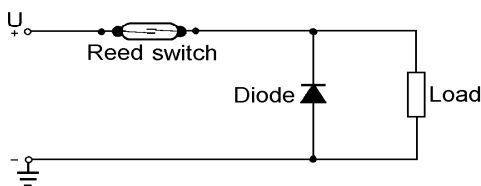
For capacitive and inductive loads (long cables and relay/protection) we recommend the following protective schemes.



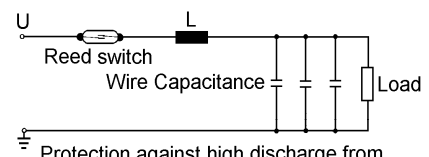
Lamp load with parallel or series resistance to the switch.



Protection with an RC circuit for a.c. current and inductive load.



Protection with an idle diode for d.c. current and inductive load.



Protection against high discharge from condensers and loadcapacitances.

8.4. ADI-Evaluation Electronics VKM-7..

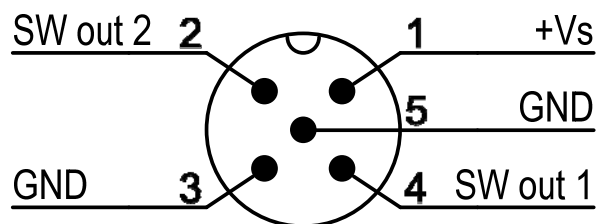
For connection of the power supply and the output signals please check with the operating instructions of the corresponding ADI electronic.



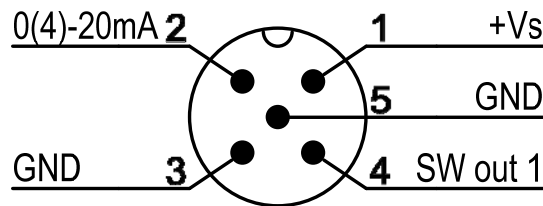
Information! The measuring input of the ADI is already factory-set.

8.5. Compact electronic VKM-8...

Compact electronic: (..C30R, ..C30M)



Compact electronic: (..C34P, .. C34N)



9. Commissioning

9.1. General

Over-ranging

The flow range may be exceeded by a large margin with a non-pulsating flow. Only a certain increase in pressure loss is experienced. (The permissible maximum operating pressure must not be exceeded!).

Viscosity range

The instrument scale is suitable for a viscosity range of 1 - 540 mm²/s. Within this range there is no need for recalibration.

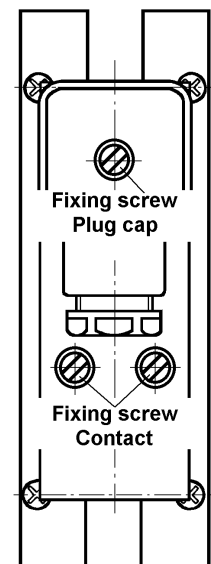
9.2. Switching Output VKM-1.. and VKM-3..

Hysteresis (VKM-1.. and VKM-3..)

Hysteresis is characterised by the difference between the switching on and switching off points of the contact. By matching the magnet and reed contact strength (AW Number) a hysteresis of approx. 3.5 mm of float movement is achieved. At the same time it may be assured that the contacts have a bistable switching characteristic.

Adjustment of the limit values (VKM-1..)

- Loosen the mounting screws on the contact.
- Position the marking on the contact in line with the required value on the housing scale.
- Tighten the mounting screws at this position.



Adjustment of the limit values (VKM-3..)

- With a screwdriver, loosen both mounting screws at the contact.
- Move the switch housing to the lowest position.
- After loosening the screws, remove the plug cap from the contact.
- Connect a suitable multimeter to PIN 1 & 2 (SPDT: contact PIN 2 & 3); (see page 5).
- When the instrument is already installed, open the inlet pipe and slowly allow the medium to flow until the pointer indicator shows the required minimum flow throughput. The reed switch is then closed (electrical continuity).
- Move the switch housing upwards until the reed switch just opens (no electrical continuity).
- At this position tighten the mounting screws. Replace the plug cap. The instrument is now ready for operation.
- By correct adjustment of the limit switch, a bi-stable switch condition is achieved, i.e.: even when exceeding the adjusted limit value, the contact remains closed (PIN 1 + 2 or PIN 2 + 3 for changeover contact option).

9.3. ADI-Electronic Analyser VKM-7..

For adjusting the output parameters (analogue-, switching output) please check with the operating instruction of the corresponding ADI-electronic. The electronic of the ADI is already factory-set to the sensor.

9.4. Compact electronic VKM-8...

see Operating instructions supplement
for compact electronics without frequency output.

10. Technical Information

Body:	VKM-x1...: Brass, nickel-plated VKM-x2...: Stainless steel 1.4301
Screwed fitting:	VKM-x1...: Brass, nickel-plated VKM-x2...: Stainless steel 1.4301
Float:	VKM-x1...: Brass, nickel-plated VKM-x2...: Stainless steel 1.4301
Orifice:	Stainless steel 1. 4310
Spring:	Stainless steel 1. 4310
Magnet:	Oxide ceramics
Seals:	VKM-x1...: NBR VKM-x2...: FPM
Max. temperature:	+100 °C (Attention! Note restrictions for the Ex-area. See section 5.)
Max. pressure:	VKM-x1...: 250 bar VKM-x2...: 350 bar
Installation position:	arbitrary
Basic accuracy:	±4% f. s. (with a viscosity of 105 mm ² /s)
Measuring error due to change in viscosity:	For changes in viscosity within 1–540 mm ² /s the additional deviation is ± 5% f. s. maximum
Viscosity range:	1–540 mm ² /s
Contacts: Optional with VKM-1..., VKM-3...	
Electrical connection:	2 m cable (VKM-..F0...) For all other types: Connector DIN 43 650
Electrical switching values:	N/O contact (standard) max. 250 V _{AC/DC} / 1.5 A / 100 W / 100 VA changeover contact (standard) max. 250 V _{AC/DC} / 1 A / 30 W / 60 VA N/O contact and changeover contact (cCSAus) max. 230 V _{DC} / 0,26 A / 60 W, 60 V _{DC} / 1 A / 60 W, max. 240 V _{AC} / 0.42 A / 100 W, 100 V _{AC} / 1 A / 100 W N/O contact (Ex) II 2G Ex mb IIC T6 Gb II 2D Ex mb IIIC T80°C Db IP67 max. 250 V _{AC} / 1.5 A / 100 VA
Protection:	IP 65 (electr. contact) IP 54 (side display)

VKM-7..

Evaluating electronics: Digital indication, bargraph indication or combined indication (digital/bargraph)

For technical information please see the operating instructions for ADI.

VKM-8..

display:	3-digit LED display
indication:	semi conductor PNP or NPN
Analogue output:	4–20 mA, 3 wire version
	max. 500 Ω , linear
Auxiliary power:	24 V _{DC} +-20%
Max. temperature:	+80° C
Electrical conn.:	plug M12x1

11. Order Codes

Viscosity-compensated flow switches model: VKM-1...

Measuring range L/min oil	Pressure loss ΔP (bar) at rated flow*		Brass	Stainless steel	Contact	Connection		Option special connect.	Flow direction
	min.	max.							
0.01...0.07	0.02	1.0	VKM-1101...	VKM-1201...	..R0... = 1 N/O contact ..U0... = 1 changeover contact ..F0... = 1 EX N/O contact ..C0... = 1 N/O contact (cCSAus) ..D0... = 1 changeover contact (cCSAus) ..RR... = 2 N/O contact ..UU... = 2 changeover contact ..CC... = 2 N/O contact (cCSAus) ..DD... = 2 changeover contact (cCSAus)	..R08 = G 1/4	..N08 = 1/4 NPT	0 = without option	B = from bottom T = from top L = from left R = from right
0.1...0.45	0.03	0.8	VKM-1102...	VKM-1202...		..R08 = G 1/4	..N08 = 1/4 NPT		
0.2...1.2	0.05	1.1	VKM-1103...	VKM-1203...		..R08 = G 1/4	..N08 = 1/4 NPT		
0.5...2	0.07	1.2	VKM-1104...	VKM-1204...		..R15 = G 1/2	..N15 = 1/2 NPT		
0.8...3.4	0.05	0.9	VKM-1105...	VKM-1205...		..R15 = G 1/2	..N15 = 1/2 NPT	B = outlet female thread inlet BVB	
3...9	0.05	0.8	VKM-1106...	VKM-1206...		..R15 = G 1/2	..N15 = 1/2 NPT		
4...14	0.08	1.1	VKM-1107...	VKM-1207...		..R20 = G 3/4	..N20 = 3/4 NPT	manifold	
5...20	0.05	1.1	VKM-1108...	VKM-1208...		..R20 = G 3/4	..N20 = 3/4 NPT		
4...40	0.1	0.4	VKM-1109...	VKM-1209...		..R25 = G 1	..N25 = 1 NPT		
5...55	0.15	1.1	VKM-1110...	VKM-1210...					
7...70	0.15	1.1	VKM-1111...	VKM-1211...					
8...80	0.15	1.1	VKM-1112...	VKM-1212...					

* Pressure loss refers to water

Viscosity-compensated flow meters model: VKM-2...

Measuring range L/min oil	Pressure loss ΔP [bar] at rated flow*		Brass	Stainless steel	Contact	Connection		Option special connect.	Flow direction
	min.	max.							
0.01...0.07	0.02	1.0	VKM-2101...	VKM-2201...	00... = without contact	..R08 = G 1/4	..N08 = 1/4 NPT	0 = without option	B = from bottom T = from top L = from left R = from right
0.1...0.45	0.03	0.8	VKM-2102...	VKM-2202...		..R08 = G 1/4	..N08 = 1/4 NPT		
0.2...1.2	0.05	1.1	VKM-2103...	VKM-2203...		..R08 = G 1/4	..N08 = 1/4 NPT		
0.5...2	0.07	1.2	VKM-2104...	VKM-2204...		..R15 = G 1/2	..N15 = 1/2 NPT		
0.8...3.4	0.05	0.9	VKM-2105...	VKM-2205...		..R15 = G 1/2	..N15 = 1/2 NPT	B = outlet female thread inlet BVB manifold	
3...9	0.05	0.8	VKM-2106...	VKM-2206...		..R15 = G 1/2	..N15 = 1/2 NPT		
4...14	0.08	1.1	VKM-2107...	VKM-2207...		..R20 = G 3/4	..N20 = 3/4 NPT	manifold	
5...20	0.05	1.1	VKM-2108...	VKM-2208...		..R20 = G 3/4	..N20 = 3/4 NPT		
4...40	0.1	0.4	VKM-2109...	VKM-2209...		..R25 = G 1	..N25 = 1 NPT		
5...55	0.15	1.1	VKM-2110...	VKM-2210...					
7...70	0.15	1.1	VKM-2111...	VKM-2211...					
8...80	0.15	1.1	VKM-2112...	VKM-2212...					

* Pressure loss refers to water

Viscosity-compensated flow meters model: VKM-3...

Measuring range L/min oil	Pressure loss ΔP [bar] at rated flow*		Brass	Stainless steel	Contact	Connection		Option special connect.	Flow direction
	min.	max.							
0.01...0.07	0.02	1.0	VKM-3101...	VKM-3201...	...R0... = 1 N/O contact ...U0... = 1 changeover contact ...F0... = 1 EX N/O contact ...C0... = 1 N/O contact (cCSAus) ...D0... = 1 changeover contact (cCSAus) ...RR... = 2 N/O contact ...UU... = 2 changeover contact ...CC... = 2 N/O contact (cCSAus) ...DD... = 2 changeover contact (cCSAus)	..R08 = G 1/4	..N08 = 1/4 NPT	0 = without option	B = from bottom T = from top L = from left R = from right
0.1...0.45	0.03	0.8	VKM-3102...	VKM-3202...		..R08 = G 1/4	..N08 = 1/4 NPT		
0.2...1.2	0.05	1.1	VKM-3103...	VKM-3203...		..R08 = G 1/4	..N08 = 1/4 NPT		
0.5...2	0.07	1.2	VKM-3104...	VKM-3204...		..R15 = G 1/2	..N15 = 1/2 NPT		
0.8...3.4	0.05	0.9	VKM-3105...	VKM-3205...		..R15 = G 1/2	..N15 = 1/2 NPT	B = outlet female thread inlet BVB manifold	
3...9	0.05	0.8	VKM-3106...	VKM-3206...		..R15 = G 1/2	..N15 = 1/2 NPT		
4...14	0.08	1.1	VKM-3107...	VKM-3207...		..R20 = G 3/4	..N20 = 3/4 NPT	manifold	
5...20	0.05	1.1	VKM-3108...	VKM-3208...		..R20 = G 3/4	..N20 = 3/4 NPT		
4...40	0.1	0.4	VKM-3109...	VKM-3209...		..R25 = G 1	..N25 = 1 NPT		
5...55	0.15	1.1	VKM-3110...	VKM-3210...					
7...70	0.15	1.1	VKM-3111...	VKM-3211...					
8...80	0.15	1.1	VKM-3112...	VKM-3212...					

* Pressure loss refers to water

Viscosity-compensated flow meter with evaluating electronics model: VKM-7...

Measuring range L/min oil approx.	Pressure loss ΔP [bar] at rated flow*		Brass	Stainless steel	Output	Connection		Flow direction
	min.	max.				Standard	Sonder	
0.01-0.063	0.02	1.0	VKM-7101...	VKM-7201...	...K04... = combination ind. 100-240 V _{AC/DC} , ±10% (50-60 Hz) ...K34... = combination ind. 10-40 V _{DC} , 18-30 V _{AC} 50/60 Hz	..R08 = G 1/4	..N08 = 1/4 NPT	B = from bottom T = from top L = from left R = from right
0.1...0.4	0.03	0.8	VKM-7102...	VKM-7202...		..R08 = G 1/4	..N08 = 1/4 NPT	
0.2...1.1	0.05	1.1	VKM-7103...	VKM-7203...		..R15 = G 1/2	..N15 = 1/2 NPT	
0.5...1.8	0.07	1.2	VKM-7104...	VKM-7204...		..R15 = G 1/2	..N15 = 1/2 NPT	
0.8...3.1	0.05	0.9	VKM-7105...	VKM-7205...		..R20 = G 3/4	..N20 = 3/4 NPT	
3...8.1	0.05	0.8	VKM-7106...	VKM-7206...		..R20 = G 3/4	..N20 = 3/4 NPT	
4...12.6	0.08	1.1	VKM-7107...	VKM-7207...		..R25 = G 1	..N25 = 1 NPT	
5...18	0.05	1.1	VKM-7108...	VKM-7208...		..R25 = G 1	..N25 = 1 NPT	
4...36	0.1	0.4	VKM-7109...	VKM-7209...		..R25 = G 1	..N25 = 1 NPT	
5...50	0.15	1.1	VKM-7110...	VKM-7210...		..R25 = G 1	..N25 = 1 NPT	
7...63	0.15	1.1	VKM-7111...	VKM-7211...	..R25 = G 1	..N25 = 1 NPT		
8...72	0.15	1.1	VKM-7112...	VKM-7212...	..R25 = G 1	..N25 = 1 NPT		

* Pressure loss refers to water

Viscosity-compensated flow meter with compact electronics model: VKM-8...

Measuring range L/min oil approx.	Pressure loss ΔP [bar] at rated flow*		Brass	Stainless steel	Output	Connection		Flow direction
	min.	max.				Standard	Sonder	
0.01-0.063	0.02	1.0	VKM-8101...	VKM-8201...	...C0R... = compact electr. 24 V _{DC} , 2x PNP ...C0M... = compact electr. 24 V _{DC} , 2xNPN ...C4P... = compact electr. 24 V _{DC} , 4-20 mA, 1xPNP ...C4N... = compact electr. 24 V _{DC} , 4-20 mA, 1x NPN	..R08 = G 1/4	..N08 = 1/4 NPT	B = from bottom T = from top L = from left R = from right
0.1...0.4	0.03	0.8	VKM-8102...	VKM-8202...		..R08 = G 1/4	..N08 = 1/4 NPT	
0.2...1.1	0.05	1.1	VKM-8103...	VKM-8203...		..R15 = G 1/2	..N15 = 1/2 NPT	
0.5...1.8	0.07	1.2	VKM-8104...	VKM-8204...		..R15 = G 1/2	..N15 = 1/2 NPT	
0.8...3.1	0.05	0.9	VKM-8105...	VKM-8205...		..R20 = G 3/4	..N20 = 3/4 NPT	
3...8.1	0.05	0.8	VKM-8106...	VKM-8206...		..R20 = G 3/4	..N20 = 3/4 NPT	
4...12.6	0.08	1.1	VKM-8107...	VKM-8207...		..R25 = G 1	..N25 = 1 NPT	
5...18	0.05	1.1	VKM-8108...	VKM-8208...		..R25 = G 1	..N25 = 1 NPT	
4...36	0.1	0.4	VKM-8109...	VKM-8209...		..R25 = G 1	..N25 = 1 NPT	
5...50	0.15	1.1	VKM-8110...	VKM-8210...		..R25 = G 1	..N25 = 1 NPT	
7...63	0.15	1.1	VKM-8111...	VKM-8211...	..R25 = G 1	..N25 = 1 NPT		
8...72	0.15	1.1	VKM-8112...	VKM-8212...	..R25 = G 1	..N25 = 1 NPT		

* Pressure loss refers to water

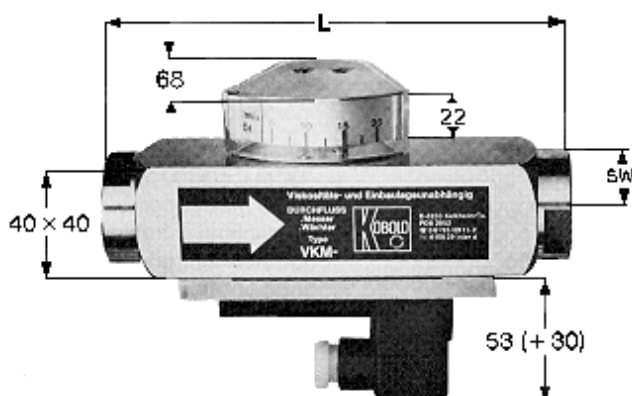
12. Maintenance

In cases where the medium to be measured is uncontaminated, the models VKM are almost maintenance-free. However where calcium or dirt deposits form in the housing or other internal parts, the instruments should be regularly cleaned.

With a suitable open-ended spanner, remove the instrument from the pipe. After removal of the uppermost threaded connection, the internal parts may be removed for cleaning. The internal parts can be cleaned with a suitable brush. After cleaning reassemble the instrument in the correct order of assembly.

Please note that the spring must be installed into the nipple of the upper threaded connection and onto the float body. The lower end of the float with the inserted orifice is located at the fluid inlet side.

13. Dimensions



Model	Square (mm)	Length (mm) Connection	SW (mm) Connection	Weight* (kg)
VKM--01	40x40	162	36	1,7
VKM--02	40x40	162	36	1,7
VKM--03	40x40	162	36	1,7
VKM--04	40x40	162	36	1,7
VKM--05	40x40	162	36	1,7
VKM--07	40x40	162	36	1,6
VKM--08	40x40	162	36	1,6
VKM--09	40x40	162 (186,5)**	36 (41)**	1,7
VKM--10	40x40	162 (186,5)**	36 (41)**	1,7
VKM--11	40x40	162 (186,5)**	36 (41)**	1,7
VKM--12	40x40	186,5	41	1,7

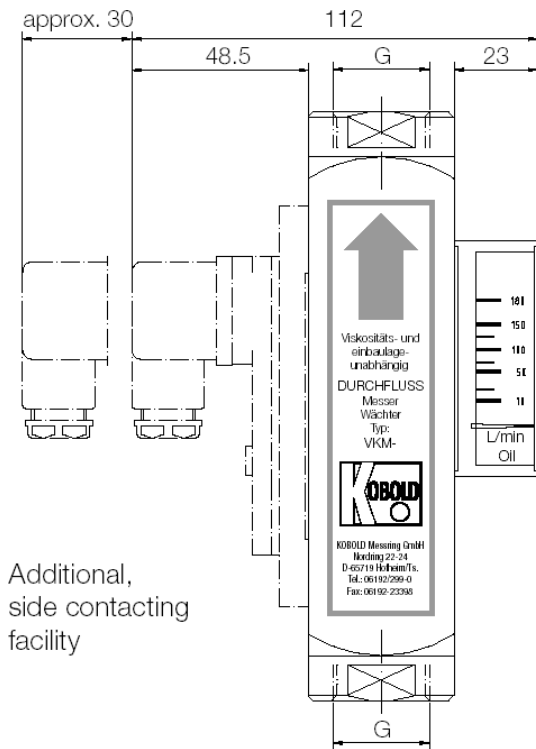
* Weight valid for: VKM-1..., VKM-2...

for model VKM-3... + 0,1 kg

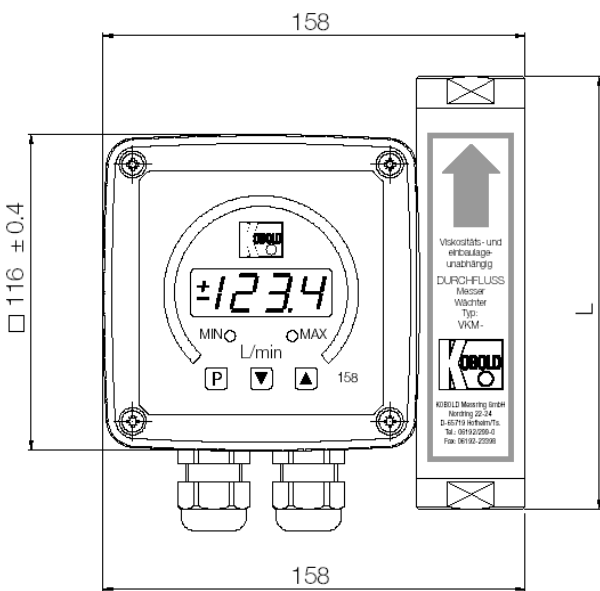
for model VKM-7... + 1,4 kg

** at G1 or 1 NPT

VKM-1..., VKM-2..., VKM-3...

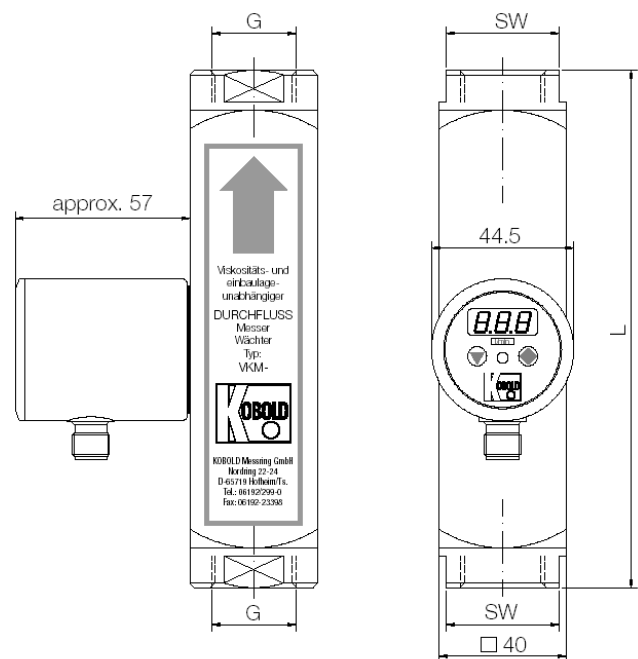


VKM-7...

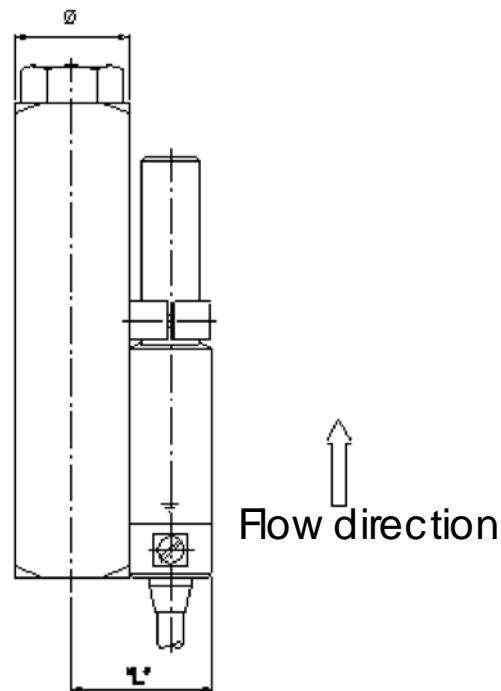


Depth 127 mm

VKM-8...



Ex contact for VKM-..F0..



Housing	Meas. "L"
40x40	42

14. Recommended Spare-Parts

Only the instrument parts and material are listed. Depending on the instrument type the parts are available in various sizes (when ordering please indicate instrument type).

- | | |
|-------------------------------------|------------------------------------|
| 1.1) Float Brass | 5.1) N/O contact (standard) |
| 1.2) Float Stainless Steel | 5.2) Changeover contact (standard) |
| 2.1) Slotted-nozzle Brass | 5.3) N/O contact Ex |
| 2.2) Slotted-nozzle Stainless Steel | 5.4) N/O contact (cCSAus) |
| 3.1) Spring St. Steel | 5.5) Changeover contact (cCSAus) |
| 4.1) O-Ring set NBR | |
| 4.2) O-Ring set FPM | |

15. Declaration of the Manufacturer (VKM)

Declaration for equipment without a potential igniting source according to the explosion protection guideline 2014/34/EU (ATEX 95).

We, KOBOLD Messring GmbH, herewith declare that the following units and/or assembly groups:

Viscosity Compensated Flow Meter / Monitor model: VKM-***

according to guideline 2014/34/EU, article 1 paragraph 2 and 3 are

- a. no safety, controlling and regulating equipment,
- b. no devices,
- c. no protection systems and
- d. no components.

The All-Metal Flow Monitor does not have a potential igniting source of its own as a mechanical operating device; it does not get any identification according to the guideline 2014/34/EU ("ATEX 100a").

The attachable contact at the sides is part and parcel of an own check and requires certificates and/or approvals.

The units / assembly groups can be used as follows:

- a. In the Zone 2 (Gas-Ex, Cat. 3G) in explosion group of IIA, IIB and IIC
- b. In the Zone 22 (Dust-Ex, Category 3D) with non-conductive dusts with a minimum igniting energy of > 3 mJ
- c. In the Zone 1 (Gas-Ex, Cat. 2G) in explosion group of IIA, IIB and IIC
- d. In the Zone 21 (Dust-Ex, Category 2D) with non-conductive dusts with a minimum igniting energy of > 3 mJ

The heating is negligible, a limit value of 20 K must be accounted for the ambient temperature and the temperature classification and/or the maximum surface temperature.

The following harmonised norms were used in the current version applicable on the date of signature.

- EN 1127-1 Potentially Explosive Atmosphere, Explosion Protection, part 1: Basics and Methodology

The operation instructions with the broader details listed therein and the installation regulations for the potentially explosive atmosphere should be observed. Some essential measures are:

- a. The Flow Meter / -Switch has to be involved in the potential equalisation system.
- b. Add-on control contacts can under application of EN 60079-14 article 12.2.1 be used as simple electrical equipment without any additional marking in intrinsically safe equipment.
- c. Add-on control contacts with an own EU type examination test can be used, however, are not subject to this declaration.

Hofheim, 18. Oct. 2016



H. Peters
General Manager



M. Wenzel
Proxy Holder

17. EU Declaration of Conformance

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Flow Meter and Monitor Model VKM

to which this declaration relates is in conformity with the standards noted below:

EN 61010-1:2011-07

Safety requirements for electrical equipment for measuring control and laboratory use

EN 60529:2014-09

Protection type through case (IP code)

EN 60079-0:2009

General Regulations

EN 60079-18:2009

Encapsulation „m“

EN 50581:2012

Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Also the following EC guidelines are fulfilled:

2014/35/EU Low Voltage Directive

2014/34/EU Equipment and Protective systems intended for use in a potentially Explosive Atmospheres (ATEX 100a)

Quality Management Production

Certificate number: BVS 15 ATEX ZQS/E110

Notified body: DEKRA Exam GmbH

Identification number: 0158

2011/65/EU RoHS (category 9)



H. Peters
General Manager



M. Wenzel
Proxy Holder

Hofheim, 11. Jan. 2018

18. EC-Type Examination Certificate Magnetic reed switch EEx RC



Translation

- (1) **EC-Type Examination Certificate**
- (2) **- Directive 94/9/EC -**
Equipment and protective systems intended for use
in potentially explosive atmospheres
- (3) **DMT 01 ATEX E 058 X**
- (4) **Equipment:** Magnetic reed switch Type EEx RC... Art.No.: 2.....
- (5) **Manufacturer:** Steute Schaltgeräte GmbH & Co. KG
- (6) **Address:** D 32567 Löhne
- (7) The design and construction of this equipment and any acceptable variation thereto are specified in the schedule to this type examination certificate.
- (8) The certification body of Deutsche Montan Technologie GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.
The examination and test results are recorded in the test and assessment report BVS PP 01.2051 EG.
- (9) The Essential Health and Safety Requirements are assured by compliance with:
- | | |
|---------------------|----------------------|
| EN 50014:1997+A1-A2 | General requirements |
| EN 50028:1987 | Encapsulation „m“ |
- (10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.
- (11) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to Directive 94/9/EC.
Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate
- (12) The marking of the equipment shall include the following:

II 2G EEx m II T6

Deutsche Montan Technologie GmbH

Essen, dated 08. May 2001

Signed: Jockers

DMT-Certification body

Signed: Dill

Head of special services unit



(13) Appendix to
 (14) **EC-Type Examination Certificate**

DMT 01 ATEX E 058 X

(15) 15.1 Subject and type

Magnetic reed switch Type EEx RC... Art.Nr.: 2.....

15.2 Description

The magnetic reed switch is designed for the protection method encapsulation „m“ and will be used for the implementation of switching operations.

15.3 Parameters

15.3.1 Electrical Data:

Switching voltage	to	AC 250	V
Switching current	to	1,5	A
Switching capacity for change-over contact element and for break-contact element	to	50	VA/W
Switching capacity for normally open contact element	to	100	VA/W
Short-circuit current I_k for change-over contact element and for break-contact element	to	2	A
Short-circuit current I_k for normally open contact element	to	5	A

15.3.2 Thermal Dates

Range of ambient temperature -20 °C bis +70 °C

(16) Test and assessment report

BVS PP 01.2051 EG as of 08.05.2001

(17) Special conditions for safe use

17.1 The connection of the magnetic reed switch has to be made in housings which meet a standardized type of protection according EN 50014, 1.2

17.2 The short-circuit I_k of the supply source may not exceed the parameters which are mentioned under 15.3.1

17.3 The magnetic reed switch is suitable for an ambient temperature range from -20°C to +70°C.

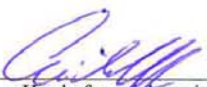
17.4 Housings with a diameter less than 15 mm (Type RC ... Art.No.: 214.... to Type RC ... Art.No.: 212....) have to be arranged that they are protected against mechanical danger.

We confirm the correctness of the translation from the German original.
 In the case of arbitration only the German wording shall be valid and binding.

45307 Essen, 08.10.2002
 BVS-Ld/Mi E 1621/02

Deutsche Montan Technologie GmbH


 DMT-Certification body


 Head of special services unit



Translation

1st Supplement

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

to the EC-Type Examination Certificate DMT 01 ATEX E 058 X

Equipment: Magnetic reed switch, type EEx RC ... Art.-No.: 2 ...
Manufacturer: Steute Schaltgeräte GmbH & Co. KG
Address: D - 32567 Löhne

Description

The magnetic reed switch, type EEx RC ... Art.-No.: 2 ... can be modified according to the descriptive documents as mentioned in the pertinent test and assessment report. The switch is also suitable in areas with combustible dust. In addition, the magnetic reed switch can be manufactured with a changed cable.

The Essential Health and Safety Requirements of the modified equipment are assured by compliance with:

EN 50014 : 1997 + A1 - A2	General requirements
EN 50028 : 1987	Encapsulation
EN 50281-1-1 : 1998 + A1	Dust explosion protection

Test and assessment report

BVS PP 01.2051 EG as of 24.04.2003

Parameter:

Protection class acc. EN 60529 IP 67
 otherwise unchanged

Marking:

The existing marking is extended by:

2D IP 67 T 80 °C

Deutsche Montan Technologie GmbH

Bochum, dated 24. April 2003

Signed: Dr. Eickhoff

Signed: Dr. Wittler

 Certification body

 Special services unit



We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

44809 Bochum, 07.06.2004
BVS-Ld/Mi E 1017

EXAM BBG Prüf- und Zertifizier GmbH



Certification body



Special services unit



Translation

2nd Supplement

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

**to the EC-Type Examination Certificate
DMT 01 ATEX E 058 X**

Equipment: Magnetic reed switch type EEx RC ... Art.-No.: 2 ...
Manufacturer: Steute Schaltgeräte GmbH & Co. KG
Address: D - 32567 Löhne

Description

The magnetic reed switch type EEx RC can be modified according to the descriptive documents as mentioned in the pertinent test and assessment report. The switch can be manufactured in future with a changed potting material and in an additional enclosure specification with a changed built-in reed contact enclosure.

The Essential Health and Safety Requirements of the modified equipment are assured by compliance with:

EN 50014:1997 + A1 – A2	General requirements
EN 50028:1987	Encapsulation
EN 50281-1-1:1998 + A1	Protection against dust explosion

Test and assessment report

BVS PP 01.2051 EG as of 5. October 2004

EXAM BBG Prüf- und Zertifizier GmbH

Bochum, dated 5. October 2004

Signed: Dr. Jockers

Certification body

Signed: Dr. Eickhoff

Special services unit



We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

44809 Bochum, 26.10.2004
BVS-Ld/Mi A 20040057

EXAM BBG Prüf- und Zertifizier GmbH



Certification body



Special services unit



Translation

3rd Supplement

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

to the EC-Type Examination Certificate DMT 01 ATEX E 058 X

Equipment: Magnetic reed switch type EEx RC... ART.Nr.:2
Manufacturer: Steute Schaltgeräte GmbH & Co. KG
Address: 32584 Löhne, Germany

Description

The magnetic reed switch can be modified according to the descriptive documents as mentioned in the pertinent test and assessment report with a cable entry part made from a threaded metal socket.

The Essential Health and Safety Requirements of the modified equipment are assured by compliance with:

EN 50014:1997+A1-A2 General requirements
 EN 50028:1987 Encapsulation 'm'
 EN 50281-1-1:1998 +A1 Dust explosion protection

The marking of the equipment shall include the following:

 II 2G EEx m II T6
 II 2D IP 67 T 80 °C

Special conditions for safe use

The connection of the magnetic reed switch has to be made in housings which meet a standardized type of protection according EN 50014, 1.2

The short-circuit I_k of the supply source may not exceed the parameters which are mentioned under 15.3.1 (EC-Type Examination Certificate DMT 01 ATEX E 058 X).

The magnetic reed switch is suitable for an ambient temperature range from -20 °C to $+70\text{ °C}$.

Housings with a diameter less than 15 mm (Type RC ... Art. No.: 214.... to Type RC ... Art. No.: 212....) have to be arranged that they are protected against mechanical danger.



Test and assessment report
BVS PP 01.2051EG as of 13.07.2006

EXAM BBG Prüf- und Zertifizier GmbH
Bochum, dated 13. July 2006

Signed: Migenda

Certification body

Signed: Dr. Wittler

Special services unit

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

44809 Bochum, 13.07.2006
BVS-Ld/Mi A 20060343

EXAM BBG Prüf- und Zertifizier GmbH

Migenda

Certification body

Dr. Wittler

Special services unit



Translation

4th Supplement

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

to the EC-Type Examination Certificate DMT 01 ATEX E 058 X

Equipment: Magnetic reed switch type EEx RC... / -40 °C ART.Nr.:2
Manufacturer: Steute Schaltgeräte GmbH & Co. KG
Address: 32584 Löhne, Germany

Description


The magnetic reed switch can be modified according to the descriptive documents as mentioned in the pertinent test and assessment report, with an enhanced ambient temperature range down to -40 °C. Now the magnetic reed switch can be used in an ambient temperature range from -40 °C up to +70 °C.

The changed magnetic reed switch gets the following type EEx RC ... / -40 °C ART. Nr.:2

The Essential Health and Safety Requirements of the modified equipment are assured by compliance with:

EN 60079-0:2006	General requirements
EN 60079-18:2004	Encapsulation
EN 61241-0 2006	General requirements
EN 61241-1 2004	Protection by enclosures

The marking of the equipment shall include the following:

 **II 2G Ex mb II T6**
II 2D Ex tD A21 IP67 T80°C

Special conditions for safe use

The connection of the magnetic reed switch has to be made in housings which meet a standardized type of protection according EN 60079-0, 1.

The short-circuit I_k of the supply source may not exceed the parameters which are mentioned under 15.3.1 of the EC-Type Examination Certificate DMT 01 ATEX E 058 X.

The magnetic reed switch is suitable for an ambient temperature range from -40 °C up to +70 °C.

Housings with a diameter less than 15 mm (Type RC ... Art. Nr.: 212.... to Type RC ... Art. Nr.: 214....) have to be arranged that they are protected against mechanical danger.

Page 1 of 2 to DMT 01 ATEX E 058 X / N4

This certificate may only be reproduced in its entirety and without change.

DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Germany Phone +49 234/3696-105 Fax +49 234/3696-110 E-mail zs-exam@dekra.com
 (until 31.03.2007 EXAM BBG Prüf- und Zertifizier GmbH)



Test and assessment report
BVS PP 01.2051 EG as of 17.08.2007

DEKRA EXAM GmbH
Bochum, dated 17. August 2007

Signed: Dr. Jockers

Signed: Dr. Eickhoff

Certification body

Special services unit

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

44809 Bochum, 05.09.2007
BVS-Ld/Ar E 1233/07

DEKRA EXAM GmbH



Certification body




Special services unit



Translation

(1) 5. Supplement to the EC-Type Examination Certificate

- (2) Equipment and protective systems intended for use in potentially explosive atmospheres - Directive 94/9/EC Supplement accordant with Annex III number 6
- (3) No. of EC-Type Examination Certificate: **DMT 01 ATEX E 058 X**
- (4) Equipment: **Magnetic reed switch type Ex RC...
Magnetic reed switch type Ex RC... / - 40°C
Magnetic reed switch type Ex RC 2580-...**
- (5) Manufacturer: **Steute Schaltgeräte GmbH & Co. KG**
- (6) Address: **32567 Löhne, Germany**
- (7) The design and construction of this equipment and any acceptable variation thereto are specified in the appendix to this supplement.
- (8) The certification body of DEKRA EXAM GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive. The examination and test results are recorded in the test and assessment report BVS PP 01.2051 EG.
- (9) The Essential Health and Safety Requirements are assured by compliance with:
- EN 60079-0:2009 General requirements**
EN 60079-18:2009 Encapsulation
- (10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the appendix to this certificate.
- (11) This supplement to the EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.
- (12) The marking of the equipment shall include the following:

 **II 2G Ex mb IIC T6 Gb**
II 2D Ex mb IIIC T80°C Db IP67

DEKRA EXAM GmbH
Bochum, dated 24.11.2011

Signed: Simanski

Certification body

Signed: Dr. Wittler

Special services unit



- (13) Appendix to
- (14) **5. Supplement to the EC-Type Examination Certificate
DMT 01 ATEX E 058 X**

(15) 15.1 Subject and type

Magnetic reed switch type Ex RC...
Magnetic reed switch type Ex RC... / - 40°C
Magnetic reed switch type Ex RC 2580-...

15.2 Description

The magnetic reed switch is now being manufactured in compliance with the updated editions of the relevant standards; in the future, the types are going to be labelled as follows:

**Magnetic reed switch type Ex RC... und
Magnetic reed switch type Ex RC... / - 40°C**

The magnetic reed switch can now also be manufactured according to the test documents listed in the pertinent test and assessment report; the new variant described features a rectangular metal enclosure made of brass or stainless steel and is labelled as follows:

Magnetic reed switch type Ex RC 2580-...

The marking of the relevant types of protection has been changed to mb IIIC due to the dust explosion atmospheres.

15.3 Parameters

The magnetic reed switch **type Ex RC 2580-...** is suitable for an ambient temperature range from -40 °C up to +70 °C.

The other parameters remain unchanged.

(16) Test and assessment report

BVS PP 01.2051 EG as of 24.11.2011

(17) Special conditions for safe use

The ends of the permanent cables have to be connected inside enclosures that have been certified for the use in the relevant category accordingly.

The short-circuit I_k of the supply source may not exceed the parameters which are mentioned under 4.1 (Test Report BVS PP 01.2051EG).

The magnetic reed switch **type Ex RC... / - 40°C and type Ex RC 2580-...** is suitable for an ambient temperature range from -40 °C up to +70 °C.

The magnetic reed switch **type Ex RC... -...** is suitable for an ambient temperature range from -20 °C up to +70 °C.

Housings with a diameter less than 15 mm (Type RC 12) have to be arranged that they are protected against mechanical danger.

The magnetic reed switch shall not be installed in dust explosive atmospheres where propagating brush discharges are likely to occur.

We confirm the correctness of the translation from the German original.
In the case of arbitration only the German wording shall be valid and binding.

DEKRA EXAM GmbH
44809 Bochum, 09.12.2011
BVS-Ld/Ar E 1973/11



Certification body



Special services unit

Page 2 of 2 to DMT 01 ATEX E 058 X / N5
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DEKRA EXAM GmbH Dinnendahlstrasse 9 44809 Bochum Phone +49.234.3896-105 Fax +49.234.3896-110 zs-exam@dekra.com