Technical Information

Liquiline Compact CM82

Configurable multi-parameter transmitter for Memosens sensors

Space-saving transmitter for monitoring and controlling processes in industry and the environmental sector

Application

The CM82 transmitter can be used in all sectors and by plant manufacturers in these sectors and supports sensors with the blue Memosens plug-in head:

- pH sensors
- ORP sensors
- pH/ORP combined sensors
- Contacting conductivity sensors
- Oxygen sensors

Direct connection to PLC via:
- 4 to 20 mA
- HART
- Bluetooth® LE interface for commissioning and maintenance

Your benefits

- Space-saving installation and storage:
  - The two-wire device fits into an assembly and does not require a separate power supply.
  - Minimum inventory
- Maximum safety:
  - Tried and trusted Memosens technology
- Easy operation
  - Use your existing tablet and smartphone for operation and commissioning.
  - Standardized operating concept across all devices from the Liquiline platform
- Fast and reliable
  - A reliable Bluetooth® LE connection allows you to check measuring points that are dangerous or difficult to access from a safe distance.
- Suitable for all locations
  - Regardless of whether your measuring point is exposed to dust, steam, rain, snow, heat or cold, the CM82 is always exactly the transmitter you need!
Function and system design

Measuring system

The overview shows examples of measuring systems. Other sensors and assemblies can be ordered for conditions specific to your application (www.endress.com/products).

A complete measuring system comprises the following components:
- Liquiline compact transmitter
- Sensors with Memosens technology
- Assemblies to suit the sensors used

Sensor connection

Sensors with Memosens protocol

<table>
<thead>
<tr>
<th>Sensor types</th>
<th>Sensors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital sensors with inductive Memosens plug-in head</td>
<td>pH sensors</td>
</tr>
<tr>
<td></td>
<td>ORP sensors</td>
</tr>
<tr>
<td></td>
<td>pH/ORP combined sensors</td>
</tr>
<tr>
<td></td>
<td>Oxygen sensors</td>
</tr>
<tr>
<td></td>
<td>Conductivity sensors</td>
</tr>
</tbody>
</table>
Application example

Communication and data processing

Communication protocols:
- 4 to 20 mA
- Fieldbus HART
- Bluetooth® LE wireless technology (optional)

The device drivers available make it possible to perform a basic setup and display measured values and diagnostics information via the fieldbus. Full device configuration is possible via the fieldbus and Bluetooth.

Dependability

Memosens makes your measuring point safer and more reliable:
- Non-contact, digital signal transmission enables optimum galvanic isolation
- No contact corrosion
- Completely watertight
- Sensor can be calibrated in a lab, thus increasing the availability of the measuring point in the process
- Predictive maintenance thanks to recording of sensor data, e.g.:
  - Total hours of operation
  - Hours of operation with very high or very low measured values
  - Hours of operation at high temperatures
  - Number of steam sterilizations
  - Sensor condition

Reiability

Plug & Play with Memosens technology
The status of the transmitter and the connected sensor is indicated by a red/green LED.

**USP and EP**

- "Water for Injection" (WFI) as per USP <645> and EP
- "Highly Purified Water" (HPW) as per EP
- "Purified Water" (PW) as per EP

The uncompensated conductivity value and the temperature are measured for the USP/EP limit functions. The measured values are compared against the tables defined in the standards. An alarm is triggered if the limit value is exceeded. Furthermore, it is also possible to configure an early warning alarm that signals undesired operating states before they occur.

**Security**

*Safe signal transmission via Bluetooth® LE*

Signal transmission via Bluetooth® wireless technology uses a cryptographic technique tested by the Fraunhofer Institute.

Security levels for Endress and Hauser Bluetooth infrastructure: 1):
- Protocol: **High**
- Algorithms: **High**

Measured against:
- the security objectives, e.g. confidentiality, integrity, availability, etc.
- the risk analysis, e.g. key distribution, authentication, password recovery, etc.
- the attack model, e.g. motivation for attack, time required, expertise in electronics, etc.
- the weak-point analysis

For comparison: The general Bluetooth standard is classified as "Low".

Protection against unauthorized access:
- Password-protected
- Without the SmartBlue app, the device is not visible via Bluetooth® wireless technology.
- Only one point-to-point connection is established between a sensor and a smartphone or tablet.
- The Bluetooth® wireless technology interface can be disabled via SmartBlue.
- Bluetooth® is optional. The device can be ordered with this functionality enabled. If ordered with Bluetooth® disabled, Bluetooth® can be enabled at a later stage by means of an activation code (accessory kit) linked to the serial number.
- A disabled Bluetooth® interface can be re-enabled only via HART.

*Measured value compensation*

**pH:**
- Temperature

**Oxygen:**
- Temperature
- Air pressure

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1) Multi-level scale for security assessments in accordance with Fraunhofer AISEC cryptographic technique: "Very low", "Low", "High", "Very high"
**Conductivity:**
Temperature
Various methods are available to compensate for the temperature dependency:
- Linear
- NaCl (IEC 746-3)
- Water ISO7888 (20°C)
- Water ISO7888 (25°C)
- Ultrapure water (NaCl)
- Ultrapure water (HCl)

**IT security**
Our warranty is valid only if the product is installed and used as described in the Operating Instructions. The product is equipped with security mechanisms to protect it against any inadvertent changes to the settings.

IT security measures, which provide additional protection for the product and associated data transfer, must be implemented by the operators themselves in line with their security standards.

**Input**

<table>
<thead>
<tr>
<th>Measured variable</th>
<th>The transmitter is designed for digital Memosens sensors with an inductive plug-in head:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• pH</td>
</tr>
<tr>
<td></td>
<td>• ORP</td>
</tr>
<tr>
<td></td>
<td>• pH/ORP combined sensors</td>
</tr>
<tr>
<td></td>
<td>• Conductive conductivity</td>
</tr>
<tr>
<td></td>
<td>• Dissolved oxygen</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Measuring range</th>
<th>→ Documentation of the connected sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of input</td>
<td>Digital sensor inputs for Memosens-sensors</td>
</tr>
</tbody>
</table>

**Output**

<table>
<thead>
<tr>
<th>Output signal</th>
<th>4 ... 20 mA/HART, galvanically isolated from the sensor circuits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linearization</td>
<td>Linear</td>
</tr>
<tr>
<td>Transmission behavior</td>
<td>Linear</td>
</tr>
</tbody>
</table>

**Power supply**

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>12.6 to 30 VDC (when failure current setting &gt; 20 mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>14 to 30 VDC (when failure current setting &lt; 4 mA)</td>
</tr>
</tbody>
</table>
Supply voltage and load

The lower voltage value in each case applies only to a load resistance of 0 Ohm.

**NOTICE**

The device does not have a power switch

- At the supply point, the power supply must be isolated from dangerous live cables by double or reinforced insulation in the case of devices with a 24 V power supply.

## Cable specification

<table>
<thead>
<tr>
<th>Cable length:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. 3 m (10 ft)</td>
</tr>
<tr>
<td>Max. 7 m (23 ft)</td>
</tr>
<tr>
<td>Max. 15 m (49 ft)</td>
</tr>
</tbody>
</table>

## Overvoltage protection

IEC 61 000-4-4 and IEC 61 000-4-5 with +/- 1 kV

## Performance characteristics

### Resolution

Current output

- < 5 µA

### Repeatability

Documentation of the connected sensor

### Response time

Current output

\[ t_{90} = \text{max. 500 ms for an increase from 0 to 20 mA} \]

### Tolerance

Current output

**Typical measuring tolerances:**

- < ±20 µA (if current value = 4 mA)
- < ±50 µA (for current values 4 to 20 mA)

at 25 °C (77 °F) each

**Additional tolerance depending on the temperature:**

- < 1.5 µA/K
Environment

**Ambient temperature range**  
-20 to 85 °C (−4 to 185 °F)

The maximum ambient temperature depends on the process temperature and the transmitter's installation position.

- Make sure that the ambient temperature at the transmitter does not exceed 85 °C (185 °F).

Example for ambient conditions in Endress+Hauser assemblies:
- for open installation (without protective cover, i.e. free convection at the transmitter), e.g. CPA442, CPA842
- for enclosed installation (with protective cover), e.g. CPA871, CPA875, CPA842

\[ T_{\text{ambient}} = \text{max. 60 °C (140 °F)} \]

\[ T_{\text{process}} = \text{max. 100 °C (212 °F), in continuous operation} \]

\[ T_{\text{process}} = \text{max. 140 °C (284 °F), < 2h (for sterilization)} \]

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**Storage temperature**  
-40 to +85 °C (−40 to 185 °F)

**Relative humidity**  
5 to 95 %

**Degree of protection**  
IP 67  
IP 68  
NEMA Type 6

**Electromagnetic compatibility (EMC)**  
- EN 61326-1  
- EN 61326-2-3  
- EN 301489-1  
- EN 301489-17  
- NAMUR NE 21

**Electrical safety**  
EN 61010-1

**Operating height**  
< 2000 m (< 6562 ft) above MSL

**Pollution degree**

<table>
<thead>
<tr>
<th>Complete device:</th>
<th>Pollution level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal:</td>
<td>Pollution level 2</td>
</tr>
</tbody>
</table>
Mechanical construction

Dimensions

![Diagram of the Liquiline Compact CM82 with dimensions labeled: Ø18.95 (0.75), 110.8 (4.33), 99.8 (3.92), 32.75 (1.29), 114.7 (4.52), 124.6 (4.90), Ø5.5 (0.22).]

7 Dimensions in mm (inch)

Materials

<table>
<thead>
<tr>
<th>Components</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing, cover</td>
<td>Peek 151</td>
</tr>
<tr>
<td>Strain relief</td>
<td>EPDM (peroxide crosslinked)</td>
</tr>
<tr>
<td>Axial ring</td>
<td>Peek 450 G</td>
</tr>
<tr>
<td>Optical waveguide</td>
<td>PC transparent</td>
</tr>
</tbody>
</table>

Impact loads

The product is designed for mechanical impact loads of 1 J (IK06) as per the requirements of EN 61010-1.

Weight

<table>
<thead>
<tr>
<th>Weight</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>without cable</td>
<td>Approx. 42 g (1.5 oz)</td>
</tr>
<tr>
<td>3 m (9 ft) cable</td>
<td>Approx. 190 g (7 oz)</td>
</tr>
<tr>
<td>7 m (23 ft) cable</td>
<td>Approx. 380 g (13 oz)</td>
</tr>
<tr>
<td>15 m (49 ft) cable</td>
<td>Approx. 760 g (27 oz)</td>
</tr>
<tr>
<td>For every 1 m (3 ft) of cable</td>
<td>Approx. 48 g (2 oz)</td>
</tr>
</tbody>
</table>

Operability

Operating concept

- Bluetooth® LE wireless technology
- HART

Operation via SmartBlue (app)

SmartBlue is available as a download for Android terminals from the Google Play Store and for iOS devices in the App Store.

If you scan the QR code, you will be brought directly to the app:
8 Download links

9 SmartBlue app

10 Livelist

The Livelist displays all of the devices that are within range.

**System requirements**

- **iOS devices:** iPhone 4S or higher from iOS9.0; iPad2 or higher from iOS9.0; iPod Touch 5th generation or higher from iOS9.0
- **Android devices:** from Android 4.4 KitKat and Bluetooth® 4.0
11 Wiring options for remote operation via HART protocol

1. PLC (programmable logic control)
2. RIA15 loop-powered process indicator, optional
3. Junction box
4. HART operating device (e.g. Fieldcare), optional
5. Transmitter with optional Bluetooth® LE wireless technology
6. Optional: Smartphone / tablet with SmartBlue (app)

Certificates and approvals

Current certificates and approvals that are available for the product can be selected via the Product Configurator at www.endress.com:

1. Select the product using the filters and search field.
2. Open the product page.
3. Select Configuration.

Radio standards

- EN 300 328 (Europe)
- 47 CFR 15.247 (United States)
- RSS-247 Issue 1 (Canada)
- RSS-GEN Issue 4 (Canada)
- 202-LSF040 (Japan)
- CMIIT ID: 2017DJ6495 (China)
- R-CRM-E1H-CM82A (South Korea)
- Anatel 00182-18-11036 (Brazil)
- IFETEL: RCPENCM18-0926-A1 (Mexico)
- SDoC procedure (Thailand)
- IMDA Standards DA108204 (Singapore)
- CNC ID: C-23909 (Argentina)

Ordering information

Product page  www.endress.com/CM82

Product Configurator

1. Configure: Click this button on the product page.
2. Select **Extended selection**.  
   ✅ The Configurator opens in a separate window.

3. Configure the device according to your requirements by selecting the desired option for each feature.  
   ✅ In this way, you receive a valid and complete order code for the device.

4. **Apply**: Add the configured product to the shopping cart.

5. **Show details**: Open this tab for the product in the shopping cart.  
   ✅ The link to the CAD drawing is displayed. If selected, the 3D display format is displayed along with the option to download various formats.

### Scope of delivery

The scope of delivery includes:
- CM82
- Brief Operating Instructions

### Accessories

#### Device-specific accessories

#### Sensors

- **pH glass electrodes**

  - **Memosens CPS11E**
    - pH sensor for standard applications in process and environmental engineering
    - Digital with Memosens 2.0 technology
    - Product Configurator on the product page: [www.endress.com/cps11e](http://www.endress.com/cps11e)
    - Technical Information TI01493C

  - **Memosens CPS31E**
    - pH sensor for standard applications in drinking water and swimming pool water
    - Digital with Memosens 2.0 technology
    - Product Configurator on the product page: [www.endress.com/cps31e](http://www.endress.com/cps31e)
    - Technical Information TI01574C

  - **Memosens CPS41E**
    - pH sensor for process technology
    - With ceramic junction and KCl liquid electrolyte
    - Digital with Memosens 2.0 technology
    - Product Configurator on the product page: [www.endress.com/cps41e](http://www.endress.com/cps41e)
    - Technical Information TI01495C

  - **Memosens CPS71E**
    - pH sensor for chemical process applications
    - Digital with Memosens 2.0 technology
    - Product Configurator on the product page: [www.endress.com/cps71e](http://www.endress.com/cps71e)
    - Technical Information TI01496C

  - **Memosens CPS171D**
    - pH electrode for bio-fermenters with digital Memosens technology
    - Product Configurator on the product page: [www.endress.com/cps171d](http://www.endress.com/cps171d)
    - Technical Information TI01254C
Memosens CPS91E
- pH sensor for heavily polluted media
- With open aperture
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps91e
- Technical Information TI01497C

Memosens CPF81E
- pH sensor for mining operations, industrial water and wastewater treatment
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cpf81e
- Technical Information TI01594C

Enamel pH electrodes
Ceramax CPS341D
- pH electrode with pH-sensitive enamel
- Meets highest demands of measuring accuracy, pressure, temperature, sterility and durability
- Product Configurator on the product page: www.endress.com/cps341d
- Technical Information TI00468C

ORP sensors
Memosens CPS12E
- ORP sensor for standard applications in process and environmental engineering
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps12e
- Technical Information TI01494C

Memosens CPS42E
- ORP sensor for process technology
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps42e
- Technical Information TI01575C

Ceragel CPS72D
- ORP electrode with reference system including ion trap
- Product Configurator on the product page: www.endress.com/cps72d
- Technical Information TI00374C

Memosens CPF82E
- ORP sensor for mining operations, industrial water and wastewater treatment
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cpf82e
- Technical Information TI01595C

Orbipore CPS92D
- ORP electrode with open aperture for media with high dirt load
- Product Configurator on the product page: www.endress.com/cps92d
- Technical Information TI00435C

pH-ISFET sensors
Tophit CPS441D
- Sterilizable ISFET sensor for low-conductivity media
- Liquid KCl electrolyte
- Product Configurator on the product page: www.endress.com/cps441d
- Technical Information TI00352C
Tophit CPS471D
- Sterilizable and autoclavable ISFET sensor for food and pharmaceutics, process engineering
- Water treatment and biotechnology
- Product Configurator on the product page: www.endress.com/cps471d
  Technical Information TI00283C

Tophit CPS491D
- ISFET sensor with open aperture for media with high dirt load
- Product Configurator on the product page: www.endress.com/cps491d
  Technical Information TI00377C

pH/ORP combined sensors
Memosens CPS16E
- pH/ORP sensor for standard applications in process technology and environmental engineering
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps16e
  Technical Information TI01600C

Memosens CPS76E
- pH/ORP sensor for process technology
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps76e
  Technical Information TI01601C

Memosens CPS96E
- pH/ORP sensor for heavily polluted media and suspended solids
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cps96e
  Technical Information TI01602C

Conductivity sensors with conductive measurement of conductivity
Memosens CLS15E
- Digital conductivity sensor for measurements in pure and ultrapure water
- Conductive measurement
- With Memosens 2.0
- Product Configurator on the product page: www.endress.com/cls15e
  Technical Information TI01526C

Memosens CLS16E
- Digital conductivity sensor for measurements in pure and ultrapure water
- Conductive measurement
- With Memosens 2.0
- Product Configurator on the product page: www.endress.com/cls16e
  Technical Information TI01527C

Memosens CLS21E
- Digital conductivity sensor for media with medium or high conductivity
- Conductive measurement
- With Memosens 2.0
- Product Configurator on the product page: www.endress.com/cls21e
  Technical Information TI01528C

Memosens CLS82E
- Hygienic conductivity sensor
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: www.endress.com/cls82e
  Technical Information TI01529C
Oxygen sensors

**Memosens COS22E**
- Hygienic amperometric oxygen sensor with maximum measurement stability over multiple sterilization cycles
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: [www.endress.com/cos22e](http://www.endress.com/cos22e)
- Technical Information TI01619C

**Memosens COS51E**
- Amperometric oxygen sensor for water, wastewater and utilities
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: [www.endress.com/cos51e](http://www.endress.com/cos51e)
- Technical Information TI01620C

**Memosens COS81E**
- Hygienic optical oxygen sensor with maximum measurement stability over multiple sterilization cycles
- Digital with Memosens 2.0 technology
- Product Configurator on the product page: [www.endress.com/cos81e](http://www.endress.com/cos81e)
- Technical Information TI01558C

Software

**Memobase Plus CYZ71D**
- PC software to support laboratory calibration
- Visualization and documentation of sensor management
- Sensor calibrations stored in database
- Product Configurator on the product page: [www.endress.com/cyz71d](http://www.endress.com/cyz71d)
- Technical Information TI00502C

**DeviceCare SFE100**
Configuration tool for HART, PROFIBUS and FOUNDATION Fieldbus field devices
DeviceCare is available for download at [www.software-products.endress.com](http://www.software-products.endress.com). You need to register in the Endress+Hauser software portal to download the application.
- Technical Information TI01134S

Other accessories

**Activation codes**
You must quote the serial number of the device when ordering the activation code.

**Activation code: Bluetooth**
Order No. 71401176

**Cable junction with Velcro strip**
- 4 pieces, for sensor cable
- Order No. 71092051

<table>
<thead>
<tr>
<th>Communication-specific accessories</th>
<th>Commubox FXA195</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrinsically safe HART communication with FieldCare via the USB port</td>
<td>Technical Information TI00404F</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wireless HART adapter SWA70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wireless device connection</td>
</tr>
<tr>
<td>Easily integrated, offers data protection and transmission safety, can be operated in parallel with other wireless networks, minimum cabling complexity</td>
</tr>
<tr>
<td>Technical Information TI00061S</td>
</tr>
</tbody>
</table>
System components

RIA15
- Process display unit, Digital display unit for integration into 4-20 mA circuits
- Panel mounting
- With optional HART communication

Technical Information TI01043K