

EE364

Compact moisture in oil transmitter

The EE364 is an innovative moisture in oil transmitter, suitable for OEM applications. The high measurement accuracy and excellent long-term stability make the EE364 ideal for online monitoring of moisture in transformer, lubricating and hydraulic oil, as well as diesel fuel.

The compact design and rugged stainless steel housing allow a space-saving installation in the most demanding applications. The EE364 measures water activity (a_w), oil temperature (t) and calculates the absolute water content (x). The measured values are available on two 4-20mA outputs and one digital output with MODBUS RTU interface.

The analog outputs can be individually scaled and configured using the optional converter cable and the free EE-PCS Product Configuration software.



EE364

Typical applications

- Monitoring of
- Transformer oil
- Lubrication oil
- Hydraulic oil
- Engine oil
- Diesel fuel

Features

- Measurement of water activity (a_w), temperature and water content (x) in ppm
- Two configurable 4...20 mA outputs
- MODBUS-RTU interface
- Pressure rating 20 bar
- G 1/2" ISO or 1/2" NPT process connection

Technical data

Measurands

Water activity

| | | |
|--------------------------------|------------------------------|------------------------------|
| Sensor | HC1000-400 | |
| Measurement range | 0...1 a_w | |
| Accuracy at 20°C ¹⁾ | ±0.02 a_w (0...0.9 a_w) | ±0.03 a_w (0.9...1 a_w) |
| Response time t_{90} | < 10min. in still oil | |

Temperature

| | | |
|-------------------------|------------------|--|
| Sensor | Pt1000 DIN A | |
| Accuracy at 20°C in oil | ±0.2°C (0.36 °F) | |

Output

| | | |
|--|------------------------------|-------------------------|
| 2 x analogue output (freely selectable and scalable for a_w , T, ppm) | 4 - 20mA (3-wire technology) | $R_L < 500 \text{ Ohm}$ |
| Digital output | MODBUS RTU | |

General

| | | |
|-------------------------------------|-------------------------------|----------------------------|
| Supply voltage | 10 ⁺ ...28V DC | *) 10V+0.02*R _L |
| Power consumption at 24V DC | <40mA | |
| Pressure rating | 0...20 bar (0...290 psi) | |
| Housing / protection rating | Stainless steel 1.4404 / IP65 | |
| Electrical connection ²⁾ | M12x1 8-pin plug | |
| Sensor protection | Stainless steel filter | |
| Oil temperature | -40...80°C (-40...176 °F) | |
| Ambient temperature | -40...60°C (-40...140 °F) | |
| Storage temperature | -40...60°C (-40...140 °F) | |
| Electromagnetic compatibility | EN61326-1 | EN61326-2-3 |
| | Industrial environment | |



1) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2 x standard deviation).

The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).

2) Flange receptacle for self assembly included in scope of supply.

Modbus Map

The measured values are 32Bit float values. The factory-set slave ID is 243 as integer 16Bit value. This ID can be customised in the register 0x00 (value range 1 - 247 permitted). For Modbus settings please see Application Note [AN0103](#). Transmission rate factory settings are: baud rate 9600, parity even and stop bit 1.

32Bit FLOAT:

| Register address | Protocol address | Parameter name |
|------------------|------------------|------------------------------|
| 30052 | 0x33 | Water activity A_w |
| 30054 | 0x35 | Water content X_m or X_k |
| 30026 | 0x19 | Temperature T_x |
| 60101 | 0x64 | Parameter A (write) |
| 60103 | 0x66 | Parameter B (write) |

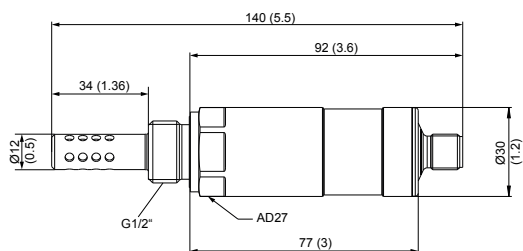
16Bit:

| Register address | Protocol address | Parameter name |
|------------------|------------------|----------------|
| 60001 | 0x00 | Slave-ID |
| 60002 | 0x01 | RS485 Setting |

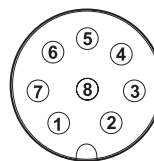
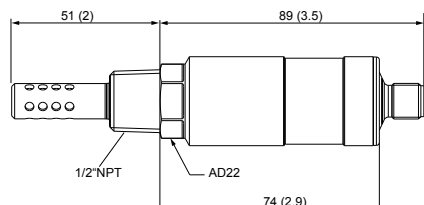
Dimensions in mm (inch)

Connection diagram

ISO



NPT



Plug

- 1...NC
- 2...RS485 B
- 3...RS485 A
- 4...Analogue output 1
- 5...Analogue output 2
- 6...GND
- 7...NC
- 8...V+

Ordering information

| MODEL | ANALOGUE | DIGITAL | PRESSURE RATING | PROCESS CONNECTION |
|---------------|----------------|------------------------|-----------------|---|
| Transmitter | (T) 4-20mA (6) | MODBUS RTU (RS485) (3) | 20bar (E) | G1/2" thread (A) 1/2" NPT thread (C) |
| EE364- | | | | |

| OUTPUT 1 | SCALING 1 ³⁾ | OUTPUT 2 | SCALING 2 | UNIT |
|---|-------------------------|-----------------|-----------------|----------------|
| Water activity (Aw) ¹⁾ | 0...100 (001) | Temperature (T) | -40... 60 (002) | metric (M) |
| Water content in mineral transformer oil (Xm) | 0...500 (002) | | 0... 80 (021) | non-metric (N) |
| Water content in customer-specific oil (Xk) ²⁾ | 0...1000 (003) | | -40... 80 (022) | |
| | | | -20... 80 (024) | |
| | | | -40...180 (052) | |
| | | | -40...140 (083) | |
| | | | 32...132 (096) | |

1) Factory setting Aw: 0...1

2) Oil-specific parameters can be determined on request.

3) Valid for Xm and Xk

Accessories (see accessories data sheet)

| | | | |
|--|---|------------------------------|----------|
| M12x1 8pin mating plug suitable for customer-specific assembly | HA010704 | Stainless steel filter | HA010110 |
| M12x1 8pin connection cable socket/flying leads 1.5m | HA010322 | Modbus - USB converter cable | HA011013 |
| M12x1 8pin connection cable socket/flying leads 5m | HA010324 | | |
| M12x1 8pin connection cable socket/flying leads 10m | HA010325 | | |
| Product Configuration Software | EE-PCS (free download: www.epluse.com/EE364) | | |

Order example

EE364-T63EA/AwT002M

Model: Transmitter
Analogue output: 4-20mA
Digital output: MODBUS RTU
Pressure rating: 20bar
Process connection: G1/2" thread

Output 1: Water activity
Output 2: Temperature
Scaling 2: -40...60
Units: metric [°C]