HWR350 Moisture in Oil Transmitter

Product profile

HWR350 is a fast, reliable and accurate online detector for water activity (aw) in oil and temperature (T). It is very suitable for integration in OEM application with its rugged housing and excellent performance. HWR350 is ideal for online monitoring of moisture in lubrication, hydraulic or insulation oil, which is significant for the long-term performance and preventive maintenance of plant and machinery.

Major features

- ❖ Continuous measurement of water activity in oil and temperature
- ❖ Professional calculation of moisture content in ppm for transformer oil
- ❖ Accurate and reliable, robust design under hostile environments
- ❖ Convenient local & remote calibration
- ❖ Excellent pollution & pressure tolerance
- ❖ Compact, easy for integration
- ❖ Analog and Digital Signals Output

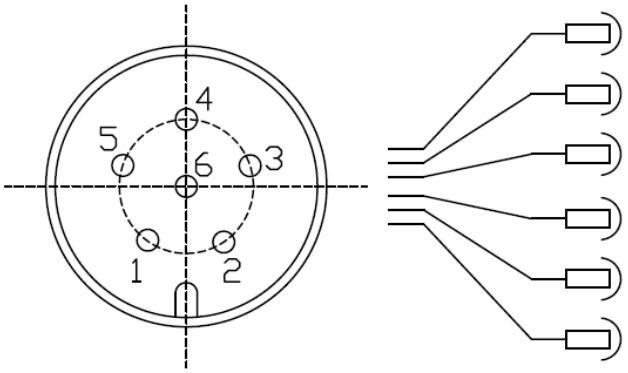
Technical Parameters

Water activity		
Measurement range	0 … 1 aw	
Accuracy	0 … 0.6	± 0.02
	0.6 … 1	± 0.03
Response time (typical)	< 1 min	
Water in oil		
Measurement range [1)]	0 … 100 ppm (suitable for Mineral transformer oil)	
Accuracy	±10%	
Temperature		
Measurement range	-40 ... 120 °C	
Accuracy (at +25 °C)	± 0.3 °C	
Working temperature	-40 ... +80 °C	
Storage temperature	-40 ... +80 °C	
Oil temperature permitted	-40 ... +120 °C	
Output		
Digital signal	RS485 MODBUS, RS232 (optional)	
Analog signal	4~20mA, resistive load=500Ω	
Others		
Housing material	304 stainless steel	
Weight	220g (transmitter), 270g(package)	
Package size	172×117×53 mm carton	
Ingress Protection	IP66	
Mechanical connections	G 1/2" ISO or 1/2" NPT	
Pressure range	Max 100 bar	
Resistance load	0 … 500 Ω	

Supply voltage	DC 9V-36V
Cable specification	M8 6 pin
Cable length	2 m
Standard applied	CE certified, EN61326-1 EN61326-2-3 standard
	ICES-003 B

[1] other measurement range is optional

Connector Definition



1— red +24VDC

2— white RS485+/A

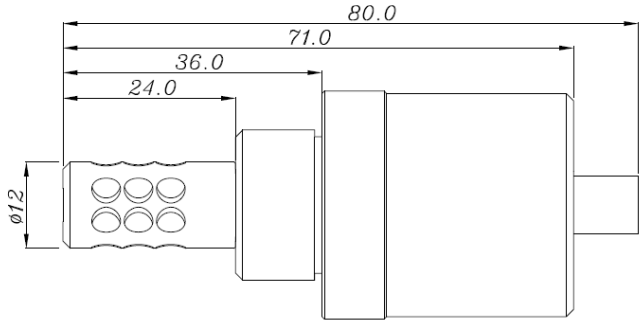
3— black 24VGND

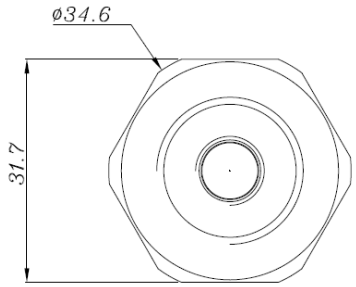
4— green RS485-/B

5— yellow 4-20mA ch1

6— pink 4-20mA ch2

Structure Dimension（mm）





Option & Parts

Stainless steel filter

USB-RS485 converter

USB-RS232 converter

Seal washer: ISO G1/2”

Connecting cable: 5m, M8 screw thread, 90°bend angle

10m, M8 screw thread, 90°bend angle

2m, M8 screw thread, with LED

PC software: OW600

Display and control unit: D350

Order info

Moisture in Oil and Temperature Transmitter		HWR350						
Measurement parameters	aw + T		A					
	ppm + T [1)]		B					
	aw + ppm + T [1)]		C					
Output	4-20mA + RS485			1				
	RS232			2				
Analog output Ch 1	T -40 ... 120°C				3			
	Others ___ ... ___ °C				4			
Analog output Ch 2	aw 0 … 1					D		
	WCO 0 … 100 ppm					E		
	WCO 0 … __ppm					F		
Mechanical connections	G 1/2” ISO						G	
	1/2” NPT						H	
Cable length	2m							5
	3m							6

1) ppm is only applicable to mineral transformer oil. If you need to measure ppm value in other oil, please contact us.

Example for order: HWR350 C13EG5
Measurement parameters: aw + ppm + T
Output: 4-20mA* 2 channel and RS485 1
channel ppm range: 0 ... 100 ppm
T range: -40 ... 120°C
Mechanical connections: G1/2” ISO
Cable length: 2m

HWR 300 / 350 / 550 variable Transmitter test guidance

1. Water content index in the oil

1. Water content: ppm, which is the absolute content, namely, the quality of water / the mass of oil, or the volume of water / the volume of oil.
2. Water activity: aw, is the relative content, namely, the ratio of the actual measured value of the moisture in the oil and the saturation value of the moisture in the oil at that temperature. Currently, domestic and foreign users tend to directly measure the oil water content of ppm; but some customers or research and development institutions are more approved for measuring water activity, as this more represents the margin of potential risk.2.

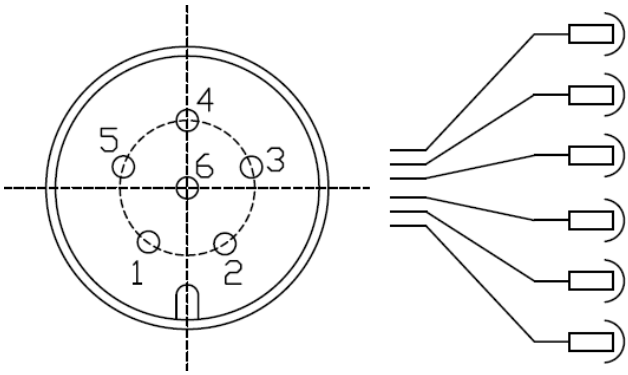
qualification	HWR300	HWR350	HWR550
Water content measurement range	N/A	0…500 ppm（1）	0…20000 ppm（2）
Water content measurement accuracy	N/A	± 5ppm or ± 10% F.S.	± 100ppm or ± 10% F.S
Range of water activity measurements	0 … 1 aw		
Precision of water activity measurement	±0.03 aw		
Temperature measurement range	-40 ...80°C		
Temperature measurement accuracy	± 0.2°C （at +25 °C ）		
response time	<1 Minutes		
communication mode	RS485, RS232,4 - 20mA, et al（3）		

Note: (1) Suitable for mineral insulating oil

(2) Suitable for mineral oil or other synthetic oils, lipids, please contact our company

(3) The RS485 is available simultaneously with the 4-20mA, and the transmitter cannot provide either the 4-20mA or the RS485 output when the RS232 communication is used

3. Wiring definition (M8 connector terminal)



1—Red + 24VDC

2—White RS485A

3—Black 24VGND

4—Green RS485B

5—Yellow 4-20mA ch1

6—Pink 4-20mA ch2

Note (4): The wiring definition in R S 232 communication mode is provided in brackets

The HWR350 Modbus RTU configuration

1. Parameter configuration

parameter	attribute
address	1
Baud rate	9600
data bit	8
parity check bit	no
stop bit	1

Table 1. Configuration of the sensor communication parameters

2. The Modbus register

Table 2 illustrates the HWR350 modbus operational registers.

Order number	Start address	FC	Word length	Memery contents	Explain
1	0x0000	0x04	2	temperature	Data type: float ABCD; unit: ℃
2	0x0002		2	wateractivity	Data type: float ABCD; unit: -
3	0x0004		2	moisturecontent	Data type: float ABCD; unit: ppm
4	0x0009	0x04	1	address	Query address
		0x06			Set the address

Note: float single-precision floating-point data meets the IEEE 754 standard

Table 2: Modbus available registers

3. Readable data

Read the HWR 350 data message example [HWR 350 address is 1, temperature T = 27.6℃, water activity aw =0.607 Water content: ppm =42.598.]

ask		respond	
realm name	(hexadecimal)	realm name	(hexadecimal)
Address	01	Address	01
FC	04	FC	04
Date start address Hi	00	Number of date bytes	0C
Date start address Lo	00	Temperature	41
Number of date words Hi	00		DC
Number of date words Lo	06		CC
CRC16 Lo	70		CD
CRC16 Hi	08	Water activity	3F
			1B
			64
			5A
		Moisture content	42
			2A
			64
			5A
		CRC16 Lo	14
		CRC16 Hi	79

Table 3 Reads the examples of HWR 350 data message

4. Query the address

Query address message example [HWR 350 current address is 1.]

ask		respond	
realm name	(hexadecimal)	realm name	(hexadecimal)
Broadcast address	00	Broadcast address	00
FC	04	FC	04
Start address Hi	90	Number of date bytes	02
Start address Lo	00	Current address	01
Number of date words Hi	00	Current address backup	01
Number of date words Lo	01	CRC16 Lo	44
CRC16 Lo	1D	CRC16 Hi	A0
CRC16 Hi	1B		

Table 4 Query HWR 350 address message

5. Set up the address

Example of setting the address message [HWR 350 Address is changed from 1 to 2.]

ask		respond	
realm name	(hexadecimal)	realm name	(hexadecimal)
Current address	01	Current address	01
FC	06	FC	06
Date start address Hi	90	Date start address Hi	90
Date start address Lo	00	Date start address Lo	00
Set the address Hi	00	Set the address Hi	00
Set the address Lo	02	Set the address Lo	02
CRC16 Lo	25	CRC16 Lo	25
CRC16 Hi	0B	CRC16 Hi	0B
CRC16 Hi	0B	CRC16 Hi	0B

Table 5 Sets the HWR 350 address message example