

Chlorine / Chlorine Dioxide Measurement *Liquisys M CCM 223 / 253*

Transmitter for free chlorine and chlorine dioxide



Liquisys M CCM 253

Liquisys M CCM 223

Due to the modularity of its design, the Liquisys M CCM 223 / 253 transmitter can be adapted to a wide range of customer needs. The basic version, which provides simple measuring and alarm signalling functions, can be equipped with additional software and hardware modules to meet specific applications. Expansion modules can be retrofitted as required.

Areas of application

- Drinking water
- Water treatment
- Cooling water
- Gas scrubbers
- Reverse osmosis
- Food processing
- Swimming pool water

Features and benefits

- Transmitter in field or panel-mounted housing
- Universal application
 - Switchable between chlorine and chlorine dioxide measurement
 - pH compensation for free chlorine
- Easy handling
 - Logical menu structure with plain text in 6 languages makes equipment configuration easy
 - Large two-line display indicates measured value and temperature or pH/redox simultaneously
- Reliable operation
 - Overvoltage protection acc. to EN 61000-4-5
 - Direct access for manual contact control
 - Automatic controller shut-down if lower flow rate limit violated or total failure in sample current

Basic unit expandable with:

- 2 or 4 contacts for use as:
 - Limit contacts (for temperature also)
 - P(ID) controller for chlorine and pH
 - Timer for simple rinse processes
 - "Complete cleaning" with Chemoclean
- Plus package:
 - Manual pH compensation for Cl_2
 - Any current output configuration via table
 - Automatic cleaning start in case of alarm or upper limit violation
 - Live check of sensor
 - Process monitoring
- Optional pH or redox measurement
 - Automatic pH compensation for Cl_2
- HART®, PROFIBUS-PA or PROFIBUS-DP
- 2nd current output for temperature, pH or redox
- Current input for controller shut-down on lower flow rate limit violation or total failure in main flow or for feedforward control

Endress + Hauser

The Power of Know How



Details

Liquisys M CCM 223 / 253 offers the right solution for all applications in drinking water and process water treatment.

Features of the **basic version (EK)**:

Measuring the concentration of free chlorine or chlorine dioxide in standard or trace amount range

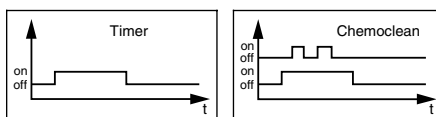
The sensor is selected from the menu. The **temperature** is displayed but the reading can also be hidden. The EP version has an alternative feature that allows the display of the pH and redox measurements simultaneously.



The CCS 140 / 141 sensors for free chlorine and the CCS 240 / 241 sensors for chlorine dioxide are zero-current-free and therefore require only **single-point calibration**. This is carried out by keying in a DPD reference measured value.

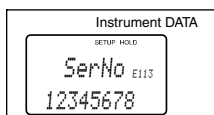
		2.4 / 22 mA
E 057	yes	no
E 080	no	yes
----	yes	no

Different alarms are required depending on the application and operator. Therefore the Liquisys M CCM 223 / 253 permits the independent **configuration of the alarm contact and the error current** for each individual error. Unnecessary or undesirable alarms can be suppressed in this way.



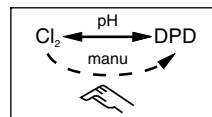
Up to four contacts can be used as limit contacts (also for temperature), to implement a P(ID) controller and for cleaning functions.

Direct **manual operation of the contacts** (bypassing the menu) provides quick access to limit, control or cleaning contacts. If necessary, this helps to correct deviations very quickly.

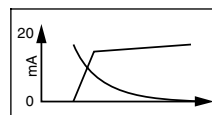


The **serial numbers** of the instrument and the modules and the order code can be called up on the display.

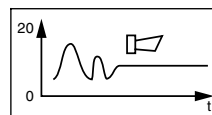
The **ES version** provides **additional functions**:



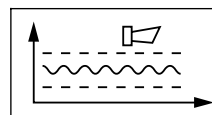
Measuring free chlorine with the amperometric sensor is pH-dependent, but not the DPD measurement used for calibration. **Manual pH compensation** means the instrument can also be used to measure a variable pH value with a slow rate of change.



The **current output** is freely configurable by means of a table in order to display large measuring ranges and still achieve high resolution in certain ranges. This permits **bilinear** or **quasi-logarithmic** curves, etc.

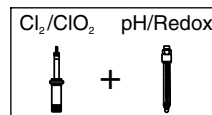


The **live check** issues an alarm when the sensor signal fails to change over a defined period of time. This detects blocking, passivation, separation from the real process, etc.

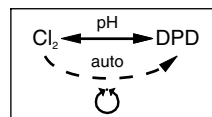


The **Process Check System** uses adjustable time intervals to monitor whether the measured value is above or below the nominal value over an excessively long period of time. This detects in good time whether the level of disinfectant is dangerously low or high.

Additional functions of the EP version:



Option: additional measurement of pH value or redox potential in an instrument. This expansion stage also allows control of the pH value in the process.



Automatic pH compensation means the instrument can also be used to measure a variable pH value which is subject to frequent changes.

Versions

	Basic version (EK version)	With Plus package (ES version)	Full expansion (EP version)
“Measuring and alarm signalling”	MEASUREMENT CALIBRATION Read instrument DATA Linear CURRENT OUTPUT CURRENT OUTPUT simulation 1 programmable ALARM CONTACT (contact and error current)	Manual pH compensation for free chlorine PROCESS CHECK SYSTEM for monitoring LIVE CHECK of sensor CURRENT OUTPUT programmable (table)	Optional pH value or redox measurement Automatic pH compensation for free chlorine PROCESS CHECK SYSTEM and LIVE CHECK also for pH or redox
	<i>Additional features</i>	<i>Additional features</i>	<i>Additional features</i>
“Cleaning”	2 CHANGEOVER CONTACTS for – Measuring parameter limit – Temperature limit – P(ID) controller – Timer for cleaning	Automatic cleaning start on alarm or upper limit violation	– pH or redox limit – pH value control
	<i>Additional features</i>	<i>Additional features</i>	
“Controlling”	2 further CHANGEOVER CONTACTS (total of 4) for – Measuring parameter limit – Temperature limit – P(ID) controller – Three-step controller – Chemoclean cleaning (water and cleaning agent)	External or automatic cleaning start on alarm upper limit violation	
	<i>Additional features</i>		
“Controlled process”	1 current input for – flow monitoring in main flow – feedforward control on chemical dosing		

Measuring and control system

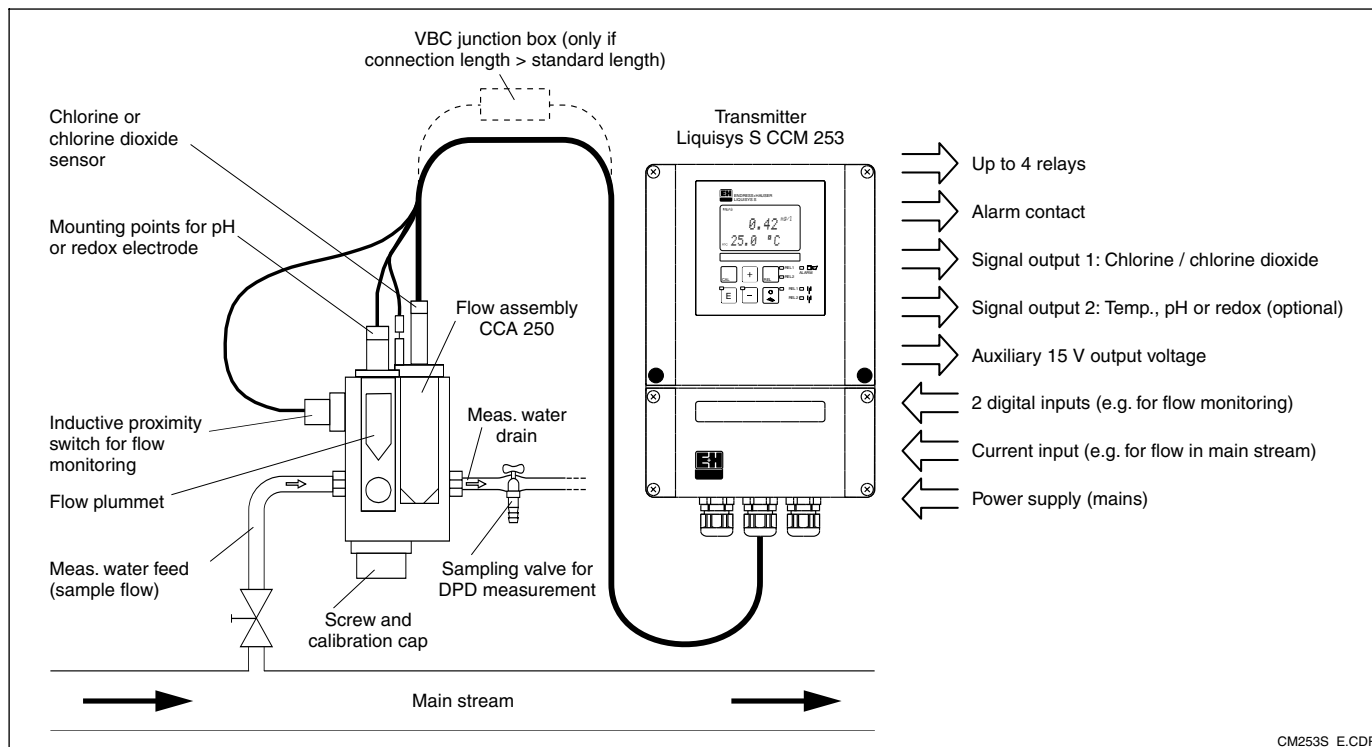
A full measuring system comprises:

- the Liquisys M CCM 223 or CCM 253 chlorine / chlorine dioxide transmitter
- a CCS 140 / 141 membrane-covered sensor for Cl_2 or CCS 240 / 241 for ClO_2 or an open sensor 963 for Cl_2
- a flow assembly CCA 250 (not required for 963 sensor).

Options:

- pH or redox electrode (e.g. CPS 31, CPS 12)
- INS proximity switch for flow monitoring (omitted with 963 sensor)
- CMK extension cable for chlorine measurement
- CYK 71 extension cable for pH/redox measurement if required
- MK extension cable for INS proximity switch
- VBC junction box.

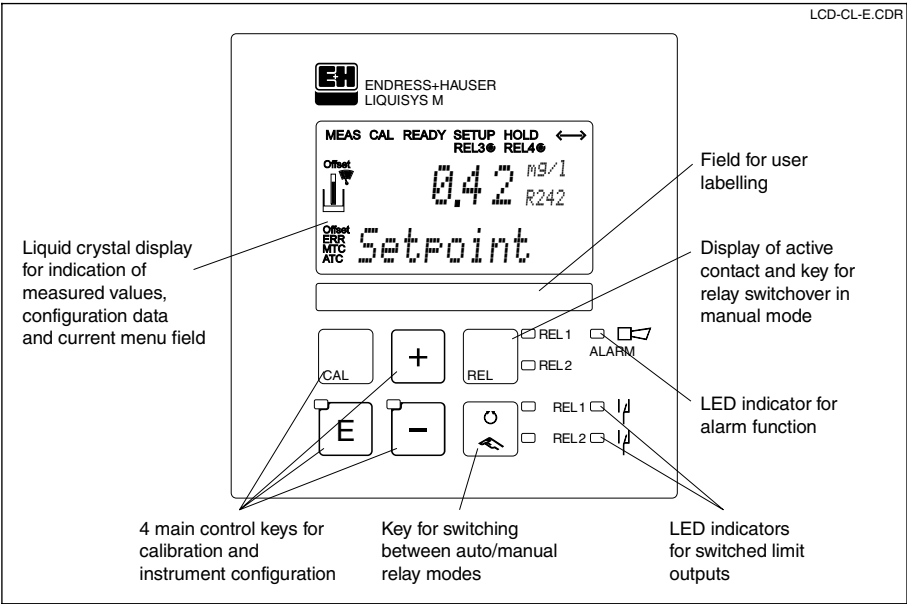
Complete measuring system with Liquisys M CCM 253



CM253S_E.CDR

Operation

User interface:
display and keys



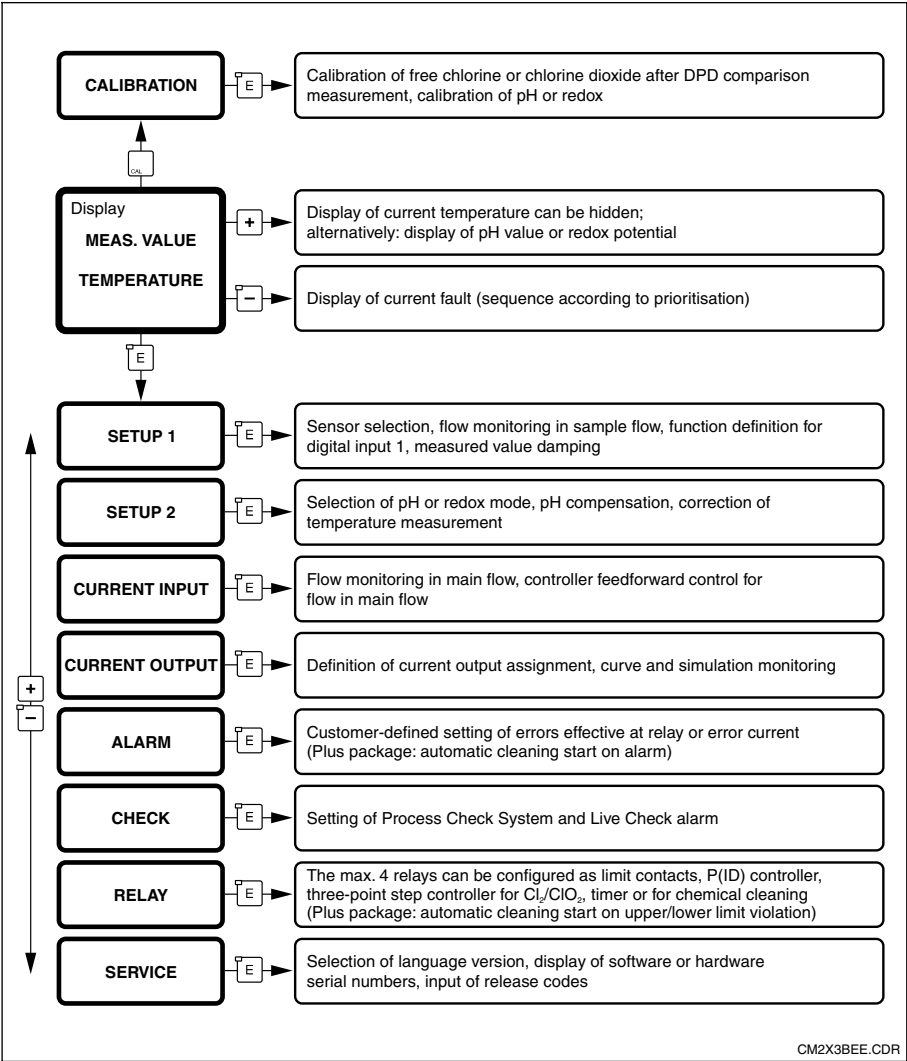
Complete overview at a glance

The display simultaneously shows the current measured value and the temperature, i.e. the essential process data at a glance. Texts in the configuration menu help to set the instrument parameters.

Intelligent and simple

All instrument control functions are arranged in a logical menu structure. Each of the parameters can be easily selected and changed after keying in the access code.

Overview of Liquisys M CCM 223 / 253 menu. It describes the maximum expansion stage (see p. 2 "Details").



Electrical connection

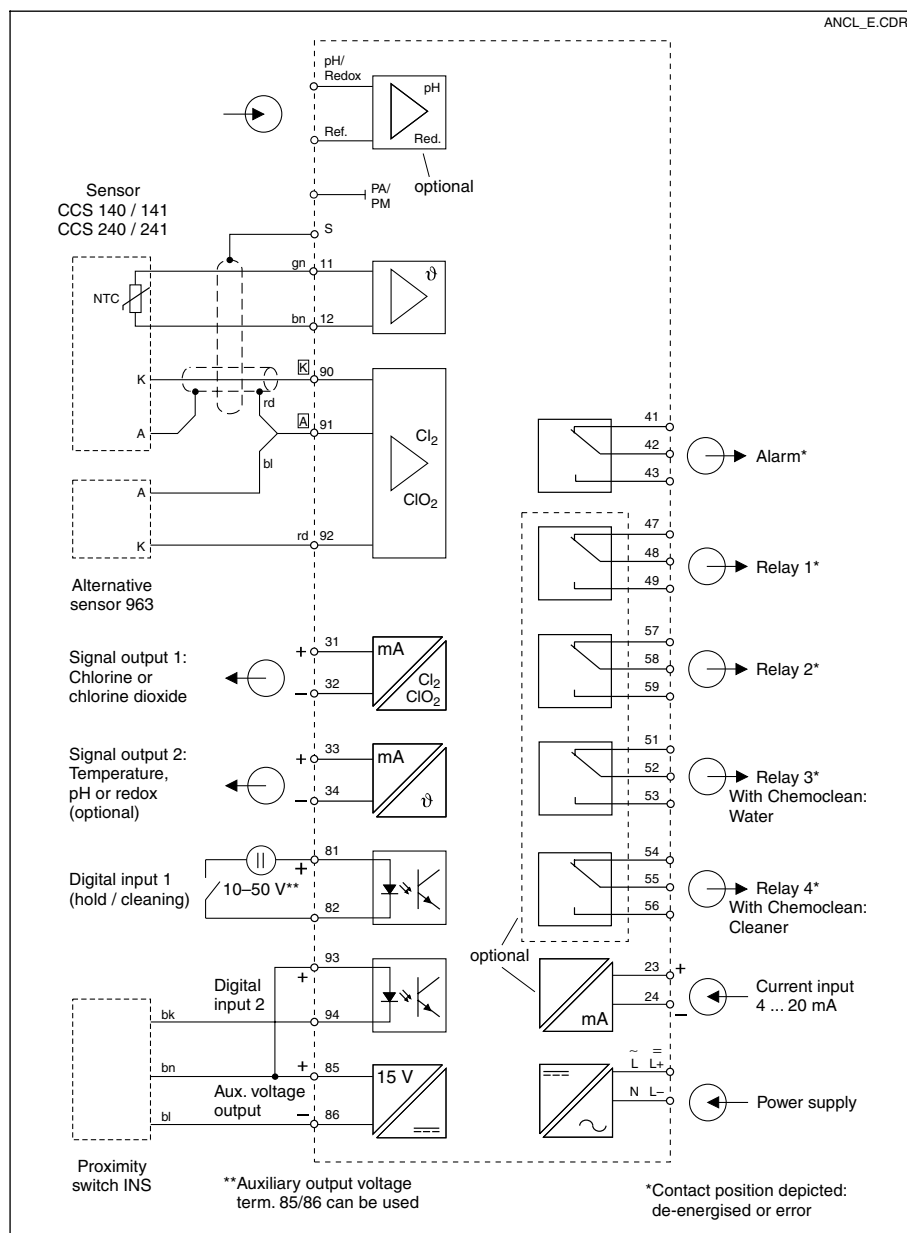
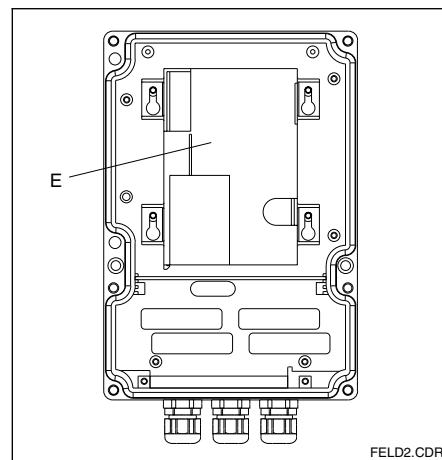
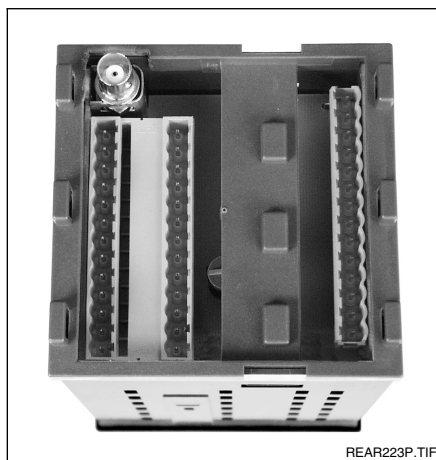
All connections to the panel-mounted instrument CCM 223 are made on terminal strips or by means of the BNC connector on the rear.

On the field instrument CCM 253 all the wires are connected to terminals in the

separate wiring compartment of the transmitter. In case of service, all the wiring can remain in place; only the modules are replaced. Dismantling the transmitter and rewiring are no longer necessary.

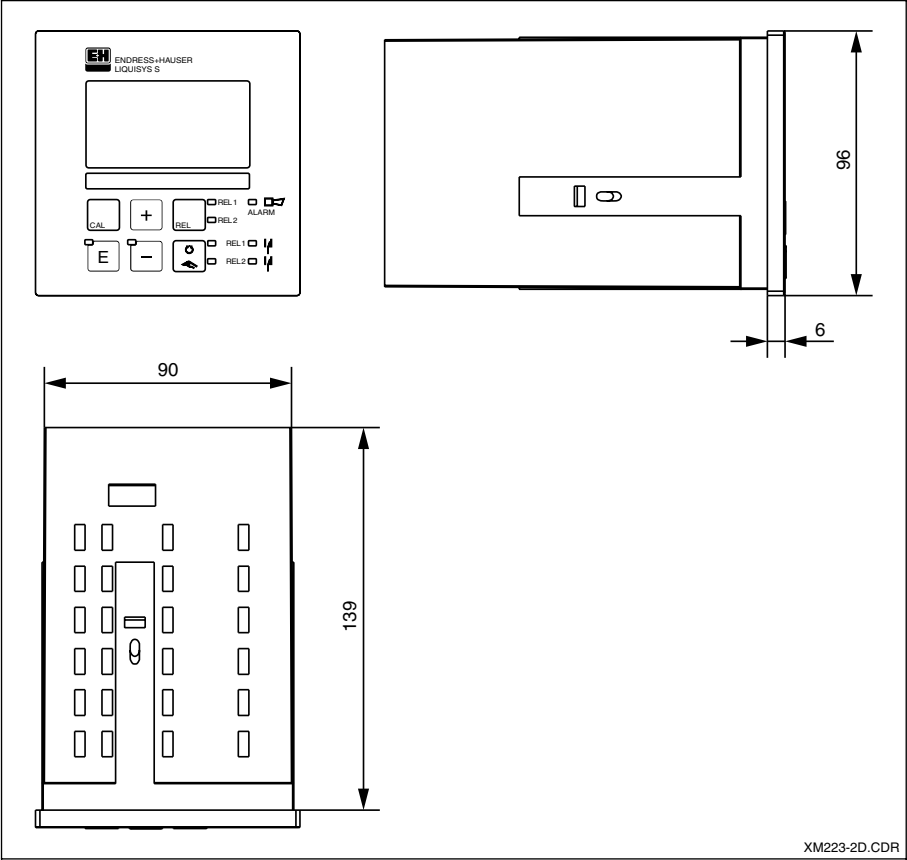
Left:
Liquisys M CCM 223
terminals on instrument
rear; pH connection on
EP version on BNC
connector

Right:
Liquisys M CCM 253
instrument rear with
replaceable electronics
box (E)

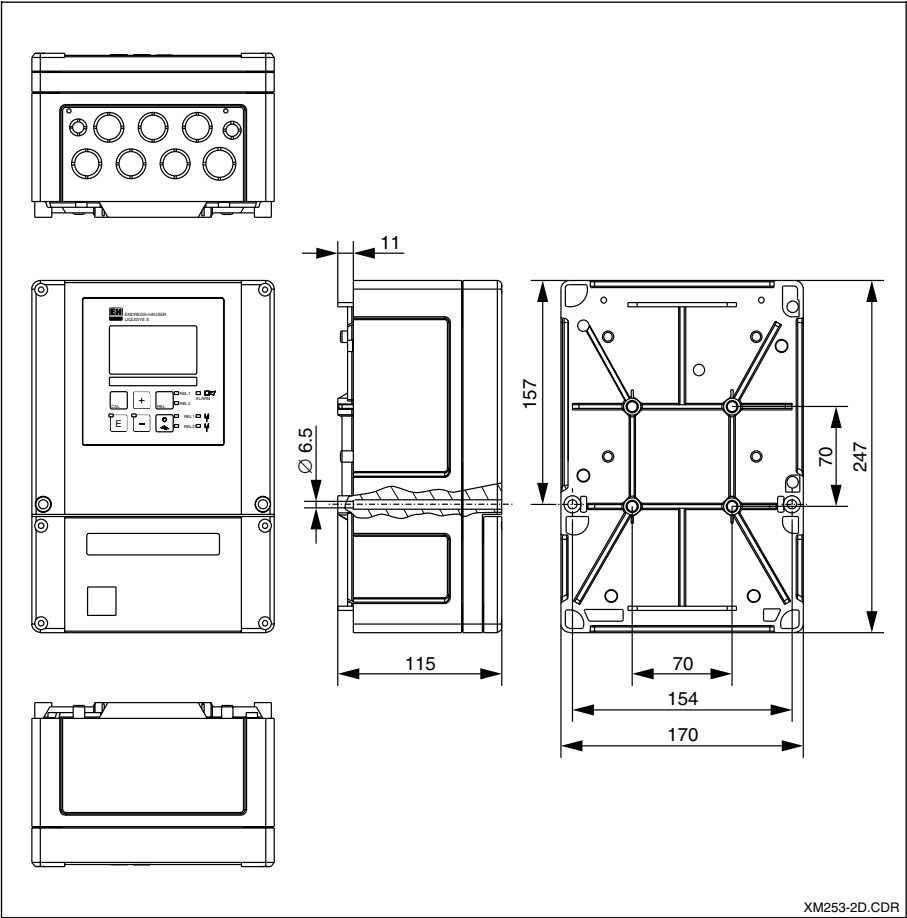


Dimensions

Dimensions of
Liquisys M CCM 223



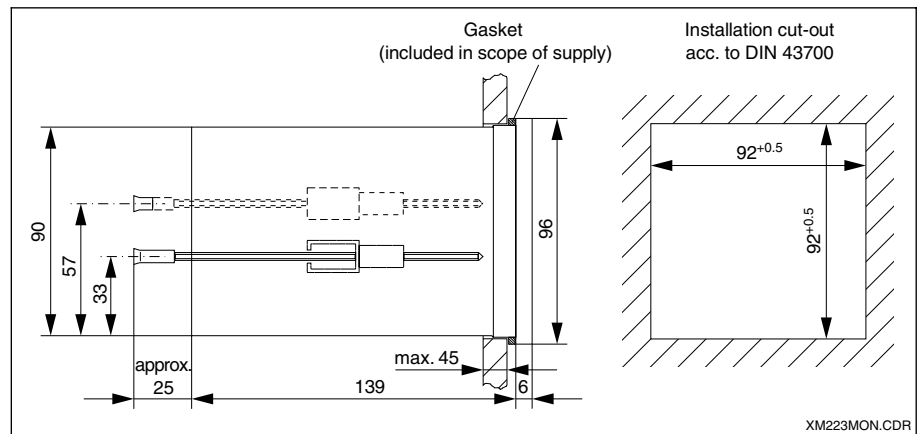
Dimensions of
Liquisys M CCM 253



Installing the Liquisys M CCM 223

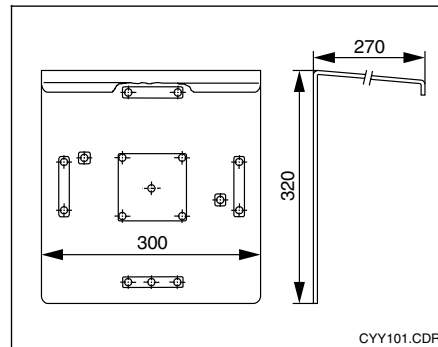
The panel-mounted instrument is mounted using the supplied tensioning screws. The total installation depth required is approx. 165 mm.

Installing the
panel-mounted housing



Installing the Liquisys M CCM 253

Weather protection
cover CYY 101
(see Accessories)



There are several installation options for the field instrument:

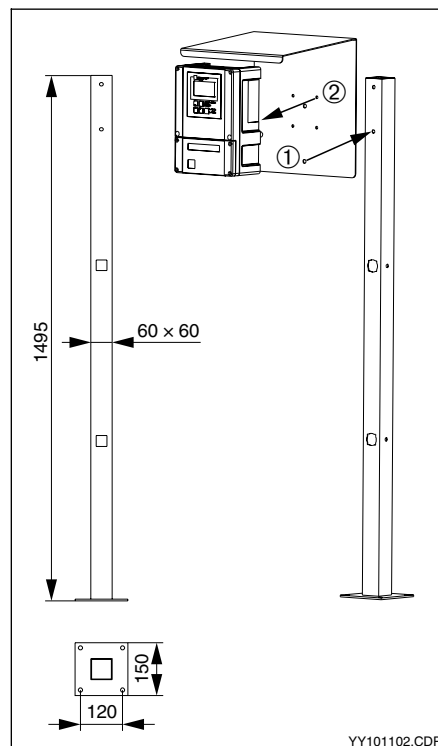
- Mounting on a square-tube post
- Mounting on round pipes
- Wall mounting using fastening screws.

When installing the instrument outdoors, you require weather protection cover CYY 101. This cover is compatible with all field instrument mounting options.

To install the instrument to a square post (universal upright post CYY 102 or upright post of suspension assembly holder CYH 101), proceed as follows:

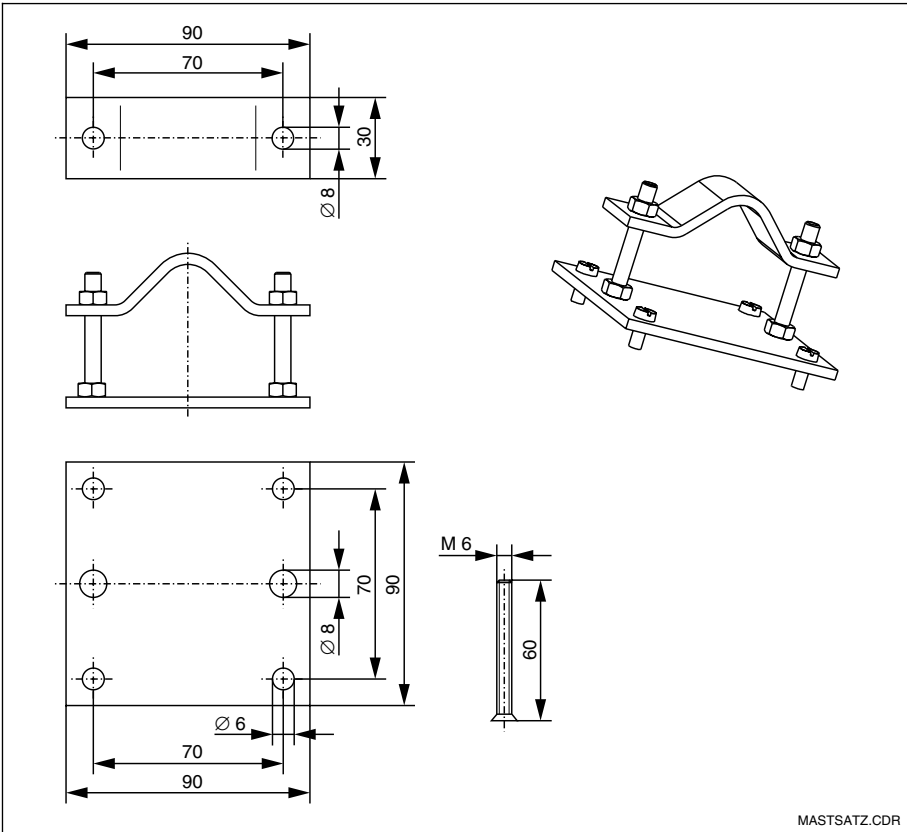
- ① Install the weather protection cover to the upright post
- ② Attach the field instrument to the weather protection cover from the rear.

Universal upright post
CYY 102 or identical
upright post of
suspension assembly
holder CYH 101
(square pipe, see
Accessories);
installing weather
protection cover and
field instrument

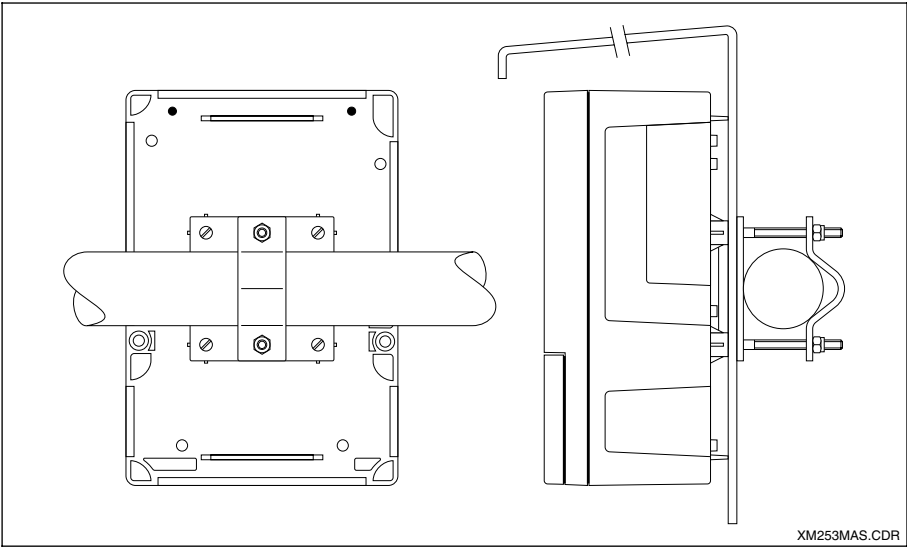


Installing the Liquisys M CCM 253 (continued)

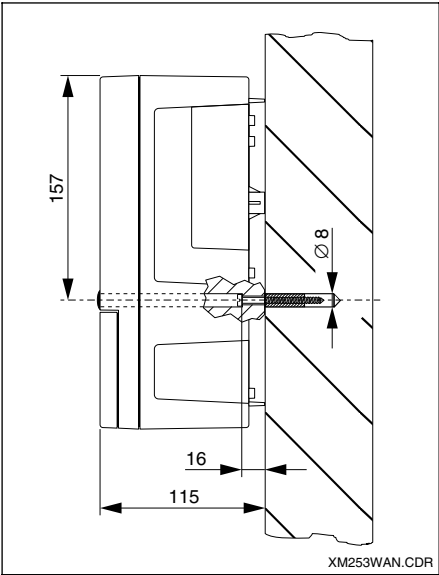
Post mounting kit for installing field housing on round pipes (horizontal or vertical, max. Ø 60 mm; see Accessories)



Mounting on round pipes (right with weather protection cover)



Wall mounting;
screws: Ø 6 mm
rawl plug: Ø 8 mm



Technical data

General specifications

Manufacturer	Endress+Hauser
Product designation	Liquisys M CCM 223 / Liquisys M CCM 253

Input

Measured variables	free chlorine or chlorine dioxide, temperature, pH or redox (optional)
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Cl₂/ClO₂ measurement

Display and measuring range	0 ... 5 mg/l or 0 ... 20 mg/l, respectively
Application measuring range	0.05 ... 20 mg/l for sensors CCS 140 / 240 0.01 ... 5 mg/l for sensors CCS 141 / 241 0.05 ... 5 mg/l for sensor 963
Temperature compensation range	2 ... 45 °C
pH compensation range for free chlorine	pH 4 ... 9
Reference point for nominal slope	25 °C / pH 7.2

Cl₂/ClO₂ signal input

Sensors CCS 140 / 141 / 240 / 241	0 ... 5000 nA
Sensor 963	-100 ... 500 µA

Temperature measurement

Temperature sensor (with CCS 140 / 141 / 240 / 241)	NTC, 10 kΩ at 25°C
Display range	0 ... 50°C

pH and redox measurement

pH measuring range	pH 3.5 ... 9.5
Redox measuring range	0 ... 1500 mV
Zero point adjustment	±100 mV
Slope adjustment	38 ... 65 mV/pH

Digital inputs 1 and 2

Voltage	10 ... 50 V DC
Current drain	max. 10 mA

Current input

Current range	4 ... 20 mA, galvanically isolated, passive
Load	voltage drop 5.2 V = load 260 Ω at 20 mA

Output

Signal outputs Cl₂/ClO₂ or temperature/pH/redox (optional)

Current range	0 / 4 ... 20 mA, galvanically isolated, active; error current 2.4 / 22 mA
Min. distance 0 / 4 ... 20 mA signal	min. 10 % of respective measuring span
Load	max. 500 Ω
Max. resolution	700 digits/mA
Transfer range Cl ₂ /ClO ₂	0 ... 20 mg/l for sensors CCS 140 / 240 0 ... 5 mg/l for sensors CCS 141 / 241 and 963
Temperature transfer range	0 ... 50 °C
pH transfer range	pH 4 ... 9
Redox transfer range	0 ... 1500 mV
Isolation voltage	max. 350 V _{rms} / 500 V DC
Overvoltage protection	acc. to EN 61000-4-5:1995

Auxiliary voltage output

Output voltage	15 V ± 0.6 V
Output current	max. 10 mA

Contact outputs (floating changeover contacts)

Switching current with resistive load (cos φ = 1)	max. 2 A
Switching current with inductive load (cos φ = 0.4)	max. 2 A
Switching voltage	max. 250 V AC, 30 V DC
Switching power with resistive load (cos φ = 1)	max. 500 VA AC, 60 W DC
Switching power with inductive load (cos φ = 0.4)	max. 500 VA AC, 60 W DC

Limit contactor

Pickup/dropout delay	0 ... 7200 s
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Controller

Function (adjustable)	pulse-length / pulse-frequency controller three-point step controller for Cl ₂ /ClO ₂
Controller response	P, PI, PD, PID
Controller gain K _p	0.01 ... 20.00
Integral action time T _i	0.0 ... 9999 min
Derivative action time T _v	00 ... 999.9 min
Period length of pulse-length controller	0.5 ... 999.9 s
Max. frequency of pulse-frequency controller	60 ... 180 min ⁻¹
Motor run time for three-point step controller	10 ... 999 s
Neutral zone for three-point step controller	0 ... 40 %

Technical data (continued)

Output (continued)

Alarm

Function (selectable)	steady / fleeting contact
Alarm threshold adjustment range	Cl ₂ /ClO ₂ / pH / redox / temperature: total measuring range
Alarm delay	0 ... 2000 min (s)
Monitoring time lower limit violation	0 ... 2000 min
Monitoring time upper limit violation	0 ... 2000 min

Accuracy

Cl₂/ClO₂ measurement

Measured value resolution CCS 140 / 240 / 963	0.01 mg/l
Measured value resolution CCS 141 / 241	0.001 mg/l
Measurement deviation ¹ of display (pH, T = const)	max. 0.5 % of measured value ± 4 digits
Reproducibility	max. 0.2 % of measuring range
Measurement deviation ¹ of Cl ₂ /ClO ₂ signal output	max. 0.75 % of current output range

Deviation for Cl₂/ClO₂ measurement with sensor 963

Measurement deviation ¹ of display (pH, T = const.)	max. 1 % of measuring range ± 4 digits
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Temperature measurement

Measured value resolution	0.1 °C
Measurement deviation ¹ of display	±0.3 K
Measurement deviation ¹ of temperature signal output	max. 1.25 % of current output range

pH and redox measurement

pH measured value resolution	pH 0.01
Redox measured value resolution	1 mV
Measurement deviation ¹ of display pH	pH 0.03
Measurement deviation ¹ of redox display	3 mV
Measurement deviation ¹ of pH signal output	max. 1.25 % of current output range
Measurement deviation ¹ of redox signal output	max. 1.25 % of current output range

Ambient conditions

Ambient temperature (nominal operating conditions)	−10 ... +55 °C
Ambient temperature (limit operating conditions)	−20 ... +60 °C
Storage and transport temperature	−25 ... +65 °C
Relative humidity (nominal operating conditions)	10 ... 95 %, non-condensing
Ingress protection of panel-mounted unit	IP 54 (front panel), IP 30 (housing)
Ingress protection of field housing	IP 65
Electromagnetic compatibility	interference emission and interference immunity acc. to EN 61326:1997 / A1:1998

Physical data

Dimensions of panel-mounted unit (H × W × D)	96 × 96 × 145 mm
Installation depth	approx. 165 mm
Dimensions of field housing (H × W × D)	247 × 170 × 115 mm
Weight of panel-mounted unit	max. 0.7 kg
Weight incl. field housing	max. 2.3 kg
Display	LC display, two lines, five- and nine-digit with status indicators

Materials

Housing of panel-mounted unit	polycarbonate
Front membrane	polyester, UV-resistant
Field housing	ABS PC Fr

Power supply

Supply voltage	100 / 115 / 230 V AC +10 / −15 %, 48 ... 62 Hz 24 V AC/DC +20 / −15 %
Power consumption	max. 7.5 VA
Fuse protection	fine-wire fuse, medium time-lag 250 V / 3.15 A

¹acc. to IEC 60746-1, at nominal operating conditions

Subject to modifications.

Accessories

Mounting accessories

Type	Features	Order code
Weather protection cover CYY 101	For mounting on field housing, for outdoor operations Dimensions (H × W × D): 320 × 300 × 270 mm Material: SS 304	CYY 101-A
Universal upright post CYY 102	Square pipe for mounting field housing Dimensions (H × W × D): 1495 × 60 × 60 mm Material: SS 304	CYY 102-A
Post mounting kit	Kit for mounting field housing to horizontal or vertical pipes (Ø max. 60 mm) Material: SS 304	50086842

Assemblies

Type	Features	Applications
FlowFit W CCA 250	Flow assembly for bypass installation, suitable for mounting a sensor CCS 140 / 141 for free chlorine or CCS 240 / 241 for chlorine dioxide and a pH and redox electrode; with flow setting and optical monitoring, optionally monitoring by proximity switch	drinking water swimming pool water process water

Sensors

Type	Features	Applications
CCS 140	Membrane-covered amperometric sensor for free chlorine in measuring range 0.05 ... 20 mg/l	drinking water swimming pool water processing water
CCS 141	Membrane-covered amperometric trace sensor for free chlorine in measuring range 0.01 ... 5 mg/l	
CCS 240	Membrane-covered amperometric sensor for chlorine dioxide in measuring range 0.05 ... 20 mg/l	
CCS 241	Membrane-covered amperometric trace sensor for chlorine dioxide in measuring range 0.01 ... 5 mg/l	

Cable extension

Type	Features	Order code
VBC	Junction box for extending measuring cable connection between sensor cable and transmitter, ingress protection IP 65	50005181
CMK	Special measuring cable for sensors CCS 140 / 141 and CCS 240 / 241 for cable extension between transmitter and junction box VBC	50005374
CYK 71	For pH/redox electrodes or conductivity sensors with temperature sensor. Consisting of one coaxial conductor of low-noise quality and four auxiliary cores (0.75 mm ²) with common screen, outside diameter 7.2 mm. Minimum length 5 m.	50085333
MK	Two-core signal line with additional screen and PVC insulation. Preferably for transmission of output signals of transmitters or input signals of controllers and for temperature measurement.	50000662

Product structure

Chlorine / chlorine dioxide transmitter Liquisys M CCM 223 / CCM 253														
Version														
EK	Measurement of free chlorine / chlorine dioxide													
ES	Measurement of free chlorine / chlorine dioxide with extended features													
EP	Measurement of chlorine / chlorine dioxide with extended features, in addition pH or redox measurement (switchable)													
Power supply														
0	230 V AC													
1	115 V AC													
5	100 V AC													
8	24 V AC/DC													
Measurement output														
0	Chlorine or chlorine dioxide													
1	Chlorine or chlorine dioxide and temperature (alternatively pH or redox with EP version)													
3	PROFIBUS-PA													
4	PROFIBUS-DP													
5	Chlorine or chlorine dioxide with HART													
6	Chlorine or chlorine dioxide with HART and temperature (alternatively pH or redox with EP version)													
Contacts														
05	No additional contacts													
10	2 contacts (limit / P(ID) / timer)													
15	4 contacts (limit / P(ID) / Chemoclean / three-point step controller for Cl ₂ /ClO ₂)													
16	4 contacts (limit / P(ID) / timer / three-point step controller for Cl ₂ /ClO ₂)													
20	2 contacts with current input (limit / P(ID) / timer)													
25	4 contacts with cleaning, current input (limit / P(ID) / Chemoclean / three-point step controller for Cl ₂ /ClO ₂)													
26	4 contacts with timer, current input (limit / P(ID) / timer / three-point step controller for Cl ₂ /ClO ₂)													
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