

Combination Measuring Instruments for Free Chlorine, pH, Redox and Temperature for Pool Water Treatment *CCM 360 (Option-RD)*



Areas of application

- Outdoor swimming pools
- Indoor swimming pools
- Motel and hotel pools
- Camping and leisure, fitness centres
- Therapeutic pools (e.g., in hospitals)
- Thermal and salt baths
- Sauna pools
- Hot whirlpools

Benefits at a glance

- Simultaneous measurement of pH value, redox potential, free chlorine and temperature
- Automatic metering stop in the event of a flow alarm
- Safety shutoff to prevent overdosing
- Automatic pH calibration
- Two independent pulse-length or pulse-frequency controllers for pH value and free chlorine content or control of chlorine gas valves with motor actuator drive; three-point step controller available alternatively
- P/PI control function
- Base load dosing for free chlorine
- Can be switched from automatic control to manual dosing
- Chlorine display and output can be temperature-compensated
- Galvanically separated signal outputs
- Potential-free output contacts
- Alarm signalling in the form of a group alarm (fleeting or steady contact can be selected)
- Instrument self-test

DIN standard 19643 regulates the disinfection and treatment of water in public pools. The microprocessor-controlled single and combination instruments from the PoolPAC family create the technical prerequisites needed to fulfill the stipulations of this standard in a reliable manner: continuous measurement and control of free chlorine and pH value, measurement of redox potential and water temperature.



Measuring system

The complete measuring and control system consists of:

- an instrument from the PoolPAC family (see table below)
- a type CCS 140-N chlorine sensor with temperature measurement
- a single Ceratex pH electrode (e.g., type CPS 31-1EC2GSA)
- a single Ceratex redox electrode (e.g., type CPS 32-OPB2GSA)
- a type CCA 250 flow assembly (with an optional inductive proximity switch for flow monitoring)
- a chlorine metering device, e.g. an externally controlled solenoid-operated metering pump or metering pump with stroke adjustment
- Acid or base metering device for pH control, e.g. solenoid-operated valve or externally controlled solenoid-operated metering pump

The PoolPAC instrument family

Instrument type	Equipment												
	Free chlorine				pH value			Redox potential			Temp.		Alarm
	Display	Meas. value output	Controller (i/f) ^{1) 2)}	Controller (c) ³⁾	Display	Meas. value output	Controller (i/f) ^{1) 2)}	Display	Meas. value output	Controller (i/f) ^{1) 2)}	Display	Meas. value output	Output contact for group alarm
CCM 360 –													
– ... 8 ... ↑↑ 00 ... 04	X	X	X	X							X	X	X
– ... 0 ... ↑↑ 10 ... 14	X	X	X	X	X	X	X				X	X	X
– ... 1 ... ↑↑ 20 ... 24	X	X	X	X	X	X	X	X	X		X	X	X
– 363RA . . . ⁴⁾					X	X	X	X	X	X			X
– 362RA . . .					X	X	X						X

1) i = P controller with pulse-proportional relay output, e.g. for solenoid valves

2) f = P controller with frequency-proportional relay output, e.g. for a solenoid-operated metering pump

3) d = PI controller with 3-point step relay output, e.g. for actuators with motor volume adjustment

4) Extended measuring range for pH and redox

Operation

The PoolPAC instrument has two operating levels:

Level 1 - operator level.

All operator functions are accessed using **a single** key.

pH:

- Measurement
- Automatic calibration
- Setpoints
- Manual / automatic dosing

Redox:

- Measurement
- Setpoints (type CCM 360-363RA)

Chlorine:

- Measurement
- DPD calibration
- Setpoints
- Manual / automatic dosing

Temperature:

- Measurement

Level 2 - start-up level. The functions needed to select the basic settings are accessed by pressing **two keys simultaneously**.

This protects the instrument against inadvertent changes.

pH:

- Manual calibration
- Control parameters

Redox:

- Manual calibration

Chlorine:

- Automatic temperature compensation (ATC) on/off
- Control parameters

Temperature:

- Manual calibration

Operator level 1 is visually distinguishable from **level 2** by the fact that the corresponding dark blue function fields for „Calibration“ and for „Setpoints“ overlap the round function switch on the front panel.

Self-monitoring

The safety concept is very important in swimming pool applications. The instruments from the PoolPAC family continuously perform a number of monitoring functions during operation:

- Signalling of incorrect pH calibration
- Plausibility check during pH zero point calibration
- Plausibility check during pH slope calibration
- Chlorine measuring cell slope monitoring

- Flow monitoring by means of proximity switch
- Flow alarm signalling and automatic shutoff of metering devices
- Safety shutoff to prevent overdosing
- Alarm in case chlorine, mV (CCM 360-363RA), pH setpoint is not reached
- Alarm clearance and acknowledgment
- Data storage in case of power failure
- Battery voltage for data backup low
- Automatic instrument self-test with a number of service functions

Instrument variants

Uniform combination housing

All PoolPAC instrument types have the same design:

Splash-proof housing made of ABS, 192 x 144 x 140 mm (W x H x D), suitable for panel installation and wall

mounting. Ingress protection IP 54 permits use in closed, damp operating rooms in the presence of traces of bases and acids.



PoolPAC type CCM 360-008IF00

For measurement and control of free effective chlorine content and temperature monitoring. Suitable, for example, for applications where another chlorine value control system is required for another pool in addition to the PoolPAC CCM 360-363RA00.

PoolPAC type CCM 360-100IF00

For measurement and control of free effective chlorine content and pH value plus temperature monitoring. Suitable, for example, for private swimming pools where an acid or base metering system to monitor and control the pH value is required in addition to the chlorine metering system.



PoolPAC type CCM 360-363RA00

For measurement and control of pH value and redox potential. Can be employed wherever only the parameters pH and redox are needed to monitor the hygienic properties of the pool water or where a separate measuring and control circuit for free chlorine exists. pH and redox values can be controlled independently.

PoolPAC type CCM 360-201IF00

Version for measuring and controlling of chlorine and pH value as well as checking of redox-potentials and temperatures

ATC function

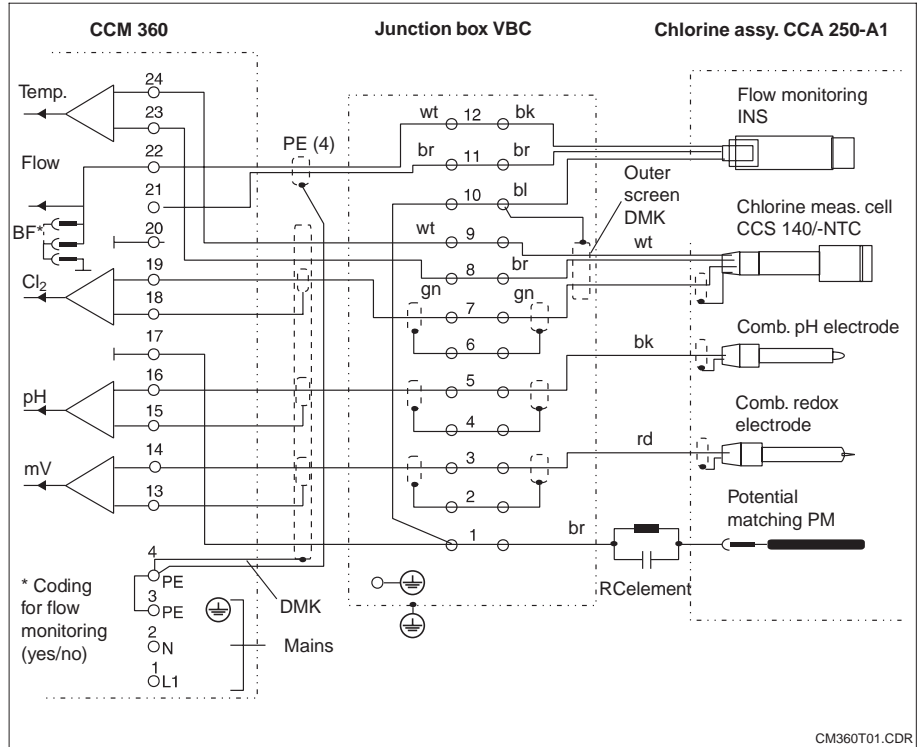
Automatic temperature compensation (Cl_2 display and output) is a standard feature of chlorine-measuring versions using the CCS 140-N cell. The ATC function can be switched on or off.

-RD option

3-point step controller (instead of pulse-length/pulse-frequency controller for Cl_2), e.g. for chlorine metering by means of motor actuator adjustment of chlorine valves. The control parameters are user-selectable.

Electrical connections

Connection diagram for PoolPAC. Diagram shows type CCM 360-201IF00 for chlorine meas. cell CCS 140-N, pH and redox electrodes, proximity switch INS and junction box VBC



Chlorine sensor CCS 140

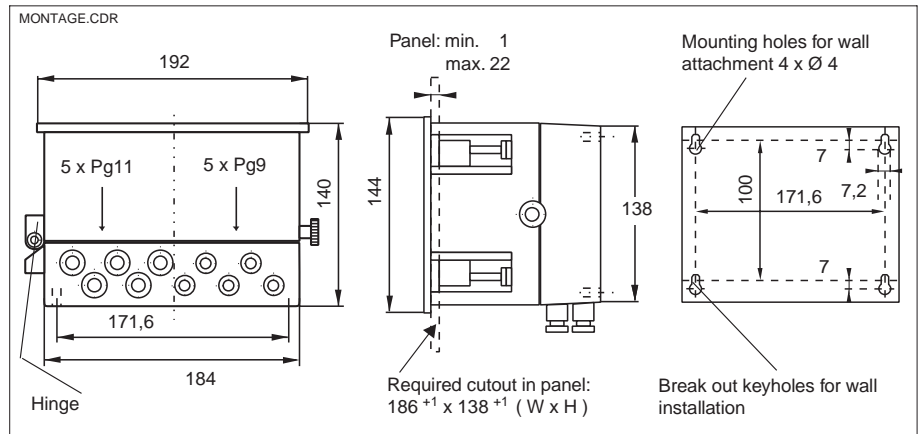
The membrane-covered amperometric sensor CCS 140 is intended for installation in flow assembly CCA 250. It is distinguished by the following features:

- Minimum flow rate for installation in the CCA 250: 30 l/h
- Zero calibration is not required
- Outflow counter-pressure of up to 1 bar is possible

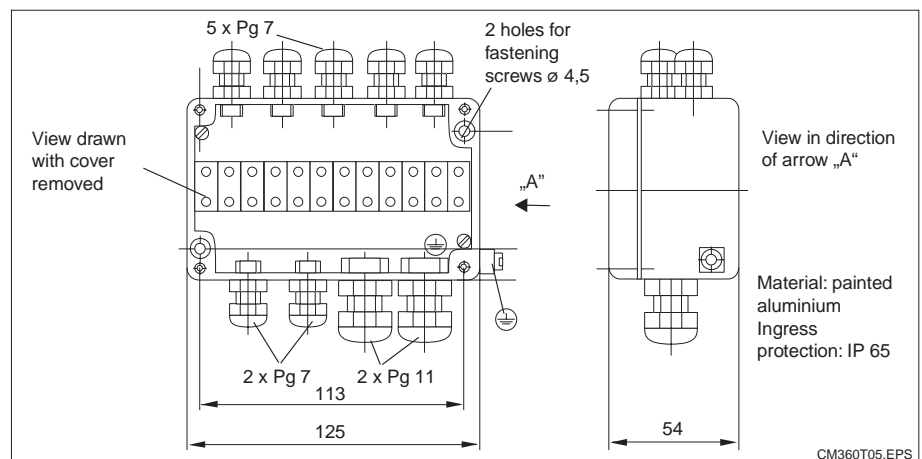
- Temperature measurement by integrated temperature sensor (NTC)
- Measured value is independent of fluctuations in conductivity
- Polarization time is only 30 – 60 min
- Simple membrane replacement
- Recalibration is required approx. every 1 – 4 months, depending on application

Installation

Pool PAC CCM 360



Junction box VBC



Technical data

General data	Manufacturer	Endress+Hauser
	Product designation	Combination measuring instrument CCM 360
Mechanical data	Dimensions	192 x 144 x 140 mm (W x H x D)
	Material of housing	ABS
	Cable entries	Pg 9 and Pg 11 cable glands
	Ingress protection	IP 54
	max. perm. ambient temperature	-10 ... +55 °C
	Weight	approx. 1 kg
Electrical connection	Aux. energy (see rating plate)	110/127/230/240 V, 48 ... 62 Hz
	Power consumption	approx. 2 VA (without contact output load)
	Aux. energy for RAM storage	lithium battery, 3 V, life approx. 10 years
Signal outputs	Output range	0 ... 20 mA/4 – 20 mA, switchable
	Max. load	500 Ω
Contact outputs (potential-free, max. number: 4)	Function	base/acid metering for pH controller, metering for Cl ₂ (/mV) controller, alarm contact
Display	Measured value displays	2 LCDs, 3 1/2 digis, height of digits 13 mm
	Function indicators	red LEDs
pH measurement	Display range/signal output range	2 ... 12 p H / 5 ... 10 pH
	Type CCM 360-363RA	1 ... 13 pH
	Slope adjustment range	48 ... 65 mV/pH
	Input impedance (acc. to DIN 19265)	0.5 · 10 ¹² Ω
Redox measurement	Display range/signal output range	0 ... 1000 m V / 0 ... 1000 mV
	Signalausgangsbereich	
	Switchable on type CCM 360-R363RA	± 1000 mV
	Input impedance	0.5 · 10 ¹² Ω
Chlorine measurement	Sensor	Typ CCS 140-N
	Display/signal output range	0 ... 0.5 mg Cl ₂ /l, 0 ... 1.0 mg Cl ₂ /l, 0 ... 2.0 mg Cl ₂ /l, 0 ... 5.0 mg Cl ₂ /l, 0 ... 10.0 mg Cl ₂ /l,
	Temperatur compensation (ATC)	can be switched on or off
Temperature measurement	Sensor	NTC sensor, 10 kΩ bei 25 °C
	Measuring range = signal output range	0 ... 50 °C
Flow monitoring	Sensor	inductive proximity switch type INS
	Output signal	TTL level, alarm high
	Auxiliary sensor energy	12 V DC from PoolPAC

Technical data (Fortsetzung)

pH value control

Control function	optionally P or PI controller
Setpoint adjustment	Xs = 0 ... 100 % (2 ... 12 pH / 1 ... 13 pH with type 363RA)
Proportional band	Xp = 0 ... 50 % or 0...500 % switchable
Integral action time	Tn = 1 ... 99 min
Characteristic	normal/inverted, switchable
Set value function	pulse-frequency proportional controller, f = 60 ... 120 min ⁻¹ pulse-length proportional controller, T = 1 ... 99 sec
Set value output	quasi-steady, potential-free relay contact

Redox value control

same as pH value control (setpoint range ± 1000 mV)

Chlorine control

Control function	P/PI controller, option: 3-point step controller (PI)
Setpoint adjustment	Xs = 0 ... 100 % (ref. to chlorine meas. range selected)
Proportional band	Xp = 0 ... 500 % (in 10 % steps)
Integral action time	Tn = 1 ... 99 min
Base load dosing	X _{GI} = 0 ... 80 % of setpoint
Set value function/output	P/PI controller: same as pH 3-point step controller: motor actuator control with two relay contacts (open/close), actuator operating time for 100 % adjustable between 10 ... 999 sec

Alarm function

Function	pH/Cl ₂ (mV)/flow group alarm
Alarm delay pH/chlorine (/mV)	0 ... 99 min, adjustable
Alarm threshold	± 5 % to ± 50 % of setpoint, adjustable
Chlorine flow alarm delay	0 ... 190 sec. adjustable

Subject to modifications.

Order No.

Supplementary documentation

Technical information

<input type="checkbox"/> Sensors for free chlorine CCS 140 and CCS 141	50028816
<input type="checkbox"/> Flow assembly for free chlorine and Chlorine dioxid CCA 250	50057220
<input type="checkbox"/> Compact measuring station CCE 1 / CCE 3	50050696

Combination measuring instruments CCM 360

Measuring range

00	0 – 1.0 mg Cl ₂ /l / 0 – 50 °C
01	0 – 0.5 mg Cl ₂ /l / 0 – 50 °C
02	0 – 2.0 mg Cl ₂ /l / 0 – 50 °C
03	0 – 5 mg Cl ₂ /l / 0 – 50 °C
04	0 – 10 mg Cl ₂ /l / 0 – 50 °C
10	0 – 1.0 mg Cl ₂ /l / 0 – 50 °C / 5 – 10 pH
11	0 – 0.5 mg Cl ₂ /l / 0 – 50 °C / 5 – 10 pH
12	0 – 2.0 mg Cl ₂ /l / 0 – 50 °C / 5 – 10 pH
13	0 – 5 mg Cl ₂ /l / 0 – 50 °C / 5 – 10 pH
14	0 – 10 mg Cl ₂ /l / 0 – 50 °C / 5 – 10 pH
20	0 – 1.0 mg Cl ₂ /l / 0 – 50 °C/5 – 10 pH/0 – 1000 mV
21	0 – 0.5 mg Cl ₂ /l / 0 – 50 °C/5 – 10 pH/0 – 1000 mV
22	0 – 2.0 mg Cl ₂ /l / 0 – 50 °C/5 – 10 pH/0 – 1000 mV
23	0 – 5 mg Cl ₂ /l / 0 – 50 °C/5 – 10 pH/0 – 1000 mV
24	0 – 10 mg Cl ₂ /l / 0 – 50 °C/5 – 10 pH/0 – 1000 mV
36	1 – 13 pH / 0 – 1000 mV (for redox/pH)

pH/redox measuring range

0	2 – 12 / 5 – 10 pH with Cl ₂ A
1	2 – 12 / 5 – 10 pH and 0 – 1000 mV with Cl ₂
3	1 – 13 / 1 – 13 pH and 0 – 1000 mV without Cl ₂
8	without pH/redox measurement

Controller

IF	Pulse-length/pulse-frequency controller for Cl/pH
RA	Pulse-length/pulse-frequency for redox/pH
RD	3-point controller for Cl, pulse-length/pulse-frequency controller for pH
RE	3-point step controller for chlorine

Mains supply

0	Mains supply 230 V, 50/60 Hz AC
1	Mains supply 110 V, 50/60 Hz AC
6	Mains supply 127 V, 50/60 Hz AC
7	Mains supply 240 V, 50/60 Hz AC

Output

0	0 ... 20 mA
1	0 ... 20 mA for 963
2	4 ... 20 mA
3	4 ... 20 mA for 963

CCM 360- [] [] [] [] [] []

complete order code

Endress+Hauser GmbH+Co.
- Instruments International -

P.O. Box 2222
D-79574 Weil am Rhein
Tel. (07621) 975 - 02
Fax (07621) 975345

Endress + Hauser

Nothing beats know-how

