

Oil Moisture Sensor BCM-W

Water or moisture is just as much an undesired parameter in hydraulic and lubrication systems as particles and air, and can cause significant system damage.

The Bühler Condition Monitoring Water Sensor (BCM-W) was designed specifically to continuously monitor the water content of oil whilst also measuring the temperature. The capacitive operating principle ensures reliable information on the saturation level of the respective oil regardless of the water absorption capacity.

The BCM-W product line has a variety of functions. Starting with a pure sensor with switching- and 4-20 mA output all the way to digital communication in form of IO link, it covers all parameters. The version with display allows the display to be mounted directly to the sensor or externally.

Special features

Requires no calibration depending on the respective oil

Up to 725 psi pressure resistance

Continuously logs the relative humidity

Continuously logs the temperature

Reliable measuring system

Display version

IO-Link output

Relative humidity as well as temperature analogue outputs, parametrisable 4-20 mA, 0-5 V, 0-10 V, 2-10 V

Up to 4 PNP switching outputs

Direct or external display mounting

Sensor type

IO-Link output

Output signal 4-20 mA relative humidity and temperature

Fixed relative humidity switching output setting

G1/2" and G3/4" connection thread



Fluidcontrol

IO-Link



Technical Data BCM-WS

| Sensor versions | BCM-WS100 | BCM-WS120 | BCM-WS160 |
|----------------------------------|---|---|---|
| Max. operating pressure | 725 psi | 725 psi | 14.5 psi |
| Medium | -4 °F to +176 °F * | -4 °F to +176 °F * | -4 °F to +176 °F * |
| Threaded connection | G3/4" pipe thread, EOlastic seal | G1/2" pipe thread, EOlastic seal | Flange (DIN 24557/T2), seal FKM |
| max. torque | 20 Nm | 20 Nm | --- |
| Sensor length from seal face | 1.4 in | 1.3 in | min. 3.9 in to max. 47.2 in |
| max. flow rate | 110 lpm | 110 lpm | 110 lpm |
| max. fluid speed at sensor | 5 m/s | 5 m/s | 5 m/s |
| Chemical resistance | Mineral oil based liquids, synthetic esters and biopetroleum | Mineral oil based liquids, synthetic esters and biopetroleum | Mineral oil based liquids, synthetic esters and biopetroleum |
| Ambient temperature | -4 °F to +158 °F | -4 °F to +158 °F | -4 °F to +158 °F |
| Supply voltage (U _B) | 18 - 30 V (nominal voltage 24 VDC) 12 V on request for version 1S2A Note load | 18 - 30 V (nominal voltage 24 VDC) 12 V on request for version 1S2A Note load | 18 - 30 V (nominal voltage 24 VDC) 12 V on request for version 1S2A Note load |

*Medium temperature up to 248 °F, from 194 °F no accurate measurand output possible within the tolerances.

| Material/Version | BCM-WS100 | BCM-WS120 | BCM-WS160 |
|--------------------------------|------------------------------------|------------------------------------|--|
| Housing | Stainless steel/aluminium | Stainless steel/aluminium | Stainless steel/aluminium |
| Material in contact with media | 1.4301, 1.4571, 2.4478, FR4, glass | 1.4301, 1.4571, 2.4478, FR4, glass | 1.4301, 1.4571, 2.4478, FR4, glass |
| Weight | approx. 0.45 lb | approx. 0.37 lb | approx. 2.05 lb at L = 7.9 in / + 0.11 lb per 3.9 in |
| IP rating | IP67* | IP67* | IP67* |

*with plug-in connector screwed on

IO-Link

| | |
|------------------|---------------|
| IO-Link | Revision 1.1 |
| Baudrate | COM2 (38.4 k) |
| SIO Mode | Yes |
| min. time period | 20 ms |

Moisture measurement

| | |
|-----------------|---|
| Measuring range | 0 - 100 % rel. humidity |
| Accuracy | ± 3 % FS |
| Analog output | 4 – 20 mA (0 – 100 % relative humidity) |
| Tolerance | ± 0.5 % FS |
| Load Ω | = (U _B – 8 V) / 0.02 A |

Switching output for humidity

| | |
|---------------------------------------|--|
| PNP switching output ^{1) 2)} | Fixed to 80 % relative humidity NC (normally closed) |
| Switching current | max. 0.2 A |

¹⁾ others on request

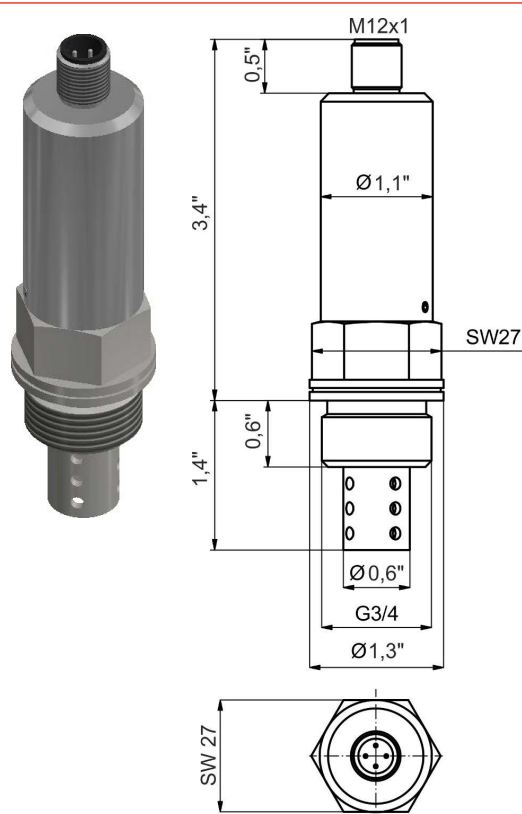
²⁾ adjustable via IO-Link

Temperature measurement

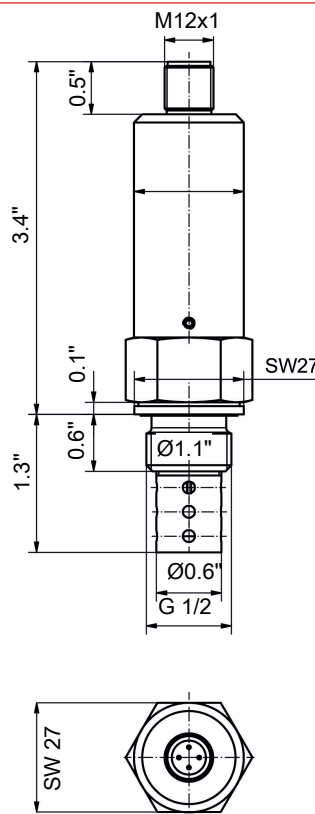
| | |
|-----------------|----------------------------------|
| Measuring range | -4 °F to 248 °F |
| Accuracy | ± 1.5 % FS |
| Analog output | 4 – 20 mA (-4 °F to 248 °F) |
| Tolerance | ± 0.5 % FS |
| Load Ω | = (U _B – 8V) / 0.02 A |

Dimensions BCM-WS

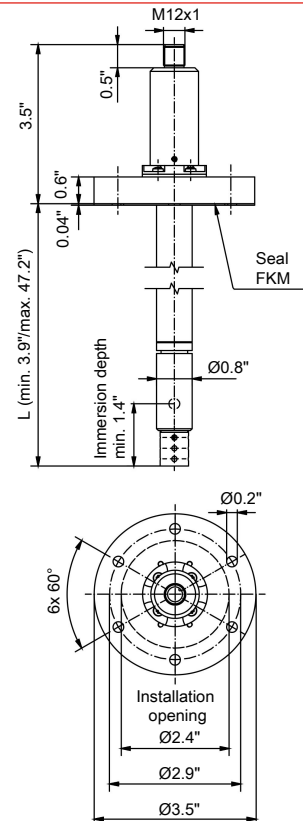
BCM-WS100



BCM-WS120



BCM-WS160



Outputs BCM-WS

| Version | 1S2A | 1D |
|-----------------------------|-----------------|-----------------|
| Plug (base) | 1 x M12 – 8-pin | 1 x M12 – 4-pin |
| Switching output (fixed) | X | |
| IO-Link | | X |
| Humidity analogue output | X | |
| Temperature analogue output | X | |

Model key BCM-WS

BCM - W S 1 0 - /

Type designation
BCM Moisture Sensor

W Humidity

Version
S Sensor

Process connection
0 G3/4
2 G1/2
6 Flange (per DIN 24557/T2)

Length (only model WS160)

Outputs

1S2A 1x switching output / 2x analog
1D Version IO-Link

Ordering example:

You require: Moisture sensor with flange connection per DIN 24557/T2, 1 fixed switching output and 1 analogue output for humidity and temperature with a length L of 280 mm

Order: BCM-WS160-1S2A/280

Pin assignment BCM-WS

| | WS-1S2A | WS-1D |
|-----------------|-------------|---------|
| | | |
| Panel plug/jack | 8-pin | 4-pin |
| | Standard | IO Link |
| Pin | | |
| 1 | L+ | L+ |
| 2 | L- | |
| 3 | S1 humidity | L- |
| 4 | | C/Q |
| 5 | | |
| 6 | I1 humidity | |
| 7 | I2 temp. | |
| 8 | | |

Technical Data BCM-WR/BCM-WD

Sensor with Display and Control Unit

General Technical Data

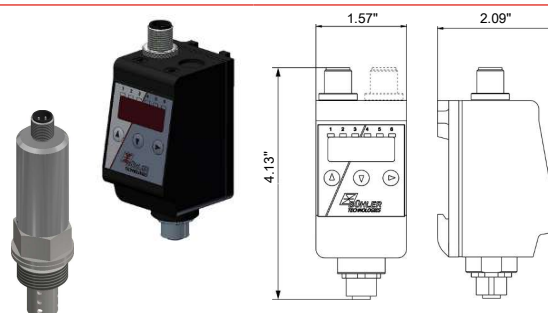
| | |
|------------------------------|---|
| Max. operating pressure | 725 psi 14.5 psi |
| Medium | -4 °F to +176 °F * |
| Threaded connection | G3/4" pipe thread, EOlastic seal |
| max. torque | 20 Nm |
| Sensor length from seal face | 1.4 in |
| max. flow rate | 110 lpm |
| max. fluid speed at sensor | 5 m/s |
| Chemical resistance | Mineral oil based liquids, synthetic esters and biopetroleums |

*Medium temperature up to 248 °F, from 194 °F no accurate measurand output possible within the tolerances.

Analysis and Display Electronics

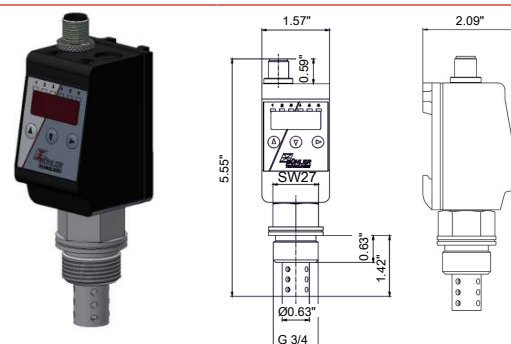
| | |
|----------------------------------|--|
| Display | 4 character 7 segment LED |
| Display unit | 0 – 100 % relative humidity |
| Operation | via 3 keys |
| Memory | Min./Max. data memory |
| Starting current input | approx. 100 mA for 100 ms |
| Current input during operation | approx. 50 mA (without current- and switching outputs) |
| Supply voltage (U _B) | 18 – 30 VDC (nominal voltage 24 VDC) |
| Ambient temperature | -4 °F to 158 °F |
| Display resolution | 0.5 %, 0.5 °C, °F |

| Version | BCM-WR remote display with sensor |
|-----------------|---|
| Mounting | 1.4 inch (35 mm) top hat rail mounting/ G3/4 |
| Weight | approx. 0.7 lb incl. sensor |
| Display housing | PA |
| IP rating | IP65* (display)/IP67* (sensor) |



* with plug-in connector screwed on

| Version | BCM-WD with attached sensor |
|-----------------|-----------------------------|
| Mounting | G3/4 / G1/2 |
| Weight | approx. 0.6 lb |
| Display housing | PA |
| IP rating | IP65* (display) |



*with plug-in connector screwed on

IO-Link

| | |
|------------------|----------------|
| IO-Link | Revision 1.1 |
| Baudrate | COM3 (230.4 k) |
| SIO Mode | Yes |
| min. time period | 10 ms |

Moisture measurement

| | |
|--------------------------------|---|
| Measuring range | 0 - 100 % rel. humidity |
| Accuracy | ± 3 % FS |
| Analog output | Parametrisable current or voltage output (4 - 20 mA, 2 - 10 V, 0 - 10 V or 0 - 5 V) |
| Tolerance | ± 0.5 % FS |
| Load Ω (current output) | $= (U_b - 8 \text{ V}) / 0.02 \text{ A}$ |

Switching outputs

| | |
|----------------------|--|
| PNP switching output | Parametrisable switching function and switching output |
| Switching current | max. 0.2 A per output |

Temperature measurement

| | |
|--------------------------------|---|
| Measuring range | -4 °F to +248 °F |
| Accuracy | ± 1.5 % FS |
| Analog output | Parametrisable current or voltage output (4 - 20 mA, 2 - 10 V, 0 - 10 V or 0 - 5 V) |
| Tolerance | ± 0.5 % FS |
| Load Ω (current output) | $= (U_b - 8 \text{ V}) / 0.02 \text{ A}$ |

Outputs BCM-WD/BCM-WR

| Version | 2S2A | 1D1S | 4S2A |
|---------------------------------|-----------------|-----------------|-----------------|
| Plug (base) | 1 x M12 – 8-pin | 1 x M12 – 4-pin | 1 x M12 – 4-pin |
| Display & remote | | | 1 x M12 – 8-pin |
| Sensor connection jack (bottom) | 1 x M12 – 8-pin | 1 x M12 – 8-pin | 1 x M12 – 8-pin |
| Remote | | | |
| Switching outputs | 2 x | 1 x | 4 x |
| IO-Link | | X | |
| Humidity analog output | X | | X |
| Temperature analog output | X | | X |

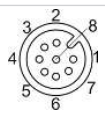
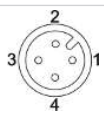
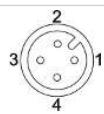
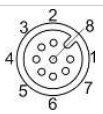

Model key BCM-WD/BCM-WR

| | | | | | | | | | | | | |
|---------------------|--|------------|--|---------------------------------------|---|--|---|--|--|--|--|--|
| Type designation | | BCM - W | | 1 | 0 | 0 | - | | | | | |
| BCM Moisture Sensor | | W Humidity | | Version | | Outputs | | | | | | |
| | | | | D Display with built-in sensor | | 2S2A 2 x switching output / 2 x analogue | | | | | | |
| | | | | R Remote display with external sensor | | 1D1S 1 x switching output / IO-Link | | | | | | |
| | | | | | | 4S2A 4 x switching output / 2 x analogue | | | | | | |
| | | | | | | Process connection | | | | | | |
| | | | | | | 0 G 3/4 | | | | | | |
| | | | | | | 2 G 1/2 | | | | | | |

Ordering example:

You require: Moisture sensor with built-in sensor, 2 PNP switching outputs and analogue output for humidity and temperature
 Order: BCM-W-D-100-2S2A

Pin assignment BCM-WR/WD

| | Plug A | | | Plug B | Sensor connection jack |
|-----------------|---|---|--|---|---|
| | WD/WR-2S2A | WD/WR-1D1S | WD/WR-4S2A | WD/WR-4S2A | WR |
| |  |  |  |  |  |
| Panel plug/jack | 8-pin | 4-pin | 4-pin | 8-pin | 8-pin |
| | Standard | IO-Link | IO-Link | | |
| Pin | | | | | |
| 1 | L+ | L+ | L+ | | L+ |
| 2 | L- | DO/S2 | S2 | | L- |
| 3 | S1 Humidity | L- | L- | S3 | |
| 4 | | C/Q | S1 | | |
| 5 | S2-Temp. | | | S4 | |
| 6 | I1 humidity | | | I1 humidity | I1 humidity |
| 7 | I2 temp. | | | I2 temp. | I2 temp. |
| 8 | | | | | |

Accessories

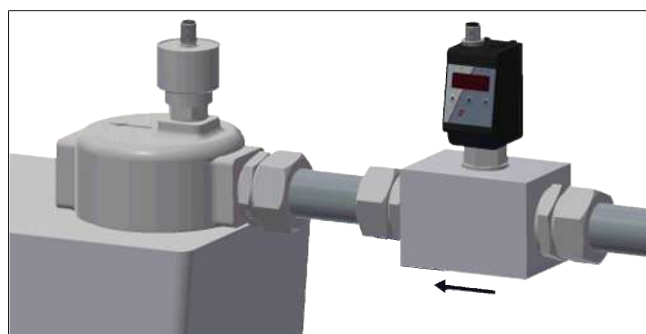
| Item no. | Description |
|----------------|---|
| 91 44 05 00 49 | Coupler cable, 3 m |
| 91 44 05 00 47 | Connecting cable, 4-pin, 5 m |
| 91 44 05 00 33 | Connecting cable, 8-pin, 5 m |
| 15 10 01 00 | Assembly block/T-piece (BCM-WS100 only) |

Installation recommendation

Proper moisture sensor function requires the entire sensor element to be inside the medium at all times. The sensor version is suitable for installation at the side of the tank. Here the installation position should be below the minimum liquid level. When installing into a return pipe, be sure not to exceed the maximum flow rate.

With the BCM-WR version the remote display mounts to a top hat rail.

Installation example:



Assembly block dimensions:

