Operating Instructions

Liquiline M CM42

Two-wire transmitter for oxygen measurement with digital sensors

Part 1: Commissioning
Overview of documentation supplied

Operating Instructions
The Operating Instructions are split into two parts:

- **Commissioning**
  - Description of your device
  - All steps that you have to carry out **once only** during initial commissioning

- **Operation**
  - Software description
  - Troubleshooting
  - All steps that you have to carry out during the **routine operation** of your device, depending on your measuring task

⚠️ Note!
This part of the Operating Instructions is the documentation on **commissioning**.

CD-ROM
Contents:
- Communication
- Overview of analytical measuring technology
- Accessories
- Safety
- Ordering information

**In addition**
- 1 manufacturer's certificate
- Adhesive labels:
  - Replacement nameplate (landscape format)
  - Wiring adhesive label
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1 Safety instructions

1.1 Designated use

Liquiline CM42 is a two-wire transmitter for liquid analysis in all areas of process engineering:

- Chemical processes
- Pharmaceutical industry
- Food technology
- Applications in hazardous areas

If the device is used for any purpose other than that described, this poses a threat to the safety of people and the entire measuring system and is thus not permitted.

The manufacturer does not accept liability for damage caused by improper or non-designated use.

1.2 Incoming acceptance, transport, storage

- Make sure the packaging is not damaged!
  Inform your supplier of any damage to the packaging.
  Please keep the damaged packaging until any issues have been resolved.

- Make sure the contents are not damaged!
  Inform your supplier of any damage to the contents.
  Please keep the damaged goods until any issues have been resolved.

- Check the scope of delivery against the delivery papers and your order to ensure it is complete and nothing is missing.

- Pack the product in such a way as to protect it reliably against impact and moisture for storage and transportation. Optimum protection is provided by the original packaging materials. In addition, the permitted ambient conditions must be observed (see Technical data).

- If you have any queries, please contact your supplier or local sales center.

1.3 Installation, commissioning and operation

Observe the following points:

- Installation, commissioning, operation and maintenance of the measuring system must only be carried out by trained technical personnel.
  The technical personnel must be authorized to perform the tasks by the owner-operator.

- The electrical connection may only be established by an electrical technician.

- The technical personnel must have read and understood these Operating Instructions and must follow the instructions they contain.

- Prior to commissioning the entire measuring point, check that all connections are correct.
  Make sure that electric cables and hose connections are not damaged.

- Do not commission damaged products. Protect them against unintentional startup. Label and identify the damaged product as defective.

- Faults at the measuring point may only be rectified by authorized and properly trained personnel.
If the faults cannot be eliminated, take the products out of service and protect them against unintentional startup.

Repairs not described in these Operating Instructions may only be carried out directly at the manufacturer’s or by the Service Organization.

1.4 Operational safety

The transmitter is designed to meet state-of-the-art safety requirements, has been tested and left the factory in a condition in which it is safe to operate.

The applicable regulations and European standards have been taken into account.

As the user, you are responsible for observing the following safety regulations:

- Guidelines for explosion protection
- Installation guidelines
- Local standards and regulations

1.5 Safety instructions for electrical equipment in hazardous areas

The transmitter meets the requirements of Explosion Protection Directive 94/9/EC and is suitable for use in hazardous areas.

The harmonized standards or normative documents applied are listed in the EC declaration of conformity.

- The transmitter is an intrinsically safe electrical apparatus, equipment group II, equipment category [1]2 G / 3 D, for use in Zone 1 or Zone 22.
- The transmitter may only be connected to suitable transmitter power supply units or to fieldbus systems as per the FISCO model.
- You can connect suitable sensors, which may be arranged in Zone 0, to the sensor circuits.
- Please observe the information provided in the Operating Instructions on the characteristic values of the input and output circuits.
- Only genuine spare parts may be used for maintenance and repair work on the device. This work may only be carried out by service staff or specially trained and authorized personnel.
- If you have connected this device to a non-intrinsically safe power supply, you must **no longer** use it in a hazardous area or in intrinsically safe circuits!

1.6 Return

If returning the transmitter, please send it *cleaned* to your sales center.

Use the original packaging when returning the device.
1.7 Notes on safety conventions and icons

1.7.1 Warnings

Warning!
This symbol alerts you to dangers. If the warning is not observed, this can result in serious injury to people or damage to property.

Caution!
This symbol alerts you to possible malfunctions resulting from incorrect operation. If not observed, this could result in damage to property.

Note!
This symbol indicates important items of information.

1.7.2 Document symbols

→ 1 This symbol stands for a cross-reference to a certain page (e.g. Page 1).

→ 2 This symbol stands for a cross-reference to a certain graphic (e.g. Fig. 2).
2 Identification

2.1 Device designation

2.1.1 Nameplate

Nameplates can be found:
- On the outside of the housing (lasered)
- On the packaging (adhesive label, portrait format)
- On the adhesive label sheet provided (landscape format, for your own use)

Compare the data on the nameplate with your order.

The nameplate provides you with the following information on your device:
1. Order code
2. Serial number
3. Device version
4. Measuring range(s)
5. Input, output values
6. Approvals (depending on the version ordered)
7. Protection class
8. Ambient temperature range
9. Approval symbols
10. Safety notices, warnings

2.1.2 Serial number and order code

The order code and serial number of your device can be found in the following locations:
- On the nameplate
- On the front page of the Operating Instructions
- In the delivery papers

Note!
- The documentation only contains information that was valid at the time of delivery.
- If you have any queries, please contact your local sales center.
2.1.3 Product structure

<table>
<thead>
<tr>
<th>Sensor input</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>No module</td>
</tr>
<tr>
<td>C</td>
<td>Conductivity, conductive measurement, analog sensor</td>
</tr>
<tr>
<td>F</td>
<td>Conductivity, inductive measurement, analog sensor</td>
</tr>
<tr>
<td>K</td>
<td>Digital sensor: conductivity, conductive measurement</td>
</tr>
<tr>
<td>M</td>
<td>Digital sensor: pH/ORP measurement, glass sensor</td>
</tr>
<tr>
<td>N</td>
<td>Digital sensor: pH measurement, ISFET sensor</td>
</tr>
<tr>
<td>O</td>
<td>Digital sensor: amperometric oxygen measurement</td>
</tr>
<tr>
<td>P</td>
<td>pH (glass/ISFET) or ORP, analog sensor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Approval</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>G</td>
</tr>
<tr>
<td>H</td>
</tr>
<tr>
<td>N</td>
</tr>
<tr>
<td>P</td>
</tr>
<tr>
<td>S</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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</tr>
</thead>
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<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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</tr>
</thead>
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<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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</tr>
</thead>
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<td>0</td>
</tr>
<tr>
<td>1</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Cable entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Software</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>EB</td>
</tr>
<tr>
<td>EC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Device language</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
</tr>
<tr>
<td>E</td>
</tr>
<tr>
<td>F</td>
</tr>
<tr>
<td>S</td>
</tr>
<tr>
<td>Z</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Additional fittings</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

Note! Please ask your sales office for other device versions, e.g. other software or documentation languages.
2.2 Scope of delivery
- 1 transmitter in the version ordered
- 1 wall securing unit incl. 4 flat head screws
- 1 sheet of adhesive labels (nameplates, terminal connection diagrams)
- 1 Operating Instructions Part 1, BA381C "Commissioning"
- 1 Operating Instructions Part 2, BA382C "Operation"
- 1 CD-ROM with additional documentation

If you have any queries, please contact your supplier or local sales center.

2.3 Reordering documentation

What to order?
- Reordering lost documentation or documentation of which several copies are required:
  You must quote the serial number of your device.
  You receive the same documentation as received with the delivery.
- First time ordering appropriate documentation for devices which you have assembled yourself
  by installing a module:
  You have to indicate the order code the device corresponds to after installing the module.
  Specify a serial number also.
  You receive the documentation to suit your newly modified device.

How to order?
- By Internet (www.endress.com/liquiline-documentation → 2):
  You receive PDF files of both parts of the Operating Instructions.
- Through your sales center:
  Indicate you want the documentation as hard copy.

Fig. 2: www.endress.com/liquiline-documentation
2.4 Certificates and approvals

2.4.1 CE mark: declaration of conformity

With this declaration, the manufacturer guarantees that the product conforms to the regulations of European Directive 89/336/EEC and Ex Directive 94/9/EC. This is proven by observing the standards listed in the declaration of conformity.

Note!
- The declaration of conformity is provided in the appendix to these Operating Instructions.
- The EC type-examination certificate can be found under the "Certificates" category on the CD-ROM supplied.

2.4.2 Notified body

The type-examination certificate for the product Liquiline M CM42-*G********* was issued by the following notified body in accordance with Article 9 of the EC Directive 94/9/EC (ATEX Directive):

TÜV Product Service
Munich
3 Device description

3.1 Housing closed

Fig. 3: CM42 with closed display cover

3.2 Housing open

Fig. 4: With open display cover (without wiring)
4 Installation

4.1 System setup

A complete system consists of:
- Liquiline M CM42
- An installation assembly, e.g. CPA442 or retractable assembly, e.g. CPA475
- A digital oxygen sensor with Memosens technology: e.g. COS21D
- A measuring cable: CYK10
- A programmable logic controller (PLC) with Profibus interface incl. PC and operating software, segment coupler and Profibus-PA terminating resistor
4.2 Installation conditions

4.2.1 Dimensions

Fig. 6: Dimensions
4.2.2 Mounting plate

4.2.3 Weather protection cover

Note!
When installing outside, always use the weather protection cover (see 'Accessories', CD-ROM) to protect the transmitter against rain and snow.

Note!
To mount the weather protection cover on pipes or round posts, you additionally require a round post mount, → "Accessories".
4.3 Installation instructions

4.3.1 Wall or field mounting

There are many ways of mounting the device:
- Wall mounting
- Mounting on a vertical pipe or post (round or square)
- Mounting on railing or on a horizontal pipe (round or square)

Note!
You require the post mount to mount on a pipe or post. This is an accessory and is not included in the scope of delivery (see "Accessories").
4.3.2 Panel mounting

**Note!**
- For panel mounting, you need the installation kit consisting of tensioning screws and a front seal. This is an accessory (see "Accessories") and is not included in the scope of delivery.
- If installing the units **above one another**, you must observe a minimum distance for the cable glands of the upper device.
- If installing the units **beside one another**, you must observe a minimum distance for opening the front of the housing.
- If arranging in a **square**, you must take into account the lengths of the mounting plates at the rear of the device or the cable glands for minimum spacing distance.

---

Fig. 11: Mounting on a horizontal pipe/railing

1 CM42 (as delivered)
2 Securing screws (post mount)

Fig. 12: Side view

3 Mounting plate (post mount)
4 Pipe or railing

Fig. 13: Wall mounting (optional weather protection cover)
4.4 Post-installation check

- After installation, check the transmitter for damage.
- Check whether the transmitter is protected against moisture and direct sunlight.
5  Wiring

5.1  Quick wiring guide
5.1.1 Temperature ranges

<table>
<thead>
<tr>
<th>Temperature class</th>
<th>T4</th>
<th>T6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature $T_a$</td>
<td>$-20 \text{ to } +55 , ^\circ\text{C}$</td>
<td>$-20 \text{ to } +50 , ^\circ\text{C}$</td>
</tr>
</tbody>
</table>

Note!
If the ambient temperatures specified are observed, no impermissible temperatures occur at the transmitter for the temperature class in question.

5.1.2 Electrical connection data

Suitable for use in a FISCO system

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. input voltage $U_i$</td>
<td>17.5 V</td>
</tr>
<tr>
<td>Max. input current $I_i$</td>
<td>380 mA</td>
</tr>
<tr>
<td>Max. input performance $P_i$</td>
<td>5.32 W</td>
</tr>
<tr>
<td>Max. inner inductance $L_i$</td>
<td>Negligible</td>
</tr>
<tr>
<td>Max. inner capacitance $C_i$</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

Intrinsically safe sensor circuit in type of protection: EEx ia IIC

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. output voltage $U_o$</td>
<td>5.04 V</td>
</tr>
<tr>
<td>Max. loop current $I_o$</td>
<td>80 mA</td>
</tr>
<tr>
<td>Max. output performance $P_o$</td>
<td>112 mW</td>
</tr>
</tbody>
</table>

For connecting the measuring cable CYK10

5.2 Electrical connection

Warning!
- The electrical connection may only be established by an electrical technician.
- The electrical technician must have read and understood these Operating Instructions and must follow the instructions they contain.
- Prior to beginning any wiring work, make sure voltage is not applied to any of the cables.
5.2.1 Opening the housing

1. Loosen the four screws on the front with a Phillips screwdriver:

Caution!

Do not use any sharp or pointed objects, such as a screwdriver, knife etc., to open the housing. Otherwise, you might damage the housing seal, scratch the housing etc.

2. Open the housing:

Caution!

Do not use any sharp or pointed objects, such as a screwdriver, knife etc., to open the housing. Otherwise, you might damage the housing seal, scratch the housing etc.

5.2.2 Housing grounding

Caution!

You must connect the outer ground connection of the housing to the foundation ground with a separate line (GN/YE) \(\geq 2.5 \text{ mm}^2 \geq 14 \text{ AWG}\).
5.2.3 Cable grounding in housing

Note!
- If possible, only use terminated genuine cables.
- Ground the sensor cable in the housing of the transmitter as shown in the following diagrams (sample cable, does not necessarily correspond to the original cable).
5.2.4 Cable terminals

1. Insert a suitable screwdriver into the opening of the terminal spring (square opening) until the stop.

Fig. 20: Opening the terminal

2. Insert the terminated cable end into the terminal opening (round opening).

Fig. 21: Inserting the cable

3. Remove the screwdriver. Make sure the cable is securely positioned in the terminal.

Fig. 22: Releasing the terminal spring

5.2.5 Signal output / power supply

Permitted supply voltage

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Voltage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profibus PA</td>
<td>9 to 17.5 V DC</td>
</tr>
<tr>
<td>Bus current consumption:</td>
<td>22 mA</td>
</tr>
</tbody>
</table>

Note!

Use a fieldbus cable grounded on both sides (device and PCS).

There are three possible ways of connecting:

1. Two-wire cabling shielded on both sides, "hard grounding" (generally to be given priority over "capacitive connection to ground")

2. Shielded two-wire cabling, "capacitive connection to ground" (shield grounded on device side via capacitor, "C-module" accessory required) Use if there is the risk of large potential equalization currents.

3. Use the fieldbus connection socket
Version 1: "Hard grounding"
- Position the cable shielding on the "fixing plate".
- Connect the cable cores as per the assignment (→ Fig. 23).

Version 2: "Capacitive connection to ground"
- Pull back the braided shield, put the stranded extension wire of the C-module (item 1) onto the exposed shield and tighten the clip:
- Position the extension wire on the "fixing plate".
- Connect the cable cores as per the assignment (→ Fig. 25).
Version 3: "Fieldbus connection socket" (accessory):
- Screw the fieldbus connection socket into the housing bushing.
- Trim the connection cores of the socket to approx. 15 cm.
- Connect the cable cores as per the assignment. In doing so, you must position the cable shielding [GN/YE] on the "fixing plate" (→ Fig. 27).
5.2.6 Sensor connection

Explanation of abbreviations in the following diagrams:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>U_+</td>
<td>Signals of the digital sensor</td>
</tr>
<tr>
<td>U_–</td>
<td></td>
</tr>
<tr>
<td>Com A</td>
<td></td>
</tr>
<tr>
<td>Com B</td>
<td></td>
</tr>
</tbody>
</table>

Note!
- Cable colors indicated as per IEC 757 (see CD–ROM).
- You must connect shielded connections and terminals with functional ground (±) (for plastic housings).

![Fig. 29: View in device (sensor module)](image1)

![Fig. 30: Wiring diagram](image2)
5.3 Post-connection check

Device state and specifications
1. Are the transmitter and cables free from damage on the outside?

Electrical connection
2. Are the mounted cables strain relieved?
3. Are the cables run without loops and cross-overs?
4. Are the signal lines correctly connected in accordance with the wiring diagram?
5. Have you positioned unused connection wires on the "fixing plate"?
6. Are all the connection wires securely positioned in the cable terminals?
7. Are all the cable entries installed, tightened and sealed?

⚠️ Warning!
Only put the transmitter into operation if you can answer yes to all these questions. Otherwise, safe operation cannot be guaranteed. In such instances, the manufacturer does not accept any liability for the device.

6 Commissioning

6.1 Function check

⚠️ Warning!
- Check that all connections have been established correctly.
- Make sure that the supply voltage matches the voltage indicated on the nameplate!

6.2 Configuring the device address

The address must always be configured for a PROFIBUS-PA device. If the address is not configured correctly, the measuring device is not recognized by the process control system. All devices are delivered from the factory with the address 126. You can use this address to check the function of the device and to connect to a PROFIBUS-PA network. You then have to change this address to integrate additional devices.

The following methods are available for configuring the address:
1. By means of PROFIBUS communication
2. By means of hardware settings (DIL switch).

⚠️ Note!
- Valid device addresses are in the range from 0 to 126.
- Each address may only be assigned once in a PROFIBUS-PA network.
6.2.1 Configuring the device address by means of PROFIBUS communication

You configure the address by means of the "Set Slave Adr" service.

Note!
You can only configure the address via the bus if DIL switch 8 is set to "On" (= factory setting).

6.2.2 Configuring the device address by means of hardware (DIL switch)

To configure the device address, you must open the housing and change the keys of the DIL switch on the CPU module.

You set the address (0 to 126) using keys 1–7. To do so, you must set key 8 to the "Off" position (= hardware setting).

You can set any number between 0 and 126 by using binary code, e.g.:

- 0:

- 1 (20=1):

- 18 (21+24=2+16=18):

6.3 Device master and type files

The device master file (GSD) is needed to configure a PROFIBUS-DP network. The GSD (simple text file) contains information on the data transmission rate the device supports or what digital information the PLC receives from the device and in what format.

Note!
Every device is given an ID number by the PROFIBUS User Organization (PNO). The name of the device master file (GSD) is derived from this.

For Endress+Hauser, the ID number always starts with "15XX".

6.4 Quick Setup (local operation)

1. Connect the supply voltage.
2. Wait for the initialization to be complete.
3. Completely work through the "Quick Setup" submenu in "PARAM".
6.4.1 Menu structure

<table>
<thead>
<tr>
<th>Function name of display (local operation)</th>
<th>Bus parameter name</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARAM</td>
<td>BUS_NAME</td>
</tr>
<tr>
<td>Quick Setup</td>
<td></td>
</tr>
<tr>
<td>Language</td>
<td>DISPLAY_LANGUAGE</td>
</tr>
<tr>
<td>TAG number</td>
<td>TAGNUMBER_INFO</td>
</tr>
<tr>
<td>Date format</td>
<td></td>
</tr>
<tr>
<td>Set date</td>
<td></td>
</tr>
<tr>
<td>Time format</td>
<td></td>
</tr>
<tr>
<td>Set time</td>
<td></td>
</tr>
<tr>
<td>Measured value</td>
<td>MEASURE_OPERATING_MODE</td>
</tr>
<tr>
<td>Concentration</td>
<td>CONCENTRATION_UNIT</td>
</tr>
<tr>
<td>(Measured value=“Concentration”)</td>
<td></td>
</tr>
<tr>
<td>Temperature unit</td>
<td>DISPLAY_UNIT_TEMPERATURE</td>
</tr>
</tbody>
</table>

6.4.2 Configuration options

The abbreviation "AC" is used in the table header. AC stands for "Access Controls", i.e. read and write authorization.

The table only indicates the rights of the "Maintenance" user group as the "Specialist" group has administrator status and thus always has full rights (→ "Commissioning/User administration").

- R = Read only, i.e. the maintenance engineer can only read the data
- R/W = Read/Write, i.e. as a maintenance engineer, you can also change values.

Note!
The access controls do not take effect until password protection has been activated!

<table>
<thead>
<tr>
<th>Function</th>
<th>Options</th>
<th>AC</th>
<th>Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td>Options</td>
<td>R/W</td>
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<td>Language ordered</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Factory setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Language ordered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date format</td>
<td>Options</td>
<td>R/W</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MM.DD.YYYY</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MM.DD.YYYY</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Factory setting</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>DD.MM.YYYY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Set date</td>
<td>Depends on the format DD.MM.YYYY</td>
<td>R/W</td>
<td></td>
</tr>
</tbody>
</table>
6.5 User administration

To protect the device against unwanted or unauthorized access, you can assign an access code to the menu.

Note!
The factory setting for the access code is an empty field (= no entry). The prompt to enter a password is deactivated. Setting is possible for everyone.

Assigning/changing access codes:

1. Go to PARAM menu, "General settings"/"User administration".
2. Select the type of protection:
   - No password protection (= factory setting).
   - Password protection per code entry.
3. If you select "Enter code", select the user role and assign a password to each of the user roles.
6.5.1 User roles and access authorization

If the password protection has been defined and activated, you have to log in with the appropriate user role before you can make changes to the settings in the menu. Here, you will be prompted by the device to enter an access code as soon as you want to configure a value:

User roles and access authorization (factory setting):

<table>
<thead>
<tr>
<th>Maintenance</th>
<th>Specialist</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Read and, sometimes, write access in the PARAM and DIAG menus</td>
<td>Admin status:</td>
</tr>
<tr>
<td>• Read and write access in the calibration menu</td>
<td>• Read and write access in all menus</td>
</tr>
<tr>
<td></td>
<td>• Change the access authorization for other user groups</td>
</tr>
</tbody>
</table>

Note!
If you are logged in as the "Specialist" (= Administrator), you can change the access authorization of all other user groups:

1. Select a software function for which you want to assign authorization to, or take authorization from, another user group.
2. Press and hold down the navigator button for at least 3 seconds.
The display shows all the user groups and the current access authorization to the function selected.
3. Use the navigator to change the authorization in question and confirm with "OK".
4. Make a note of the changes in your operating logbook or similar.

6.6 Calibration

Calibration is necessary:
- After periods of standstill
- At sensible, process-dependent intervals
6.6.1 Calibrate

Proceed as follows to calibrate the sensor:

1. Remove the sensor from the process.
2. Clean the sensor.
3. Press the soft key for "CAL".
4. Follow the instructions in the menu.
5. Finish calibrating by switching back to the measuring mode.
6. Install the sensor back into the process.

Your measuring point is now ready for operation.

Note!
- If calibration is aborted using ESC, or if the calibration is faulty, the system continues to use the original calibration data. A calibration error is shown as plain text on the display.
- Any offset set is automatically deleted after accepting the calibration.

1) Depending on the process conditions, the intervals can range from several times daily to once quarterly.
7 Maintenance

7.1 Cleaning
Clean the front of the housing with usual commercial cleaning agents.
The front is resistant to the following in accordance with DIN 42 115:
- Alcohol (briefly)
- Diluted acids (max. 2% HCl)
- Diluted alkalis (max. 3% NaOH)
- Soap-based household cleaner

Caution!
Never use any of the following for cleaning purposes:
- Concentrated mineral acids or alkalis
- Benzyl alcohol
- Methylene chloride
- High-pressure steam

7.2 Maintenance of certified devices

Caution!
Please note the following:
- Ex-certified devices may only be altered, maintained or repaired by qualified personnel or by the Service Team of the manufacturer.
- Make sure applicable standards, national Ex-area regulations and the safety instructions in the Operating Instructions and certificates are observed.
- Only use genuine spare parts from the manufacturer.
- When ordering spare parts, note the device designation on the nameplate. Parts can only be replaced by like parts.
- Only the manufacturer’s Service Team may convert a certified device to another certified version.
- Document every repair and every conversion.
8 Troubleshooting – hardware

8.1 Replacing modules

Exchange modules when replacing defective modules or in the event of changes to the configuration of your device.

1. Disconnect Liquiline from the power supply and open the housing.
2. Remove the cable connections from the module you want to replace.
3. Pull out the two removal aids on the module until the stop (→ Fig. 31).
   The module can now be easily removed from the DIN rail.
4. Slide the new module into the guides (→ Fig. 32, → Fig. 33, → Fig. 34).
5. Push the two removal aids on the module in the direction of the DIN rail until the stop.
   This locks the module onto the DIN rail.
6. Connect the cables in accordance with the wiring diagram (see "Wiring").
7. Close the housing, connect the sensor and check that the entire measuring system is working correctly.
8.2 Spare parts

Please refer to the following table for item names and order numbers for spare parts.

Fig. 35: Exploded view
<table>
<thead>
<tr>
<th>Item</th>
<th>Kit CM42</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Housing base, stainless steel, M20 (^1)</td>
<td>51517455</td>
</tr>
<tr>
<td></td>
<td>■ Base</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Plate M20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Fixing plate cpl. SS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ 3 threaded joints M20x1.5 (item 14)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>CPU module, PA+FF, Ex: ATEX</td>
<td>71035183</td>
</tr>
<tr>
<td></td>
<td>■ FMPA1 insertion module (FC2W1+FBPA1), Ex</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Terminal strip (item 3)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>CPU module terminal set, PA+FF</td>
<td>51517482</td>
</tr>
<tr>
<td>4</td>
<td>Ribbon cable for stainless steel housing</td>
<td>51517502</td>
</tr>
<tr>
<td></td>
<td>■ 1 cable, conf. 40xAWG28 EX, 130 mm (5.1&quot;) crimp</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Hinge for stainless steel housing</td>
<td>51517501</td>
</tr>
<tr>
<td></td>
<td>■ Hinge module CM42 SS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ 2 cheese head screws M4x8 A2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>DAT chip with software</td>
<td>51517509</td>
</tr>
<tr>
<td></td>
<td>■ FMDC1 FTC electronics BG EX</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Top housing section, stainless steel, with display</td>
<td>51517461</td>
</tr>
<tr>
<td></td>
<td>■ Display, keys, navigator, screws and cover plate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Hinge (item 5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Ribbon cable (item 4)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Inp. module conductivity, conductive measurement, Ex</td>
<td>51517467</td>
</tr>
<tr>
<td></td>
<td>■ FSLC1, insertion module, cond. conductivity, Ex</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Terminal strip (item 9)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Inp. module conductivity, inductive measurement, Ex</td>
<td>51517468</td>
</tr>
<tr>
<td></td>
<td>■ FSLI1, insertion module, ind. conductivity, Ex</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Terminal strip (item 9)</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Inp. module terminal set, conductive measurement</td>
<td>51517489</td>
</tr>
<tr>
<td>10</td>
<td>Inp. module digital/Memosens, Ex</td>
<td>51517490</td>
</tr>
<tr>
<td></td>
<td>■ FSDG1, insertion module, 1 channel, 1 SWU, Ex</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Terminal strip (item 11)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Inp. module terminal set, digital/Memosens</td>
<td>51517491</td>
</tr>
<tr>
<td>12</td>
<td>Inp. module pH/ORP/temperature, Ex</td>
<td>51517466</td>
</tr>
<tr>
<td></td>
<td>■ FSPH1, insertion module, pH/mV, Ex</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Terminal strip (item 13)</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Inp. module terminal set, pH/ORP/temperature</td>
<td>51517487</td>
</tr>
<tr>
<td>14</td>
<td>Threaded joints M20</td>
<td>51517504</td>
</tr>
<tr>
<td></td>
<td>■ 1 set of threaded joints</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Thread base plate</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Molded seal for stainless steel top section</td>
<td>51517463</td>
</tr>
<tr>
<td>No Fig.</td>
<td>Terminal set, 5 pcs. each for all modules, 7 types</td>
<td>51517498</td>
</tr>
</tbody>
</table>
### 8.3 Return

If returning the transmitter, please send it *cleaned* to your sales center.
Use the original packaging when returning the device.

### 8.4 Disposal

This product contains electronic components. For this reason, it must be disposed of as electronic waste.
Please observe local regulations.

---

<table>
<thead>
<tr>
<th>Item</th>
<th>Kit CM42</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Fig.</td>
<td>10 set cable clamps+screws</td>
<td>51517499</td>
</tr>
<tr>
<td></td>
<td>• 10 EMC cable clamps D6 (0.24&quot;)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 10 EMC cable clamps D4 (0.16&quot;)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• 10 cheese head screws M4x8 A2</td>
<td></td>
</tr>
<tr>
<td>No Fig.</td>
<td>Connection jack for external Historom/CDI</td>
<td>51517507</td>
</tr>
</tbody>
</table>

1) When ordering, you must specify the serial number of the device for which you are ordering the spare part.
9 Accessories

Note!
The CD-ROM supplied provides you with all the relevant information on an extensive range of accessories, including descriptions, graphics and ordering information.
For example, it contains information on:
- Sensors
- Assemblies
- Calibration solutions

9.1 Installation kits

Post mount
- 1 Mounting plate
- 2 Securing screws
- Order No. 51518286

Panel installation kit for panel cutout 138x138 mm (5.43x5.43 inch)
- 1 Panel installation seal
- 2 Tensioning screws M6x150 mm
- 4 Hexagonal nuts M6, DIN934 A2
- 4 Spring washers, A2 DIN127, form B6
- 4 Washers A6.4, DIN125 A2
- Order No. 51518284

9.2 Weather protection

Weather protection cover
- Order No. CYY101-A

9.3 Communication

M12 connector
- Four-pole metal connector for mounting on transmitter
- For connecting to connection box or cable jack. Cable length 150 mm (5.91")
- Order No. 51502184
10 Technical data

10.1 Input

10.1.1 Measured variables
- Oxygen
- Temperature

10.1.2 Measuring range

<table>
<thead>
<tr>
<th>Measured variable</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolved oxygen</td>
<td>0.0 to 100.0 mg/l</td>
</tr>
<tr>
<td></td>
<td>0 to 1000 %SAT</td>
</tr>
<tr>
<td></td>
<td>0 to 2000 hPa</td>
</tr>
</tbody>
</table>

10.1.3 Cable specification

With Memosens (CYK10) Max. cable length 100 m (330 ft)

10.1.4 Ex specification

<table>
<thead>
<tr>
<th>Safety Details</th>
<th>Specification</th>
</tr>
</thead>
</table>
| Intrinsically safe sensor circuit in type of protection: EEx ia II C
| Max. output voltage $U_o$ | 5.04 V                      |
| Max. loop current $I_o$    | 80 mA                       |
| Max. output performance $P_o$ | 112 mW                  |

For connecting the measuring cable CYK10

10.2 Output

10.2.1 Output signal
Profibus PA

10.2.2 Signal on alarm
Digital via fieldbus
10.2.3 Output distribution

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolved oxygen</td>
<td>Adjustable</td>
</tr>
<tr>
<td>Temperature</td>
<td>Adjustable, at least 2 °C (2 °F)</td>
</tr>
</tbody>
</table>

10.2.4 Ex specification

Suitable for use in a FISCO system

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. input voltage $U_i$</td>
<td>17.5 V</td>
</tr>
<tr>
<td>Max. input current $I_i$</td>
<td>380 mA</td>
</tr>
<tr>
<td>Max. input performance $P_i$</td>
<td>5.32 W</td>
</tr>
<tr>
<td>Max. inner inductance $L_i$</td>
<td>Negligible</td>
</tr>
<tr>
<td>Max. inner capacitance $C_i$</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

10.3 Electrical connection

10.3.1 Supply voltage and signal voltage

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Profibus PA</td>
<td>9 to 17.5 V DC</td>
</tr>
<tr>
<td>Bus current consumption:</td>
<td>22 mA</td>
</tr>
</tbody>
</table>

10.3.2 Cable cross-section

Max. cable cross-section: 2.5 mm² (≥14 AWG), GND 4 mm² (≥12 AWG)

10.4 Performance characteristics

10.4.1 Measured value resolution

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolved oxygen</td>
<td>0.01 or 0.001 mg/l (depends on the sensor)</td>
</tr>
<tr>
<td>Temperature</td>
<td>0.1 °C (0.1 °F)</td>
</tr>
</tbody>
</table>

10.4.2 Maximum measured error²)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolved oxygen</td>
<td>1% of measured value</td>
</tr>
<tr>
<td>Temperature</td>
<td>1 K</td>
</tr>
</tbody>
</table>
10.5 Environment

10.5.1 Ambient temperature range
–20 to 50 °C (T6)
–20 to 55 °C (T4)

10.5.2 Ambient temperature limits
–30 to +80 °C (–20 to 175 °F)

10.5.3 Storage temperature
–40 to 80 °C (–40 to 175 °F)

10.5.4 Electromagnetic compatibility
Interference emission and interference immunity to EN 61326: 2004

10.5.5 Degree of protection
IP 67 (NEMA 4X)

10.5.6 Relative humidity
10 to 95%, not condensing

10.6 Mechanical construction

10.6.1 Weight
2.1 kg (4.6 lbs)

10.6.2 Material

<table>
<thead>
<tr>
<th>Housing</th>
<th>Stainless steel 1.4301 (AISI 304)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing seals</td>
<td>Foamed silicone, EPDM</td>
</tr>
</tbody>
</table>

2) In accordance with IEC 746-1 for nominal operating conditions
EC declaration of conformity

EG-Konformitätserklärung
EC Declaration of Conformity
CE Déclaration de Conformité

Endress+Hauser Conducta
Gesellschaft für Mess- und Regeltechnik mbH+Co.KG
Deisterstraße 34, 70839 Gerlingen

erklärt in alleiniger Verantwortung, dass die Produkte
deckers under its sole responsibility that the products
déclare sous sa seule responsabilité que les produits

Liquiline M CM 42-G

EG-raumunterprüfbescheinigung:
EC type-examination certificate:EK 5 05 03 30260 012
Certificat de l'examen CE de type:

mit den Vorschriften folgender Europäischen Richtlinien übereinstimmen:
are in conformity with the regulations of the following European Directives:
sont conformes aux prescriptions et Directives Européennes ci-dessous:

94/9/EG (Geräte zur Verwendung in explosionsgefährdeten Bereichen)
(3) (Equipment for use in potentially explosive atmospheres)
(Anpoids on systems of protection in atmospheres explosive)
89/336/EWG (Elektromagnetische Verträglichkeit)
(Electromagnetic Compatibility) / (Compatibilité électromagnétique)

Angewandte harmonisierte Normen oder normative Dokumente:
Applied harmonized standards or normative documents:
Normes harmonisées ou documents normatifs applicables:

Benannte Stelle für CE-Erklärung:
Notified body for CE control:
Organisme notifié par l’Avalisation qualité:
EXAM BIG Prüf- und Zertifizier GmbH
Konformenummer / Identification number /
Numéro d’Identification [0158]

Gerlingen, 13. April 2005

[Signature]

Endress+Hauser
People for Process Automation
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