Technical
Information
TI 060C/07/en
Nr. 50028589

Combination Measuring Instruments for Free Chlorine, pH, Redox and Temperature for Pool Water Treatment

CCM 360 (Option-RD)

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.

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

Quality made by
Endress+Hauser

ISO 9001

Endress+Hauser

Nothing beats know-how

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
CCM 360 –	Display	Meas. value output	Controller (i/f) [1) 2)]	Controller (d) [3)]	Display	Meas. value output	Controller (i/f) [1) 2)]	Display	Meas. value output	Controller (i/f) [1) 2)]	Display	Mes. value output	Output contact for group alarm
– . . 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 controlller 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 sensor 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.

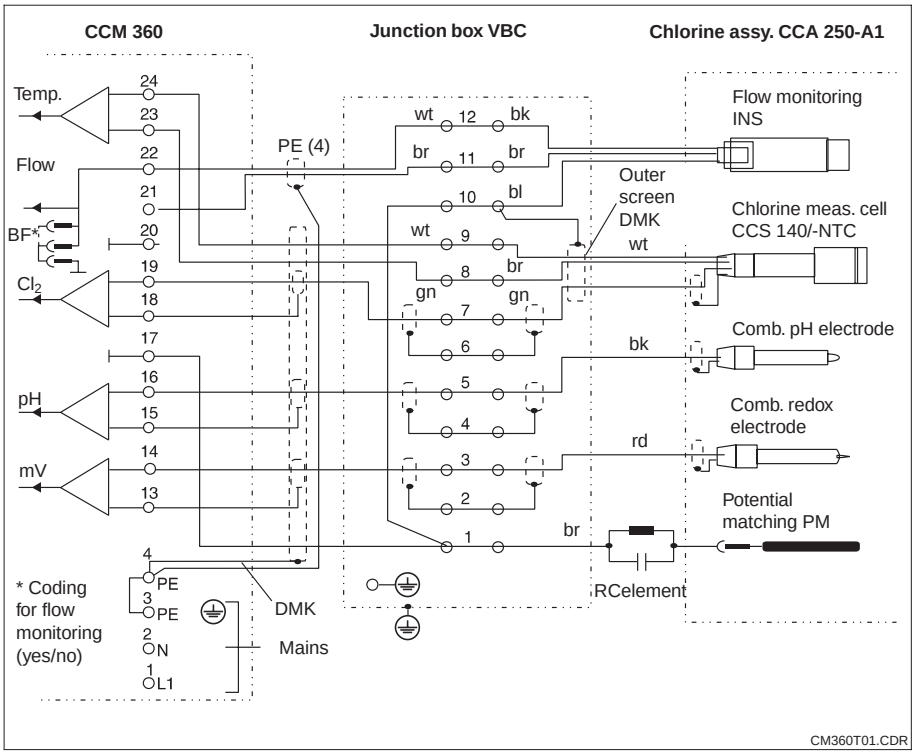
PoolPAC type CCM 360-363RA00
For measurement and control of pH value and redox potential. Can be employed wherever only the parameters pH and redox are needed to monitor the hygienic properties of the pool water or where a separate measuring and control circuit for free chlorine exists. pH and redox 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



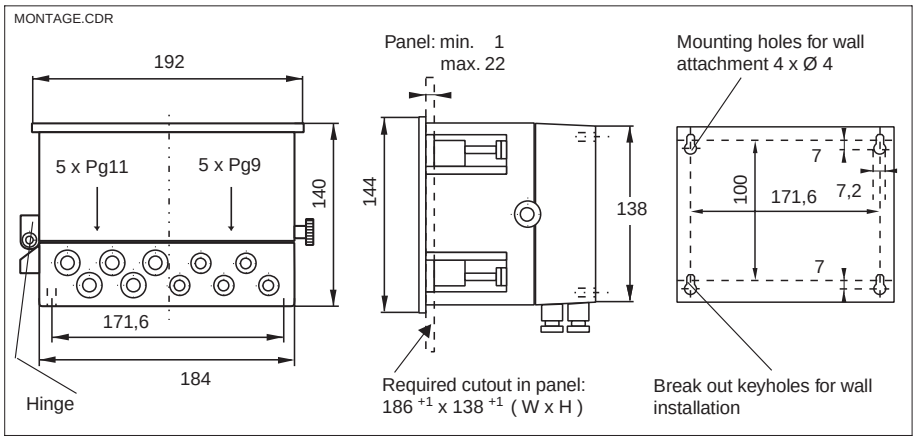
Connection diagram for PoolPAC.
Diagram shows type CCM 360-201IF00 for chlorine meas. cell CCS 140-N, pH and redox electrodes, proximity switch INS and junction box VBC

Chlorine sensor CCS 140

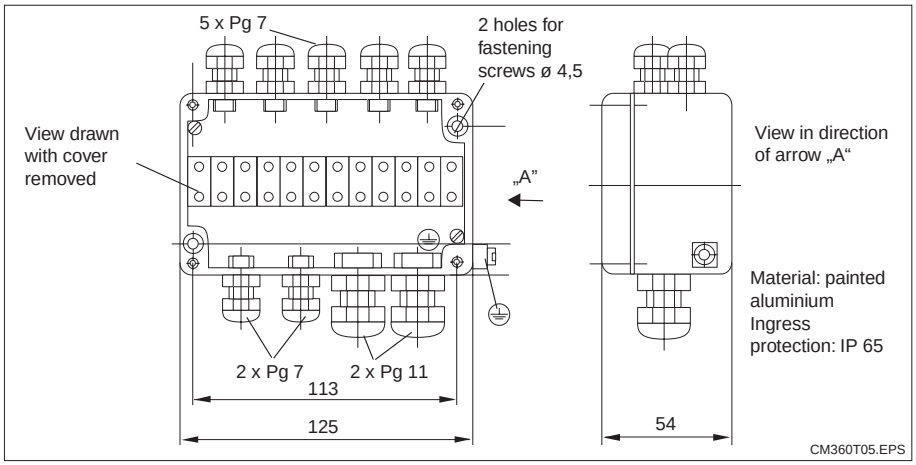
The membrane-covered amperometric sensor CCS 140 is intended for installation in flow assembly CCA 250.
It is distinguished by the following features:

- 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)	$0.5 \cdot 10^{12}$ 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	$0.5 \cdot 10^{12}$ 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

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 s
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 s

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 s. adjustable

Subject to modifications.

Supplementary documentation

Order No.

Technical information

- ❏ Sensors for free chlorine CCS 140 and CCS 141 — 50028816
- ❏ Flow assembly for free chlorine and Chlorine dioxid CCA 250 — 50057220
- ❏ Compact measuring station CCE 1 / CCE 3 — 50050696

Product structure

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 C_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

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TI 060C/07/en/05.99
Printed in Germany / DT / CV5 (50028589)