

Assembly and Operating Instructions

Pressure Monitors, Pressure Limiters

Basic models

DWR...

DGM...

Additional functions

...-2xx

...-3xx

...-5xx

Ex-DWR

Ex-DGM

IMPORTANT SAFETY INFORMATION!

Read before installation and initial operation!

Characteristics

Application

Steam and hot water according to TRBS
and DIN EN 12828

Fuel gases, according to DVGW
worksheet G260

Liquid fuels, e.g., fuel oil

Testing Standards for DWR

VdTÜV Druck 100, EN 12952-11,
EN 12953-9

DIN EN 764-7 with relation to EN 161 for
media compatibility
EN 13611, DIN EN 1854

E.U. Directives

EU 97/23 EC (PED)
EU 94/9 EC (ATEX)
EU/2009/142/EC (GAD)

Testing Standards for DGM

EN 13611, DIN EN 1854

E.U. Directives

EU/2009/142/EC (GAD)
EU/94/9/EC (ATEX)

Function

Pressure monitor and limiter (with internal
interlock) for maximum and minimum
switch action

Sensor

Special construction with 2 million
switching cycles

Type Code

Basic version	Version w/ additional function	Ex-d version	Ex-i version
DWR XXX	DWR XXX-YYY	Ex-DWR XXX	DWRXXX- 5xx
DWR	Identification for series		
XXX	Identification for pressure range		
YYY	Identification for additional function		
Ex-	Identification for Ex-d version		
...-5xx	Identification for Ex-i version		

The type code also roughly applies for series DGM...

NOTE: Not all technically conceivable combinations of models are present in our list of stock. For this reason, we recommend that, before ordering, you first contact us so that we can assist you in selecting the models most suitable for your specific application.

Switch Housings

DWR XXX	Plug connection housing (200) (as per DIN EN 175301)
DWR XXX-2...	
DWR XXX-3...	Terminal connection housing (300)
DWR XXX-5...	Terminal connection housing (500)
Ex-DWR...	Ex switching device (700)

NOTE: Pressure monitors are precision instruments, set and adjusted at the factory. **Therefore do not open the device, do not change the adjustment of the varnished adjustment screws.** The switching points would change – readjustment would be necessary.

IMPORTANT SAFETY INFORMATION

Please read this before installation and commissioning!

Installation and Commissioning

- ▶ Pressure monitors may be installed only by personnel trained in this application area (electric/hydraulic/mechanical) in accordance with the installation instructions and local legal requirements.
- ▶ The devices must be installed (mechanical, pressure-side connection) only on electro-chemically matched materials; otherwise, there is a risk of damage to base metals through contact corrosion, which can result in leakage and loss of stability.
- ▶ Caution when touching the device – risk of burns. Device can reach a medium temperature of up to 70 °C. Risk of freezing when working with media up to -20 °C.
- ▶ Do not open wiring box or plug and do not remove terminal screws before the device is de-energized.

Safety Instructions

- ▶ Devices of the DWR series are designed for use as pressure monitors for gases in accordance with DVGW worksheet G260 for liquid fuels (e.g., heating oil EL) and for steam and hot water systems in accordance with TRBS and DIN 4751, part 2.
- ▶ Devices of the DGM series are designed and approved for gases in accordance with DVGW worksheet G260 and the criteria for tightness set forth in EN 1854.
- ▶ The device must be used only within the electric, hydraulic and thermal limits specified in the data sheet.
- ▶ Inductive loads can cause contact burns or fuse the contacts. Preventive measures must be implemented by the customer, e.g., by using suitable RC elements.
- ▶ When using the version ZF 1979 (oil and grease-free), take care to avoid recontamination of surfaces that are in contact with the media, right through from opening the packaging to completed installation. Generally, no liability will be assumed for the oil and grease-free version.
- ▶ High quality stainless-steel sensor parts coming in contact with media enable the devices to be used with a variety of media. However, a **chemical resistance test** MUST be carried out before selection.
- ▶ Use with acids and other aggressive media, such as hydrofluoric acid, copper chloride, aqua regia, or hydrogen peroxide is not permitted.

- ▶ Use in systems with unstable gases and liquids such as hydrogen cyanide, dissolved acetylene or NO_x is not permitted.
- ▶ Devices must be protected from solar radiation and rain.
- ▶ Pressure monitors are precision devices, which are calibrated in the factory. Never open the device and do not change the adjustment of the varnished calibration screws.
- ▶ Protect the pressure monitor against excessive vibrations, e.g., by means of mechanical isolation or other vibration damping measures.
- ▶ Heavily contaminated media can clog the sensor and cause errors and/or malfunction. If the equipment is being used for this purpose, suitable chemical seals must be connected.
- ▶ Pressure monitors and chemical seals form a functional unit and must not be disconnected from each other in the field.
- ▶ Before disassembly (removing the pressure monitors from the system), the device must be disconnected from the power supply and the system must be emptied. Observe the Accident Prevention Regulations.
- ▶ Never use the pressure monitors as a climbing aid.
- ▶ Honeywell GmbH accepts no liability for non-compliance.

Functional Safety

- ▶ If the device is installed in a Functional Safety related circuit, the relevant data of the SIL certificate must be observed.

Contents

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*The type identification also roughly corresponds to series DGM...

1. Basic Equipment of the Pressure Monitors / Pressure Limiters

Chapter 1 describes the basic equipment and the installation of the pressure monitors DWR/DGM XXX (without any additional functions). Further chapters deal with versions and additional functions.

1.1 Technical Data (basic equipment)

Basic calibration

Depending on series and intended purpose, FEMA pressure monitors are either calibrated under falling or rising pressure. The table shows the calibration of the various devices and their versions.

	Basic device	Versions
Calibrated under rising pressure	DWR Ex-DWR...	DWR...-203, -205, -213, -301,-303, -305, -313, -351, -353, -363, -513, -563, -576, -577
	DGM..., Ex-DGM...	DGM...-205, -213, -301, -305,-313, -351, -363, -513, -563,-576, -577
Calibrated under falling pressure	n/a n/a	DWR...206, -306, -574, -575 DGM...206, -306, -574, -575

For devices calibrated under rising pressure, the following applies

If the maximum value of the setting range is set as the switching point, the reset point is lower by the value of the average switching differential.

(e.g., DWR6: setting range 0.5 – 6 bar, switching point 6 bar, reset point 5.8 bar)

If the minimum value of the setting range is used, then the lowest setting value is also the reset point.

The switching point must be set higher by the value of the average switching differential (e.g., DWR6: 0.5-6 bar, switching point 0.7 bar, reset point 0.5 bar).

For devices calibrated under falling pressure, the following applies

If the minimum value of the setting range is used, then the lowest setting value is also the switching point. The reset point must be set higher by the value of the average switching differential (e.g., DWR6-206: 0.5 – 6 bar, switching point 0.5 bar, reset point 0.8 bar).

If the maximum value of the setting range is used, then the highest value of the setting range is also the reset point.

The reset point must be set higher by the value of the average switching differential (e.g., DWR6-206: setting range 0.5-6 bar, reset point 6 bar, switching point 5.7 bar).

The following applies to all switches:

All switching and reset points must be within the limits of the specified setting range given in the technical data sheet.

Switch

Single-pole changeover

Switching capacity

8 (5) A, 250 V AC

Installation position

Vertical to the top and horizontal

Max. ambient temperature

–25 to 70 °C (DWR...)

–25 to 60 °C (DGM...)

Max. medium temperature

70 °C (DGM: 60 °C). Higher medium temperatures are possible if the above limiting values at the switching device are not exceeded by suitable measures (e.g., water pocket tube). At ambient temperatures below 0 °C, ensure that no water condensation will occur in the sensor and in the switching device.

Switching differential

Values see data sheet

Pressure connection

External thread G ½" A (pressure gauge connection) according to DIN 16288 and internal thread G ¼" according to ISO 228, Part 1.

For gas applications, internal thread permissible only up to 4 bar. Use flat gasket ring for pressure > 4 bar.

Switching box

Sturdy housing made of seawater-resistant aluminum die casting with plug connection (200) or terminal connection (300, 500) and Ex-housing (700).

Degree of protection as per EN60529

IP 54 (housing 200)

IP 65 (housing 300, 500 and 700)

Materials

See data-sheet

1.2 Electrical Connection

Wiring diagram

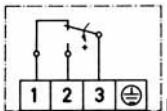


Fig. 1. Wiring diagram

With rising pressure

3-1 opens, 3-2 closes

With falling pressure

3-2 opens, 3-1 closes

Wiring



CAUTION:

SWITCH OFF VOLTAGE!

Wiring is on the angled plug. The cable outlet can be in any of 4 positions, which are at 90° in relation to each other.

- ▶ Remove screw.
- ▶ Insert the screwdriver in the slot and press downwards.

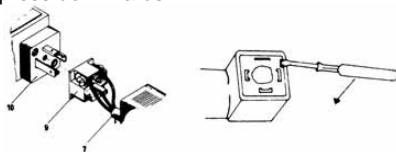


Fig. 2. Wiring

On devices with terminal connection housing, the terminal board is accessible after removing the terminal box lid.

1.3 Pressure Connection

Installation

Directly on the pipeline (pressure gauge connection G 1/2" or G 1/4" internal thread)

Tighten the device only at the hexagon located closest to the pressure connection. Never tighten device at housing or other area of sensor parts. Never use housing or plug as a lever arm.

Alternative mounting is possible with 2 screws Ø 4 mm on a flat surface area.

External thread Internal thread

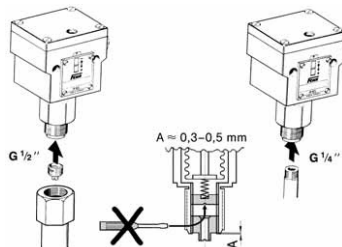


Fig. 3. Pressure switch

External thread G 1/2"

(Pressure gauge connection)

When using flat seals, turn in the centering screw (depth A approx. 0.3 – 0.5 mm)

Internal thread G 1/4"

In gas applications, internal thread is permissible only up to pressures of 4 bar.

Use flat gasket ring for pressure > 4 bar.

1.4 Setting the Switching Pressure

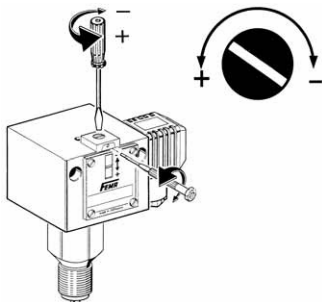


Fig. 4. Setting the switching pressure



CAUTION:

SWITCH OFF VOLTAGE!

The switching pressure is set using the setting spindle. Before setting, loosen the setscrew located above the scale by **approx. 2 turns** and tighten it again after setting.

The scale value corresponds to the switching point (for rising pressure).

The reset point is lower by the value of the switching differential.

The scale is used for an approximate value; a pressure gauge is required for an accurate setting.

On terminal connection housings, the setting screw is accessible after removing the cover.

1.5 External Electrical Interlock in the Switchgear Cabinet (circuit samples)

A pressure monitor can also be used as a limiter if an electrical interlock is connected in series. For pressure limitation in steam and hot water boilers, the external interlock is permissible only if it is assured that the pressure monitor is of "special construction."

For electrical interlock, design circuits as described in DIN EN 50156 / VDE 0116-1 or refer to local standards and statutory regulations!

Maximum pressure limitation with external interlock

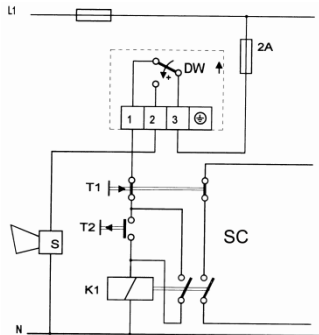


Fig. 5. Maximum pressure limitation

DW = pressure monitor

T1 = STOP

T2 = START

Minimal pressure limitation with external interlock

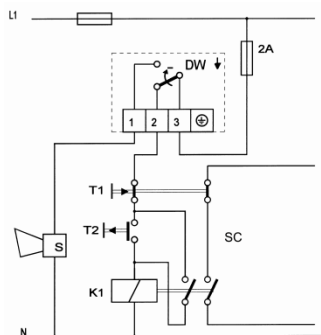


Fig. 6. Minimum pressure limitation

S = signal (as required)

K1 = relay with self-hold

SC = safety circuit

2. Pressure Monitors with Adjustable Switching Differential DWR...-203 / -303 (not for DGM)

2.1 Technical Data as for 1.1

2.2 Electrical Connection as for 1.2

2.3 Pressure Connection as for 1.3

2.4 Setting (i.e., switching at rising pressure)

One spindle is available for each setting: the switching pressure and the switching differential. Both spindles are arranged concentrically. The outer spindle with larger diameter adjusts the switching point. The switching differential and thus the reset-point is changed with the small screw located internally.

The action direction is indicated by the arrow.

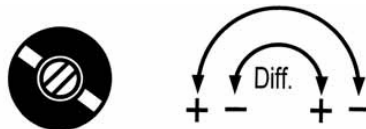


Fig. 7. Action direction



CAUTION:

When approaching the max. switching differential value, take care that the differential spindle not be turned so far as to hit the stop and possibly jam, as this could interfere with switching back. In the event that this nonetheless accidentally happens, loosen the screw by a half or full rotation.

Setting sequence

- ☐ Switching point (i.e., with rising pressure), with outer spindle, according to scale or pressure gauge
- ☐ Using the small, internal screw, adjust the switching differential and thus also the reset-point.

When the switching differential is changed, the upper switching point SP remains unchanged, while the lower switching point is shifted by the switching differential x_d .

In general:

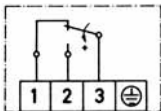


Fig. 8. Wiring diagram

With rising pressure

3-1 opens, 3-2 closes

With falling pressure

3-2 opens, 3-1 closes

$$RSP = SP - x_d$$

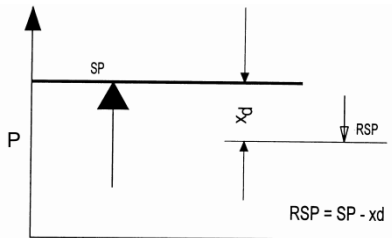


Fig. 9. Rising pressure $RSP = SP - x_d$

SP = switching point

RSP = Re-set point

x_d = switching differential (hysteresis)

p = pressure

3. Pressure Limiters with Mechanical Interlock of Switching State

(applies for DWR and roughly for DGM)

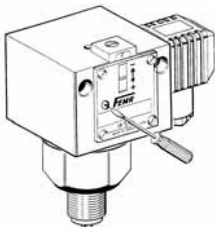


Fig. 10. Mechanical interlock

Instead of the microswitch with automatic reset, a “bi-stable” microswitch is installed in the limiters.

When the pressure reaches the value preset on the scale, the microswitch switches over and remains in this position. The catch can be released by

pressing in the unlocking button (marked on the scale side of the switching device by a red dot). The limiter cannot be unlocked until the pressure has decreased by a certain amount or, in case of interlocking at the lower switching point, is increased again.

Depending on the version, the interlock can be effective for a rising (DWR...-205 / -305) or a falling value (DWR...-206 / -306).

3.1 Technical Data as for 1.1

3.2 Electrical Connection

Maximum pressure limiting

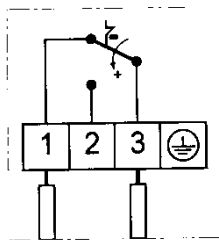


Fig. 11. DWR...-205 / -305

Switching over and interlocking on **rising** pressure

Additional function (...-205 / -305).

Connection of control circuit to terminal 1 and 3.

Minimum pressure limiting

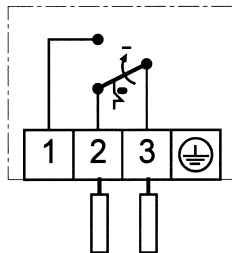


Fig. 12. DWR...-206 / -306

Switching over and interlocking on **falling** pressure

Additional function (...-206 / -306).

Connection of control circuit to terminal 2 and 3.

3.3 Pressure Connection as for 1.3

3.4 Setting as for 1.4

NOTE: In the case of maximum pressure limiters (...-205 / -305), the scale value corresponds to the upper switching point, for minimum pressure limiters (...-206 / -306) to the lower switching point.

4. Pressure Limiters with Gold-Plated Contact DWR...-213 / -313 / 363, DGM...-213 / -313 / 363

Gold-plated contacts are used exclusively in the low-voltage range in order to keep the transfer resistance at the contacts low.

4.1 Technical Data as for 1.1

Switching capacity max. 24 V DC
max. 100 mA
min. 5 V DC
min. 2 mA

At higher voltages and currents, the gold layer on the contacts will be damaged.

All other data correspond to the basic equipment.

5. Pressure Monitors in Intrinsically Safe Control Circuits DWR / DGM... -513 / -563

according to chapter 5.7 of EN 60079-11:2007, "Simple electrical apparatus"

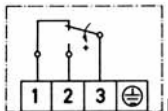


Fig. 13. Wiring diagram

Gold contacts SPDT. Switching differential not adjustable. Wiring diagram valid for maximum pressure monitoring. At rising pressure, contact 1–3 opens and 2–3 closes.

Installation only in combination with a suitable EC-type tested switching amplifier. Amplifier must be installed outside the Ex-zone. Wiring diagram of switching amplifier and valid installation guidelines for Ex-I circuits must be observed.

Operation of pressure switch only within allowed specification limits! During selection of suitable switching amplifier and planning of wiring lengths, the following parameters must be observed:

$$U_i = \max. 24 \text{ VDC} \quad L_i = 100 \mu$$

$$I_i = 100 \text{ mA} \quad C_i = 1 \text{ nF}$$

Type of Ex-protection

Ex II 1/2G Ex ia IIC T6 Ga/Gb

Ex II 1/2D Ex ia IIIC T80°C Da/Db

6. Pressure Monitors in Intrinsically Safe Circuits (Ex-i) according to ch. 5.7 of EN 60079-11, "Simple electrical apparatus"

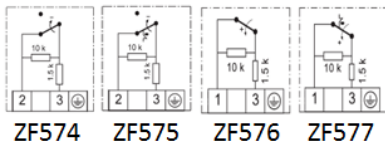


Fig. 14. Wiring diagram

The pressure monitors correspond in all technical data to the aforementioned model series. In addition, a resistor-combination is included in the switching device, which, together with a suitable Ex-proof switching amplifier, monitors the wires between the isolating amplifier and the pressure monitor for cable break and short circuit. In case of cable break or short circuit, the system switches off towards the safe side. According to its approval, the switching amplifier must be

installed outside of the Ex-zone.

Wiring of switching amplifier only according to its mounting and wiring instructions and valid standards and guidelines for intrinsic safe circuitry.

Voltage rating

U_i	14 VDC	R_i	1.5 kOhm
L_i	100 μ H	C_i	1 nF

Type of Ex-protection

Gas: II 1/2G Ex ia IIC T6 Ga/Gb

Dust: II 1/2D Ex ia IIIC T80°C Da/Db



CAUTION:

Never operate pressure monitors with resistor combinations without suitable switching amplifier. Device can overheat and burn due to overload of resistor combination.


7. Pressure Monitors in Ex-d Version Ex-DWR..., Ex-DGM...

Ex-proof pressure monitors must be supplied in the form which has been type test approved according to ATEX. Versions and additional functions are herewith not possible.

7.1 Technical Data of the Ex pressure Switches

Type of Ex-protection

CE 0035  II 2G Ex d e IIC T6 Gb

CE 0035  II 1/2D Ex ta/tb IIIC T80°C
Da/Db

Ex approval

see certificate

Ex-Zone

For zones 1, 2, 20 (at the sensor, only),
21, and 22

Type of protection

IP 65 (vertical position)

Ambient temperature

-20 to +60 °C

Max. medium temperature for pressure switches

60 °C. Higher medium temperatures are possible if the appropriate measures (e.g., installed siphon) are taken, so that permissible ranges are not exceeded on the switch.

Cable type

M16 x 1.5. For fixed installation, only.

Switching differential

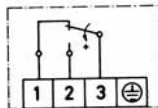
Not adjustable, approximate values see data sheet.

Fitting position

Vertically upwards.

7.2 Electrical Data**Wiring diagram**

The terminal board can be accessed after the protective casing has been removed. After connecting the supply lines, the protective casing always must be reattached.

**Fig. 15. Wiring diagram**

With increasing pressure 3–1 will be interrupted and 3–2 will be closed.

Electrical ratings of micro-switch**Voltage rating**

Up to 250 VAC

Current ratingAC: 3 A, $\cos \phi \leq 0.9$

DC: 0.1 A

Connection terminals

Tightening torque max. 0.4 Nm
Wire cross section max. 2.5 mm²
Earthing connection max. 4 mm²

7.3 Pressure Connection as for 1.3

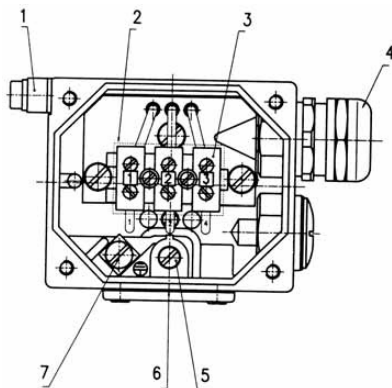
7.4 Setting of the Switching Point

The switching point can be set within the range given in the datasheet by using a screwdriver on the setting spindle.

Additionally, you should remove the terminal board casing (with 4 hexagon screws M 4). The affixing screw on the front end (above the scale) must be removed and should be reattached after setting the switching point.

Turning the setting spindle clockwise results in a lower switching point, turning anticlockwise results in a higher switching point.

The scale can be used as a guide; for more exact settings you should use a manometer.



1. Potential equalization
2. Protective casing for terminals (removable)
3. Connection terminals
4. Cable inlet M16 x 1.5
For fixed installation only!
5. Switching point adjustment
6. Locking bolt for setting spindle
7. Connection of conductive connection

Fig. 16. Setting of the switching point

7.5 Serial Numbers

All switching units and their respective terminal board casings are marked with a serial number.

When installing, make sure that the terminal board casings are not mixed up.

Important notice

When installing the Ex-proof switch units and setting them up for operation, comply with the recognized rules and guidelines for installation in Ex-areas.

For fixed installation, use only Ex-cable gland (4).



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