Humidity sensor WGM

Type WGM

▶ Recording of relative humidity and temperature
▶ Data transmission 4 ... 20 mA or IO-Link
▶ Pressure resistance up to 50 bar

Features

Humidity sensors enable quick and reliable online monitoring of the water activity in hydraulic and lubricating oils.
They have the following characteristics:

▶ Permanent measurement of humidity and temperature
▶ No calibration to fit the fluid to be measured
▶ Quick indication of changes
▶ High accuracy and stability of measurements
▶ Easy connection to external control systems

Contents

Ordering codes

01		02		03		04		05		06
WGM	–		–	**1X**	/		–		–	

Type

01	Humidity sensor	**WGM**

Variant

02	Basic variant - Sensor only	**B**
	Display variant - Sensor with display	**D**
	Remote display for basic variant (connection only possible to basic variant WGM-B-1X/2A1S-G34-V)	**R**

03	Component series	**1X**

Data transmission

04	**Variant B**	Sensor 4 ... 20 mA; 2x analog output / 1x switching output	**2A1S**
	Variant B	Digital sensor; IO-Link	**1D0S**
	Variant D	Sensor with display 4 ... ... 20 mA; 2x analog output / 2x switching output	**2A2S**
	Variant D	Sensor with digital display; IO-Link / 1x switching output	**1D1S**
	Remote display (variant R) can only be combined with basic sensor WGM-B-1X/2A1S-G34-V		
	Variant R	Remote display 4 ... 20 mA; 2x analog output / 2x switching output	**2A2S**
	Variant R	Digital remote display; IO-Link / 1x switching output	**1D1S**

Process connection

05	Thread G3/4"	**G34**
	Variant R - Remote display without process connection	**0**

Sealing material

06	FKM	**V**
	Variant R - Remote display without seal	**0**

Accessories

Designation		Art. no.
Connection line for remote display M12x1, 8-pole, length 3.0 m Angled coupling and straight connector	ZWGM remote connection line	R928058029
Connection line IO-Link M12x1, 4-pole, length 5.0 m Angled coupling and braided wires	ZWGM connection line IO-Link 4-pole	R928058030
Connection line 4...20 mA M12x1, 8-pole, length 5.0 m Angled coupling and braided wires	ZWGM connection line 4...20 mA 8-pole	R928058031

Order example:

		Sensor	Connection line	Connection line
Sensor without display				
Sensor 4 ... 20 mA; 2x analog output / 1x switching output	WGM-B-1X/2A1S-G34-V	**R928057041**	**R928058031**	–
Digital sensor; IO-Link	WGM-B-1X/1D1S-G34-V	**R928057042**	**R928058030**	–
Sensor with display (directly installed display at sensor)				
Sensor with display 4 ... 20 mA; 2x analog output / 2x switching output	WGM-D-1X/2A2S-G34-V	**R928057045**	**R928058031**	–
Sensor with digital display; IO-Link / 1x switching output	WGM-D-1X/1D1S-G34-V	**R928057046**	**R928058030**	–
Remote display for activation at WGM-B-1X/2A1S-G34-V (display for external installation)				
Remote display 4 ... 20 mA; 2x analog output / 2x switching output	WGM-R-1X/2A2S-0-0	**R928057043**	**R928058031**	**R928058029**
Digital remote display; IO-Link / 1x switching output	WGM-R-1X/1D1S-0-0	**R928057044**	**R928058030**	**R928058029**

Product description

Just as particles and air, water and humidity are regarded as undesired contamination in hydraulic and lubrication systems and may cause considerable damage.
The Hengst Condition Monitoring Wasser Sensor (WGM) was particularly designed for permanent monitoring of the relative humidity in oil and enables parallel temperature measurement.
Thanks to the capacitive functional principle, reliable indication of the relative humidity of the respective oil can be ensured.
The WGM product family offers a large variety of functions. From a standard sensor with switching and 4 ... 20 mA output, down to digital communication in form of IO-Link, all parameters are covered.
The variant with display enables installation of the display directly at the sensor or externally.
A optionally available remote display enables flexible positioning. The remote display can only be combined with the basic sensor WGM-B-1X/2A1S-G34-V.
The WGM enables measurement of the relative humidity of the oil for direct indication of the saturation with water:

▶ 0 %: Absolutely dry oil.
▶ 100 %: Oil is fully saturated with water. Any water proportion exceeding this saturation is no longer dissolved and remains free water.

In contrast to humidity analysis (titration) in a laboratory, the water content is not absolutely indicated in ppm (parts per million) but the saturation of the oil is indicated by the measured relative humidity.

The water absorption capacity of mineral oils (e.g. HLP) is comparatively low. 500 ppm generally indicates oversaturation of the oil and the presence of free water.
In case of ester oil (e.g. HEES), which may contain relatively high volumes of water, the oil saturation at 500 ppm would only be 15 %.
Warm oil can dissolve more water than cold oil.
For this reason, relatively dry oil may contain free water at operating temperature after cooling.
Irrespective of the oil type and temperature, the WGM indicates the current saturation of the oil with water and offers additional safety during operation of systems by means of direct warning.
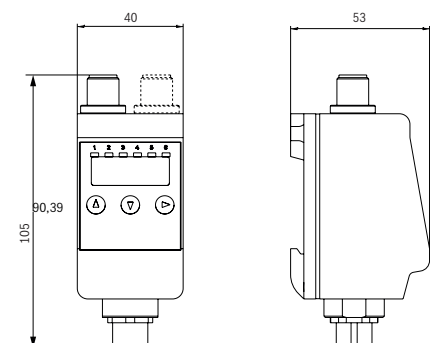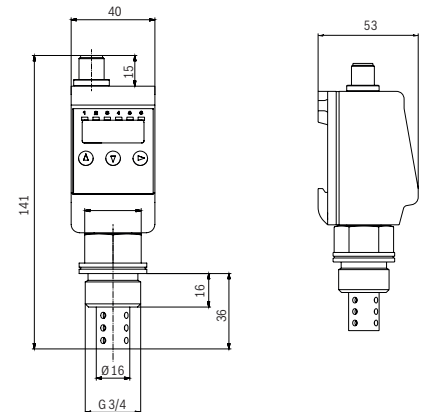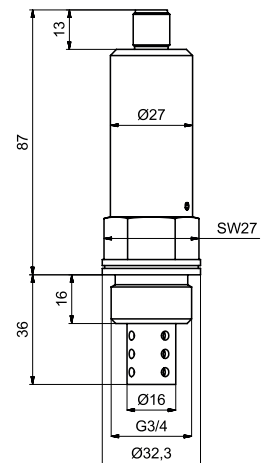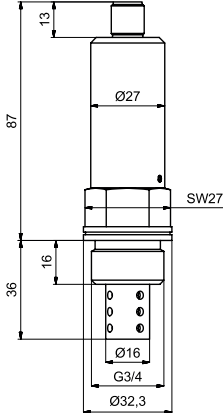
Technical data

general	
Operating pressure max.	50 bar
Medium	-20 °C ... +80 °C
Threaded connection	G3/4" pipe thread, Eolastic seal
Max. tightening torque	20 Nm
Sensor length as of sealing surface	36 mm
Max. flow velocity at sensor	5 m/s
Media resistance	Fluids based on mineral oil (other fluids on request)

Technical data WGM-B

Sensor variant WGM-B	
Ambient temperature	-20 °C ... +70 °C
Supply voltage (U_B)	18 ... 30 V (nominal voltage 24 V DC)

Material/version	
Housing	Stainless steel/aluminum
Material in contact with media	1.4301, 1.4571, 2.4478, FR4, glass
Weight	approx. 205 kg
Protection class	IP67*

*with fitted plug-in connector

IO-Link	
IO-Link	Revision 1.1
Baud rate	COM2 (38.4 k)
SIO mode	Yes
Min. cycle time	20 ms

Humidity measurement	
Measurement 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

Technical data WGM-B

Switching output for humidity	
PNP switching output [1]	Fixed setting at 80 % relative humidity
Switching current	max. 0.2 A
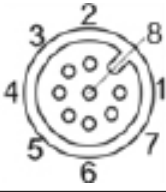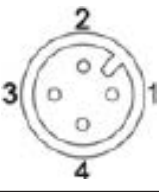
[1] Others on request

Temperature measurement	
Measurement range	-20 °C ... +120 °C
Accuracy	± 1.5 % FS
Analog output	4 ... 20 mA (-20 ... +120 °C)
Tolerance	± 0.5 % FS
Load Ω	$= (U_B - 8V) / 0.02 A$

Outputs WGM-B

Version	2A1S	1D0S
Connector (base)	1 x M12 – 8-pole	1 x M12 – 4-pole
Switching output (fixed setting)	X	
IO-Link		X
Analog output for humidity	X	
Analog output for temperature	X	

Pin assignment WGM-B

Version	2A1S	1D0S
Male/female connector	8-pole	4-pole
	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 WGM-D/ WGM-R

Sensor with display and control unit

Evaluation and indication electronics	
Display	4-digit, 7-segment LED
Indicator unit	0 ... 100 % relative humidity
Operation	using 3 keys
Memory	Storage of min./max. values
Current consumption upon switch-on	approx. 100 mA for 100 ms
Current consumption in operation	approx. 50 mA (no current nor switching outputs)
Supply voltage (U_B)	18 ... 30 V DC (nominal voltage 24 V DC)
Ambient temperature	-20 °C ... +70 °C
Display resolution	0.5 %, 0.5 °C, °F

Version	WGM-R remote display	Dimensions
Fastening	35 mm top hat rail mounting	
Weight	approx. 130 g	
Display housing	PA	
Protection class	IP65* (display)	

* with fitted plug-in connector

Version	WGM-D sensor with display	Dimensions
Fastening	G3/4	
Weight	approx. 270 kg	
Display housing	PA	
Protection class	IP65* (display)	

*with fitted plug-in connector

IO-Link	
IO-Link	Revision 1.1
Baud rate	COM3 (230.4 k)
SIO mode	Yes
Min. cycle time	10 ms

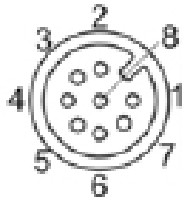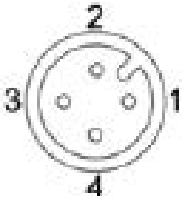| Humidity measurement	
Measurement range	0 ... 100 % rel. humidity
Accuracy	± 3 % FS
Analog output	Parameterizable current or voltage output (4 ... 20 mA, 2 ... 10 V, 0 ... 10 V or 0 ... 5 V)
Tolerance	± 0.5 % FS
Load Ω (current output)	= $(U_B – 8\ V) / 0.02\ A$

Switching outputs	
PNP switching output	Parameterizable switching function and switching output
Switching current	max. 0.2 A per output

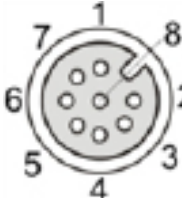| Temperature measurement	
Measurement range	-20 °C ... +120 °C
Accuracy	± 1.5 % FS
Analog output	Parameterizable current or voltage output (4 ... 20 mA, 2 ... 10 V, 0 ... 10 V or 0 ... 5 V)
Tolerance	± 0.5 % FS
Load Ω (current output)	= $(U_B – 8\ V) / 0.02\ A$

Outputs WGM-D/WGM-R

Version	2A2S	1D1S
Connector (base) Display & remote	1 x M12 – 8-pole	1 x M12 – 4-pole
Sensor connection socket (bottom) Remote	1 x M12 – 8 pole	1 x M12 – 8 pole
Switching outputs	2 x	1 x
IO-Link		X
Analog output for humidity	X	
Analog output for temperature	X	

Pin assignment WGM-D/ WGM-R

	Connector A		Sensor connection socket
	WGM-D/ WGM-R 2A2S	WGM-D/ WGM-R 1D1S	WGM-R
Male/female connector	8-pole	4-pole	8-pole
	Standard	IO-Link	IO-Link
Pin			
1	L+	L+	L+
2	L-	DO/S2	L-
3	S1 humidity	L-	
4		C/Q	
5	I2 temp.		
6	I1 humidity		I1 humidity
7	I2 temp.		I2 temp.
8			

Recommendations for installation

To ensure proper function of the humidity sensor, the sensor element must fully and constantly be immersed in the medium. Lateral tank installation can be realized with the sensor variant. The installation position should be below the minimum filling level. In case of installation in a return line, the maximum flow velocity must not be exceeded. At variant WGM-R, the remote display is attached to a top hat rail.

Guidelines and standards

The development, manufacture and assembly of Hengst products is carried out within the framework of a certified quality management system in accordance with ISO 9001:2015.
For relevant standards and directives, please refer to the CE Declaration of Conformity.