EE360 is dedicated for reliable monitoring of lubrication, hydraulic and insulation oils as well as diesel fuel. In addition to highly accurate measurement of water activity (aw) and temperature (T), EE360 calculates the absolute water content (x) in ppm.

**Measurement Performance**
The EE360 employs high-end E+E humidity sensing elements manufactured in state-of-the-art thin film technology, which are the prerequisite for outstanding measurement accuracy.

**Process Connection**
The sensing probe can be employed up to 180 °C (356 °F), 20 bar (290 psi) and is available with either ISO or NPT slide fitting, which allows for variable immersion depth. Using the optional ball valve, the probe can be mounted or removed even without process interruption.

**Enclosure**
The EE360 features an IP65 / NEMA 4 polycarbonate or stainless steel enclosure which facilitates installation and maintenance. The enclosure can accommodate a 100…240 V AC supply unit or various extension modules.

**Display and Outputs**
The measured data is available on two analogue outputs, on the RS485 (Modbus RTU) or Ethernet-PoE (Modbus TCP) interface and on the alarm (relay) outputs. The TFT colour display shows simultaneously up to four measurands and offers extensive setup and diagnosis features. The data logging function saves up to 20 000 measured values for each physical quantity. The logged data can be displayed graphically directly on the device or easily downloaded over the USB interface.

**Configurable and Adjustable**
The configuration and adjustment of the EE360 can be performed either using the display and the push buttons or with the free EE-PCS Product Configuration Software via the USB interface.

**Features**

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**3.5” TFT Colour Display**
- shows up to 4 measurands simultaneously
- layout and measurands freely selectable
- data logger for 20 000 values per measurand
- logged data shown graphically
- diagnosis functions
- intuitive device setup with push buttons

**Probe**
- oil temperature -40...180 °C (356 °F)
- pressure tight up to 20 bar (290 psi)
- ISO or NPT process connection
- pluggable probe option

**Ball valve set**
- probe mounting and removal without process interruption

**Enclosure**
- IP65 / NEMA 4 protection class
- polycarbonate or stainless steel
- easy mounting and service
- screws secured in cover

**Outputs**
- 2 analogue outputs current / voltage
- error indication according NAMUR
- Modbus RTU / Modbus TCP
- 2 alarm outputs
- configurable via display or software

**USB Service Interface**
- download logged data
- perform configuration, adjustment and firmware update
- 4 status LEDs

**Inspection certificate according to DIN EN 10204 – 3.1**
Measurement of water activity $a_w$ / water content $x$

The moisture in oil can be expressed in absolute or relative terms.

» **Water activity $a_w$** is the relative measure for moisture in oil. It represents the ratio between the actual amount of dissolved water and the maximum possible amount of dissolved water in the oil at a certain temperature. Independently of the oil type, the water activity shows how close to saturation is the oil at any moment in time.

\[
a_w = 0 \text{ indicates completely dry oil, while } a_w = 1 \text{ fully saturated oil.}
\]
EE360 measures directly the water activity.

» **The water content $x$** is an absolute measure equal to the amount of water in the oil. The water content is measured in ppm (parts per million) and is independent from the oil temperature. For assessing how far is the oil from saturation, $x$ must be regarded together with $T$.

EE360 calculates $x$ out of the measured $a_w$ and $T$ values. The calculation is oil dependent and requires a set of oil specific parameters.

### Dimensions in mm (inch)

**ENCLOSURE**

**Polycarbonate**

**Stainless steel**

**PROBE**

**Ball valve set 1/2" ISO or NPT**

1) Refer to ordering guide

**Minimum insertion depth**

**Maximum insertion depth**

64 mm (2.5") for 100 mm (3.94") probe
164 mm (6.5") for 200 mm (7.87") probe
364 mm (14.3") for 400 mm (15.75") probe

1) Refer to ordering guide
Technical data

**Measurands**

**Water activity (a<sub>w</sub>) / Water content (x)**

- **Measuring range**: 0...1 a<sub>w</sub> / 0...100,000 ppm
- **Accuracy**:
  - -15...40 °C (5...104 °F) ≤0.9 a<sub>w</sub> ± (0.013 + 0.3%*mv) a<sub>w</sub>
  - -15...40 °C (5...104 °F) >0.9 a<sub>w</sub> ± 0.023 a<sub>w</sub>
  - -25...70 °C (-13...158 °F) ± (0.014 + 1%*mv) a<sub>w</sub>
  - -40...180 °C (-40...356 °F) ± (0.015 + 1.5%*mv) a<sub>w</sub>

Temperature dependence of electronics, typ.

- ± 0.0001 [a<sub>w</sub>/°C] (typ. ± 5.6 * 10<sup>-5</sup> [a<sub>w</sub>/°F])

Response time at 20 °C (68 °F) / t<sub>90</sub>, typ.

- 10 min in still oil

**Temperature (T)**

- **Working range sensing probe**: -40...180 °C (-40...356 °F)
- **Accuracy**:
  - ± 0.005°C/°C

**Outputs**

- **Two analogue outputs**: 0 - 1 / 5 / 10 V -1 mA < IL < 1 mA
- **freely selectable and scalable**: 4 - 20 mA 3-wire R<sub>L</sub> < 500 Ohm
- 0 - 20 mA 3-wire R<sub>L</sub> < 500 Ohm

- **Digital interface / protocol**: RS485 / Modbus RTU, EE360 = 1 unit load
  - Factory settings: 9600 Baud, parity even, stop bit 1 / slave ID 231
  - Ethernet-PoE / Modbus TCP

**General**

- **Power supply class III (EU) / class 2 (NA)**: 8...35 V DC 12...30 V AC 100...240 V AC, 50/60 Hz
- **Current consumption at 24 V DC/AC, typ.**: 15 mA / 40 mA<sub>rms</sub> for 2 voltage outputs
  - 35 mA / 100 mA<sub>rms</sub> for 2 current outputs
  - 50 mA / 150 mA<sub>rms</sub> additional for display
  - 30 mA / 90 mA<sub>rms</sub> additional for display

- **Pressure range for pressure tight probe**: 0.01...20 bar (0.15...300 psi)

- **Probe material**: stainless steel 1.4404 / AISI 316L
- **Enclosure material**: polycarbonate, UL94-V0 approved stainless steel 1.4404 / AISI 316 L

- **Protection class**: IP65 / NEMA 4

- **Cable glands**: screw terminals max. 1.5 mm<sup>2</sup> (AWG 16)

- **Working and storage temperature range of electronics**: -40...60 °C (-40...140 °F) without display
  - -20...50 °C (-4...122 °F) with display

- **Electromagnetic compatibility**: EN 61326-1 EN 61326-2-3 ICES-003 ClassA

- **Two alarm outputs**:
  - changeover contact
  - 250 V AC / 6 A 28 V DC / 6 A

- **System requirements for EE-PCS software**: Windows XP or higher; USB port

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1) ppm output is valid in the range 0...100 °C (32...212 °F)
2) Including hysteresis, non-linearity and repeatability, traceable to intern. standards, administrated by NIST, PTB, BEV...
3) Appropriate for outdoor use, wet location, degree of pollution 2, overvoltage category II, altitude up to 3000 m (9843 ft).

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**Accuracy**

- mv = measured value
### Ordering Guide

#### Enclosure
- Polycarbonate (no code)
- Stainless steel (HS2)

#### Filter
- Stainless steel filter standard (F18)
- Stainless steel filter for high flow > 1 m/s (K5, K10, L100, L400)

#### Cable Length
- 2 m (6.6 ft) (no code)
- 5 m (16.4 ft) (K5)
- 10 m (32.8 ft) (K10)

#### Probe Length
- 100 mm (3.94") (no code)
- 200 mm (7.87") (L100)
- 400 mm (15.75") (L400)

#### Process Connection
- 1/2" ISO thread (no code)
- 1/2" NPT thread (PA25)

#### Electrical Connection
- Cable glands (no code)
- 1 plug for power supply and outputs (E4)
- 1 cable gland / 1 plug for Modbus RTU (requires option J3) (E5)
- 2 plugs for power supply / outputs and for Modbus RTU (requires option J3) (E6)
- 3 plugs for power supply / outputs and Modbus RTU (requires option J3) (E12)

#### Optional Features
- 3.5" TFT display with integrated data logger (D2)
- RS485 module - Modbus RTU (J3)
- Ethernet module - Modbus TCP (J4)
- Pluggable probe (PC4)
- Alarm outputs with cable glands (AM2)
- Integrated power supply 100...240 V AC, 50/60 Hz (AM3)

### Measurand Code for output 1 and 2 in the ordering guide

<table>
<thead>
<tr>
<th>Measurand Code</th>
<th>Mx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>°C</td>
</tr>
<tr>
<td></td>
<td>°F</td>
</tr>
<tr>
<td>Water activity</td>
<td>aw</td>
</tr>
<tr>
<td>Water content x in mineral transformer oil</td>
<td>ppm</td>
</tr>
<tr>
<td>Water content x in customer specific oil</td>
<td>ppm</td>
</tr>
</tbody>
</table>

### Order Example

**EE360-D2J3GA3GB3SBL-40SBH180**

- Enclosure: Polycarbonate (no code)
- Filter: Stainless steel filter standard (no code)
- Cable length: 2 m (6.6 ft) (no code)
- Probe length: 200 mm (7.87") (no code)
- Process connection: 1/2" ISO thread (no code)
- Electrical connection: Cable glands (PC4)
- Optional features: 3.5" TFT display with integrated data logger (D2), RS485 module - Modbus RTU (J3)

**Setup - Analogue Outputs**

**Output 1**
- Water activity (no code)

<table>
<thead>
<tr>
<th>Output Signal 1</th>
<th>Mx</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 V</td>
<td>GA1</td>
</tr>
<tr>
<td>0-5 V</td>
<td>GA2</td>
</tr>
<tr>
<td>0-10 V</td>
<td>GA3</td>
</tr>
<tr>
<td>0-20 mA</td>
<td>GA5</td>
</tr>
<tr>
<td>4-20 mA</td>
<td>GA6</td>
</tr>
</tbody>
</table>

**Output Signal 2**
- Temperature (°C) (no code)

<table>
<thead>
<tr>
<th>Output Signal 2</th>
<th>Mx</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 V</td>
<td>GB1</td>
</tr>
<tr>
<td>0-5 V</td>
<td>GB2</td>
</tr>
<tr>
<td>0-10 V</td>
<td>GB3</td>
</tr>
<tr>
<td>0-20 mA</td>
<td>GB5</td>
</tr>
<tr>
<td>4-20 mA</td>
<td>GB6</td>
</tr>
</tbody>
</table>

### Accessories (for further information, see data sheet "Accessories")

- Bracket for installation onto mounting rails (HA010203)
- Determination of oil specific parameters (ppm-cal)
- Humidity calibration kit (HA050101)
- Ball valve set 1/2" ISO (HA050104)
- Ball valve set 1/2" NPT (HA050104)

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1) Only with polycarbonate enclosure.
2) No combination of alarm output (AM2), Ethernet module (J4) and integrated power supply (AM3) is possible.
3) Integrated power supply includes 2 plugs for power supply and outputs, other plug options are not possible.
4) Both analogue outputs shall be either voltage or current.