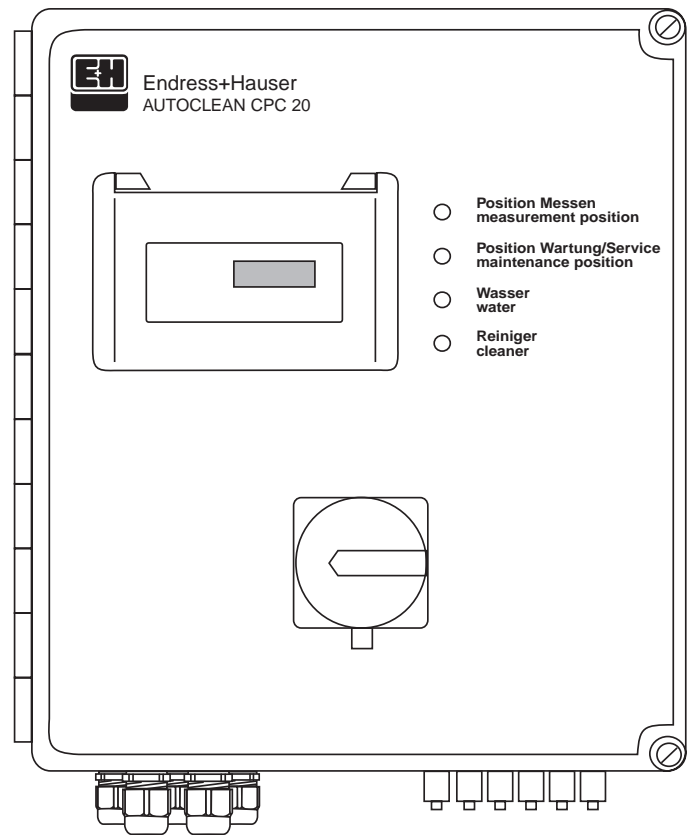
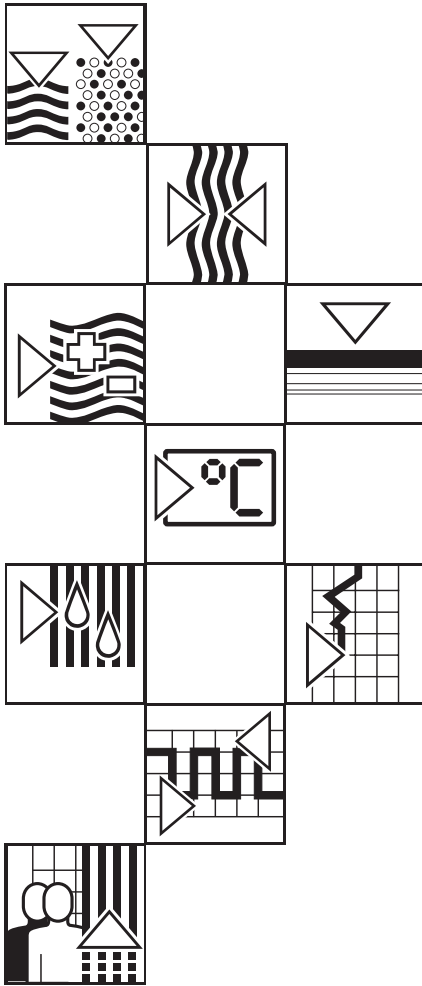


# *autoclean* CPC 20 / CPC 20 Z Control System for Automatic Cleaning of pH Electrodes

## Operating Instructions



Quality made by  
Endress+Hauser



ISO 9001

# Endress + Hauser

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# 1 General information

## 1.1 Symbols used

**Warning:**

This symbol alerts to hazards which may cause serious injuries as well as damage to equipment if ignored.

**Caution:**

This symbol alerts to possible malfunction due to operator error.

**Note:**

This symbol indicates important items of information.

## 1.2 Conformity statement

*The Autoclean CPC 20 / CPC 20 Z control system has been developed and manufactured in accordance with the applicable European standards and directives.*

**Note:**

An EC certificate of conformity may be requested from Endress+Hauser. An EC certificate of conformity is supplied with variant CPC 20 Z for installation in explosive atmospheres.

## 2 Safety

### 2.1 Intended use

The Autoclean CPC 20 / CPC 20 Z control system is used to control the automatic cleaning of pH electrodes. It can be connected to the retractable assemblies CPA 463, CPA 463S

or CPA 465. The Ex version CPC 20 Z permits operation in explosive atmospheres.

### 2.2 General safety notes



**Warning:**

Operation of the device in a manner other than as described in these operating instructions can lead to unsafe and improper functioning of the measuring system.

#### Installation, start-up, operation

The Autoclean CPC 20 / CPC 20 Z system has been designed for safe operation according to the state of the art in engineering and in keeping with the applicable regulations and EC directives; see »Technical data«.

However, if used improperly or other than for the intended purpose, it may pose a hazard, e.g. due to improper connection.

Installation, electrical connection, start-up, operation and maintenance of the measuring system must therefore be performed exclusively by trained specialists authorised by the system operator. This personnel must have read and understood these operating instructions and must adhere to them.

#### Immunity to interference

This device is protected against interference, such as pulse-shaped transients, high frequency and electrostatic discharges, according to the applicable European standards.

This is only valid, however, for a device connected according to the notes in these installation and operating instructions.

## 3 Description

### 3.1 System components

All system components are completely pre-wired. The housing comes with Pg cable glands, pneumatic connections and a vent connection. Power, the CYR 10 injector, the external control signals and the signal outputs are connected to the terminal strip in the control cabinet.

The supply voltage for the non-Ex version is 230, 110 or 100 V AC or 24 V DC. All system components are supplied with 24 V DC via the built-in power supply unit.

The Ex version is supplied with power via the CPM 152 measuring transmitter or via an intrinsically safe power supply.

#### Version C

The control system CPC 20-C (control via program sequencer CYR 20) comprises:

- program sequencer CYR 20,
- pneumatic valves for assembly control,
- feedback devices (pneumatic or inductive),
- switches and keys for manual and automatic operation, and
- LED operating status indicators.

**Note:**

The CPC 20-M / CPC 20Z-M can only be controlled with the CPM 152 transmitter in conjunction with software version 2.10 or later.

#### Version M

The control system CPC 20-M (control via CPM 152 transmitter) comprises:

- pneumatic valves for assembly control, and
- feedback devices (pneumatic or inductive).

#### Version Z

The control system CPC 20 Z (control via CPM 152 transmitter) comprises:

- pneumatic valves for assembly control, and
- feedback devices (pneumatic or inductive).

### 3.2 Measuring system

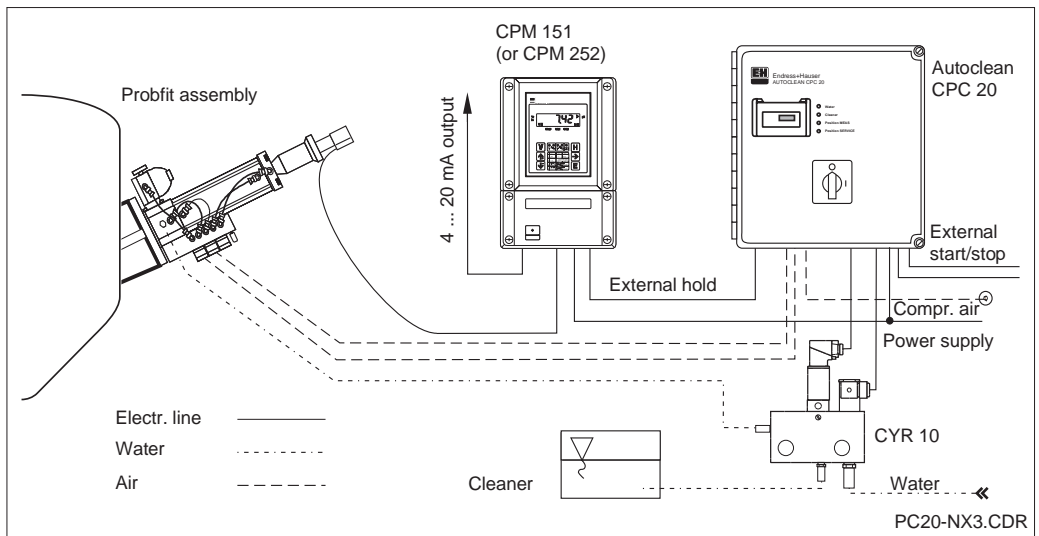


Fig. 3.1 Example of a complete measuring system in non-Ex area (CPC20-C)

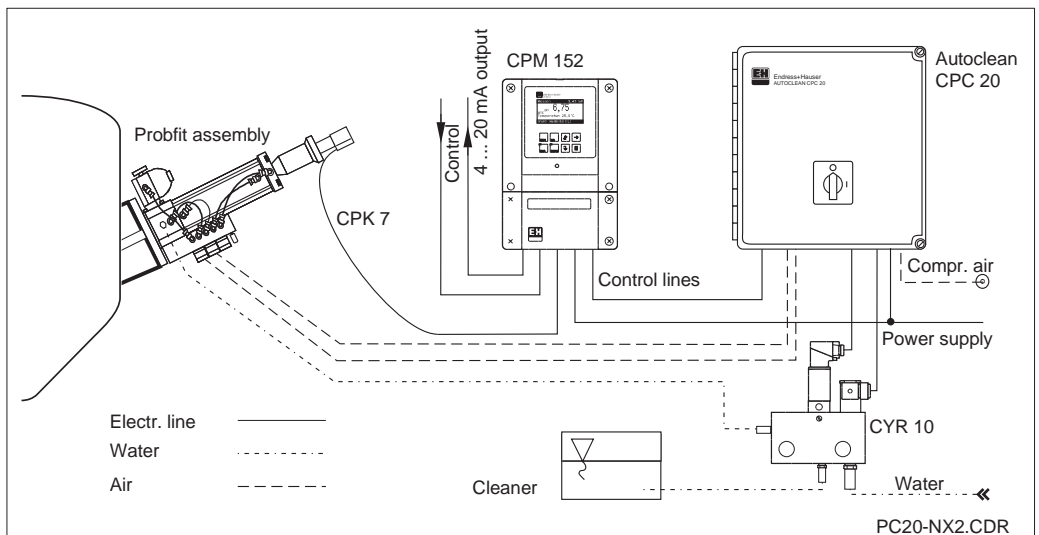


Fig. 3.2 Example of a complete measuring system in non-Ex area (CPC 20-M)

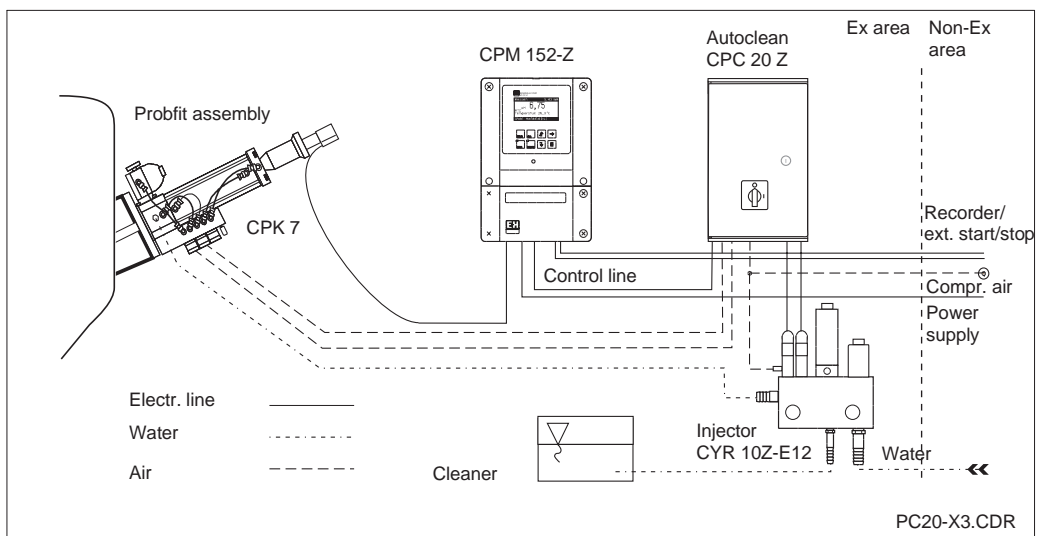


Fig. 3.3 Example of a complete measuring system in Ex area (CPC 20Z)

### 3.3 Device variants

#### 3.3.1 Nameplates

You can identify the instrument variant by the order code on the nameplate of the instrument.

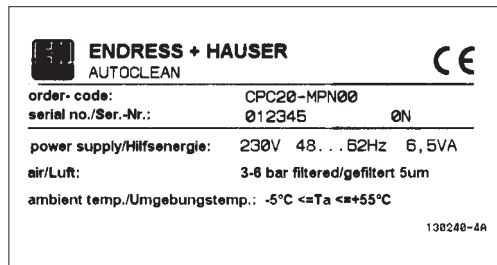


Fig. 3.4 Nameplate of CPC 20

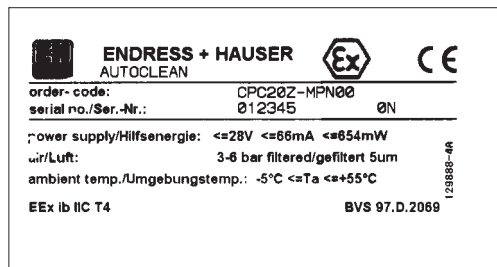
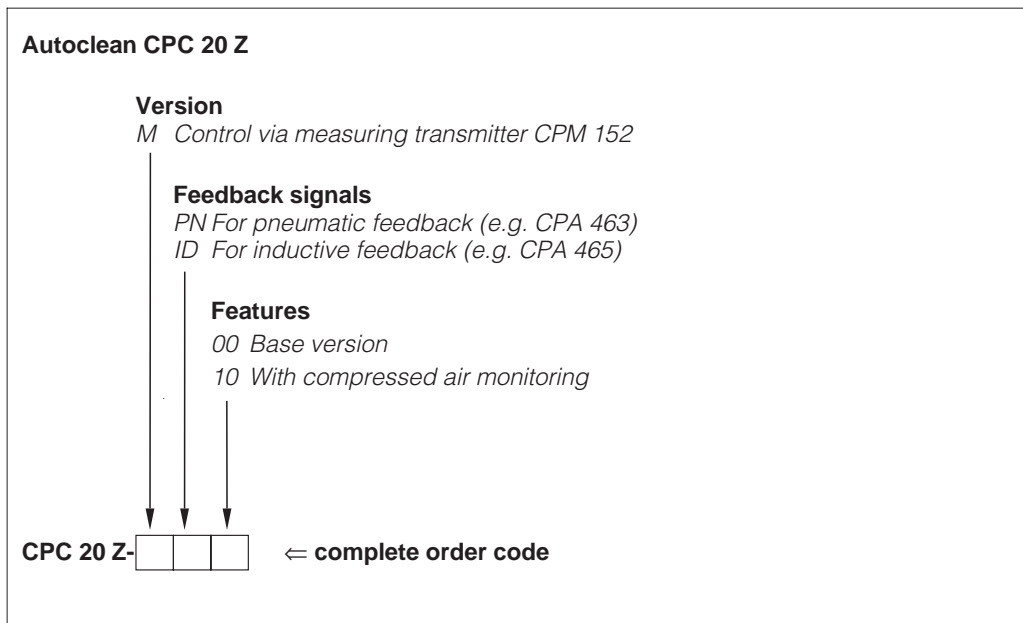
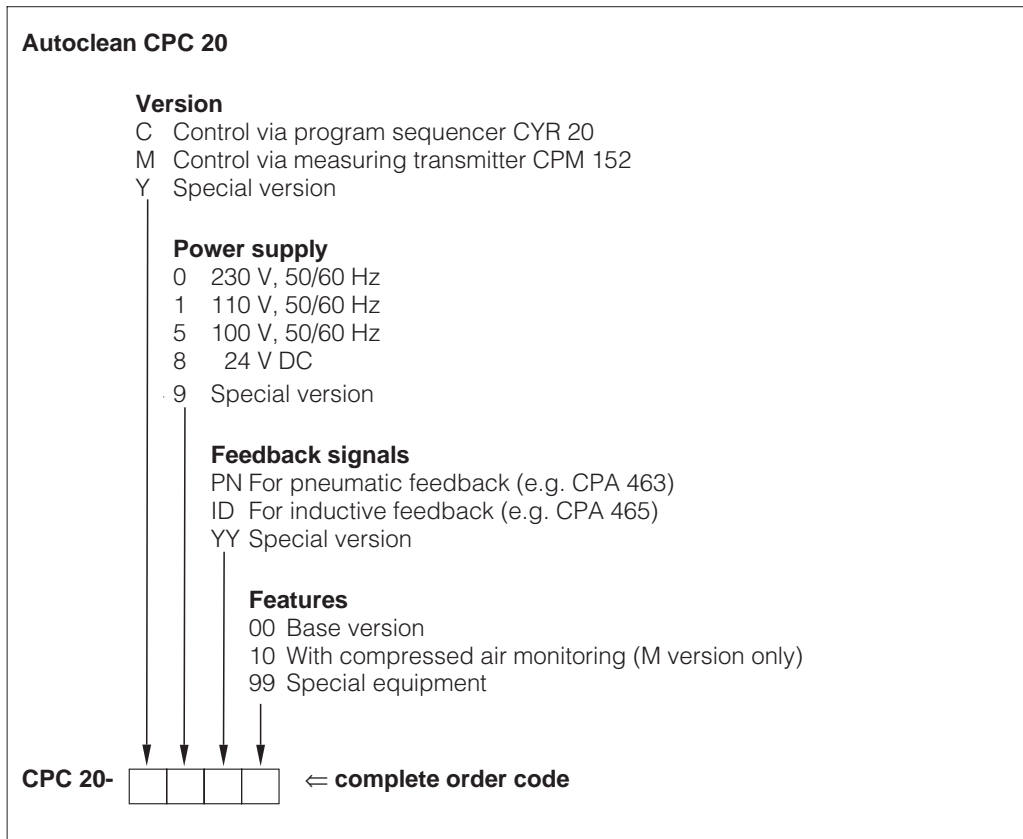


Fig. 3.5 Nameplate of CPC 20 Z

3.3.2 Order code





## 4 Installation

### 4.1 Storage and transport

The packaging material used to store or transport the instrument must provide shock and moisture protection. Optimal protection

is provided by the original packaging materials. Conformance with the ambient conditions (see »Technical data«) must be assured.

### 4.2 Unpacking

Verify that the contents are undamaged. Inform the post office or freight carrier as well as the supplier of any damage.

Save the original packaging in case the device must be stored or shipped at a later time.

Check that the delivery is complete and agrees with the shipping documents and your order:

If you have any questions, please consult your supplier or the Endress+Hauser sales office in your area (see back cover of these operating instructions for addresses).

- Quantity delivered
- Instrument type and version according to the nameplate (see section 3.3)
- Operating instructions
- Identification card(s)

#### Included in delivery:

- CPC 20-M.PN..  
Switch cabinet with mounting kit  
Operating Instructions
- CPC 20-M.ID..  
Switch cabinet with mounting kit  
Operating Instructions  
Inductive proximity switches to Namur
- CPC 20-C.PN..  
Switch cabinet with mounting kit  
Operating Instructions
- CPC 20-C.ID..  
Switch cabinet with mounting kit  
Inductive proximity switches
- CPC 20Z-MPN..  
Switch cabinet with mounting kit  
Operating Instructions  
Switch cabinet key  
Ex conformity certificate
- CPC 20Z-MID..  
Switch cabinet with mounting kit  
Operating Instructions  
Switch cabinet key  
Inductive proximity switches to Namur  
Ex conformity certificate

### 4.3 Dimensions

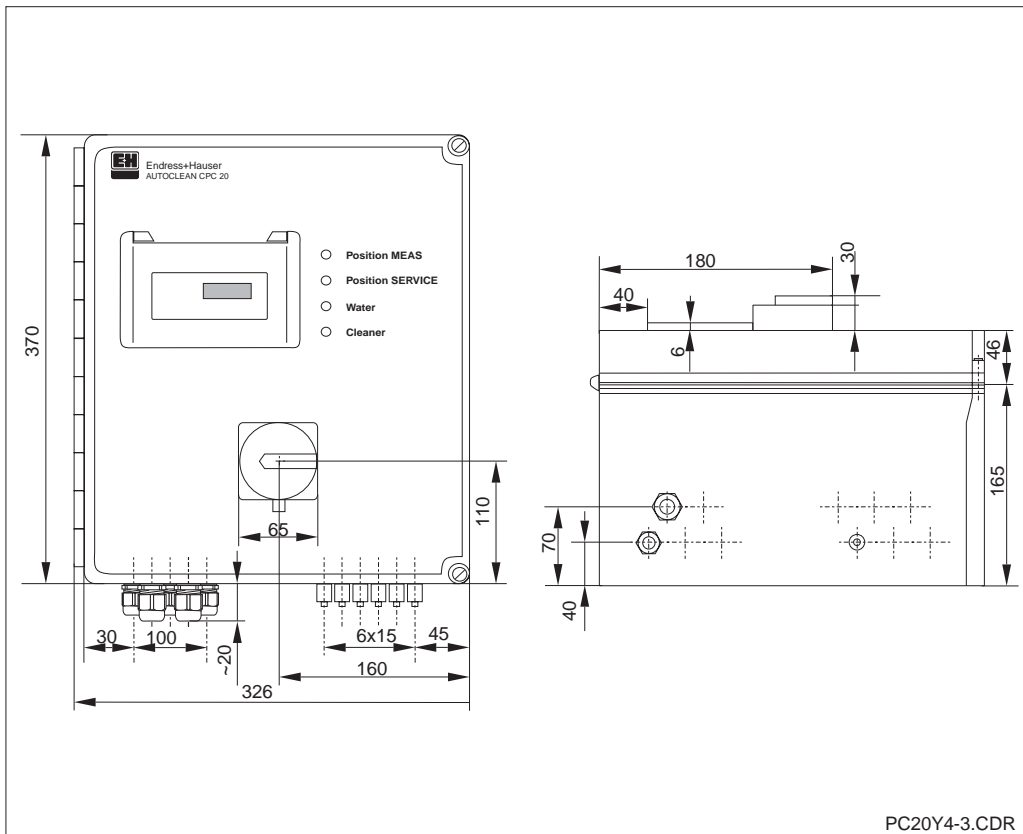


Fig. 4.1 Dimensions of CPC 20

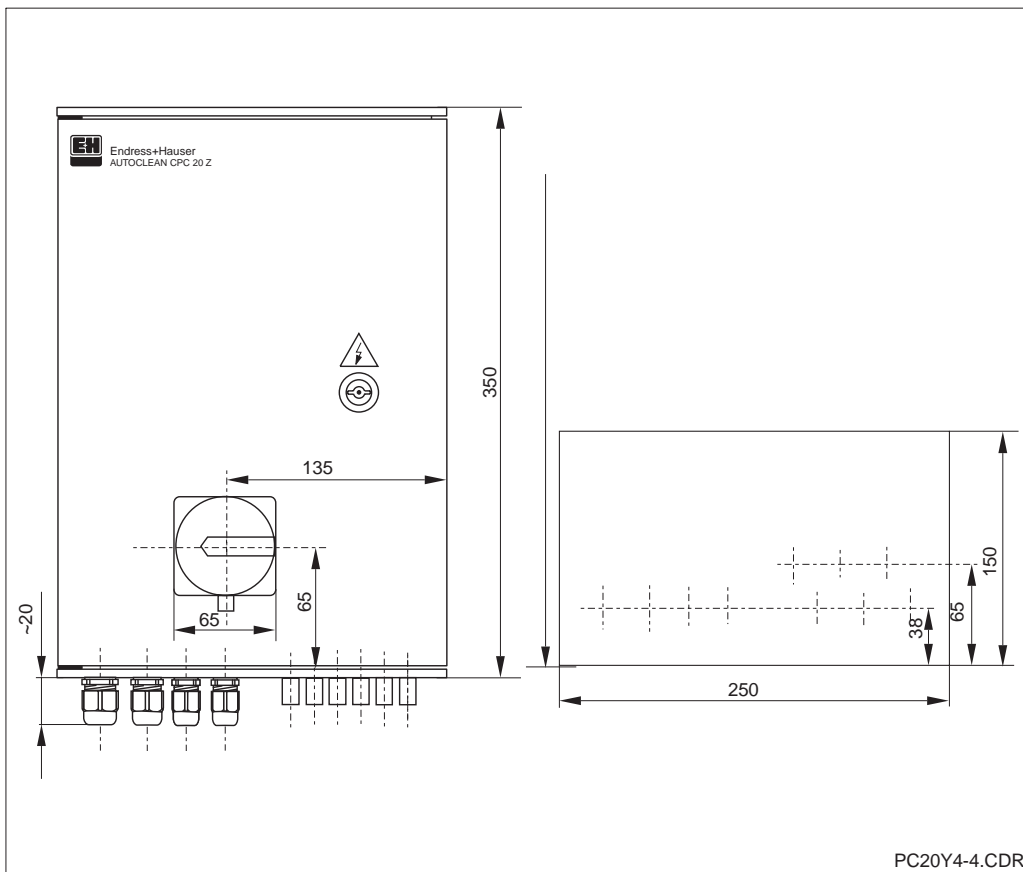
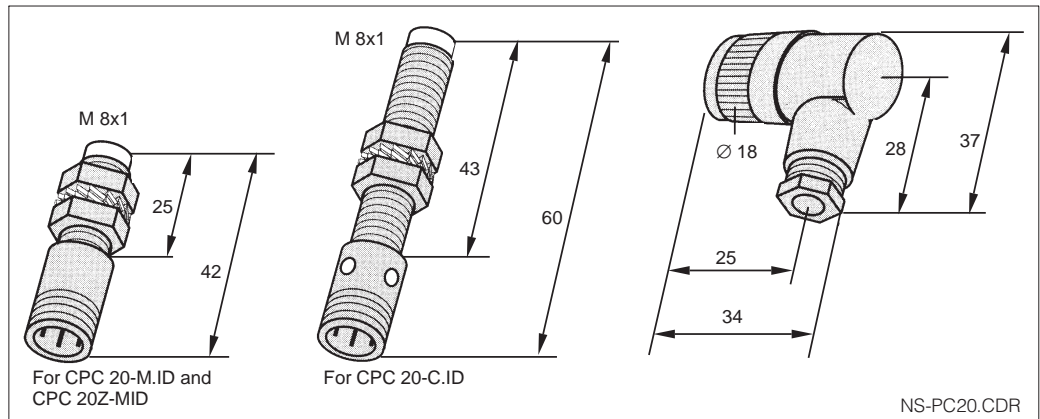


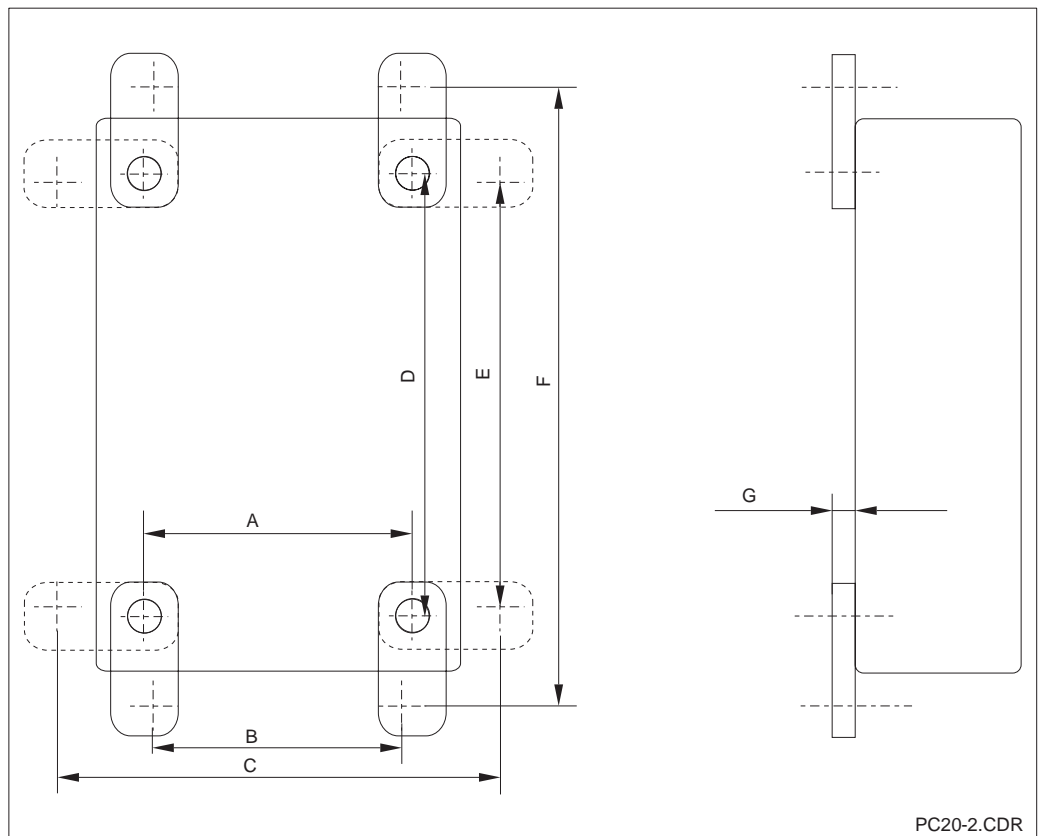
Fig. 4.2 Dimensions of CPC 20 Z

Fig. 4.4 Dimensions of inductive proximity switches (left) and right-angle connector



### 4.4 Mounting

Fig. 4.3 Dimensions for wall mounting



Variant	Length in mm						
	A	B	C	D	E	F	G
CPC 20-M CPC 20-C	260	254		260		379	30
CPC 20 Z		176	269		370	277	30

### 4.5 Pneumatic connection

**Safety notes:**



**Warning:**

- If faults cannot be remedied, the equipment must be removed from service and secured to prevent accidental start-up.
- The pressure in the system is to be released before carrying out any service work. The applicable safety rules are to be observed.
- Compressed air and water shutoff valves are to be provided by the operator.
- Couplings and lines under pressure are to be checked at regular intervals.



**Note:**

- The distance between the Autoclean CPC 20 and the retractable assembly must not exceed 10 m.
- Connections number 5 and 6 on all ID versions of the CPC 20 / CPC 20Z are equipped with cable glands for connection of retractable assemblies with inductive position feedback (e.g. CPA 465).

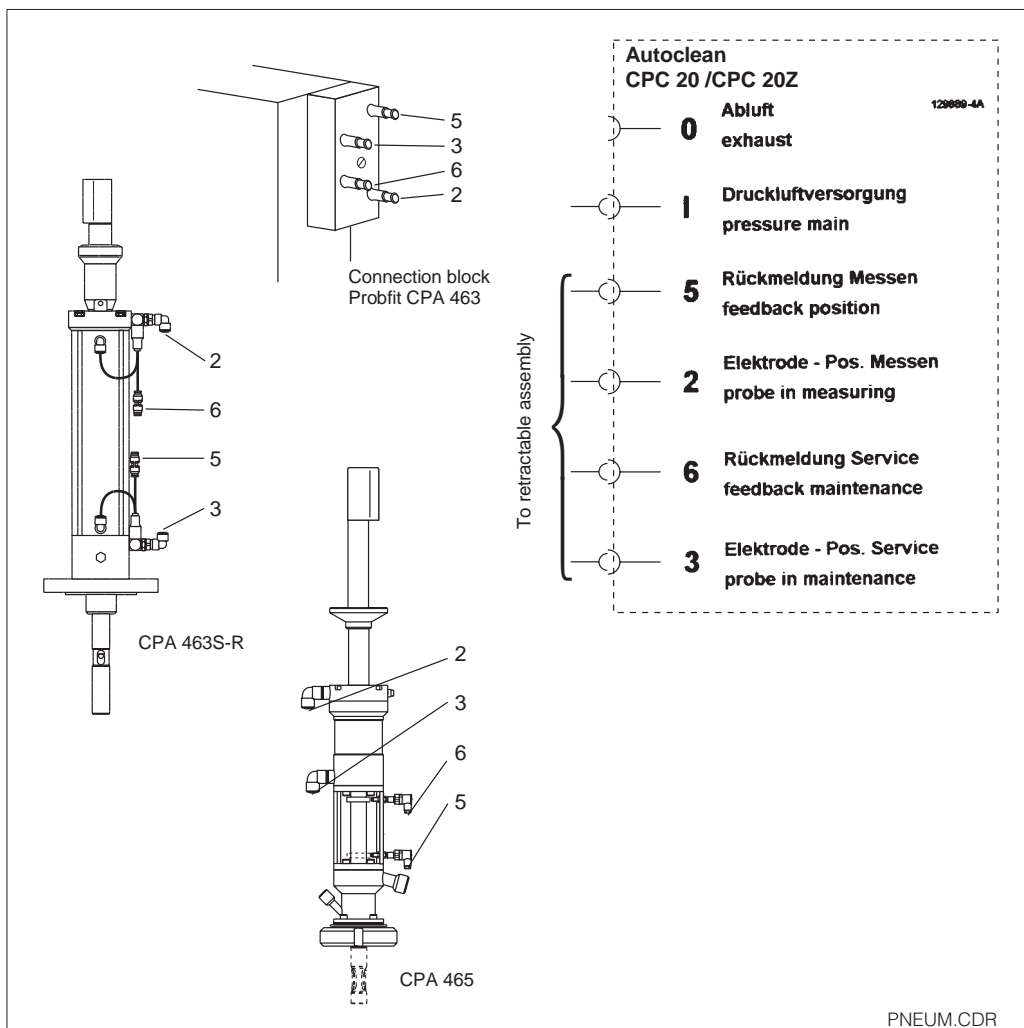


Fig. 4.5 Pneumatic connections

## 4.6 Electrical connection

### 4.6.1 Safety notes

**Warning:**

- Work under tension and connection to the mains may only be performed by properly trained specialist personnel.
- The device must be grounded before start-up!
- Verify before connection that the power supply ratings match the data specified on the nameplate!
- Adherence to the applicable regulations is mandatory for connection of units with explosion protection (see section 4.6.3).

**Caution:**

- All lines conducting signals are to be shielded according to VDE 0165 and to be routed separately from other control lines.
- There is no galvanic separation between power supply input, control and feedback connections on versions CPC 20-.8.. intended for connection to 24 V DC.

**Note:**

Immunity to interference is only guaranteed if the screens are connected to PE.

4.6.2 Installation in non-Ex area

Connection for version M

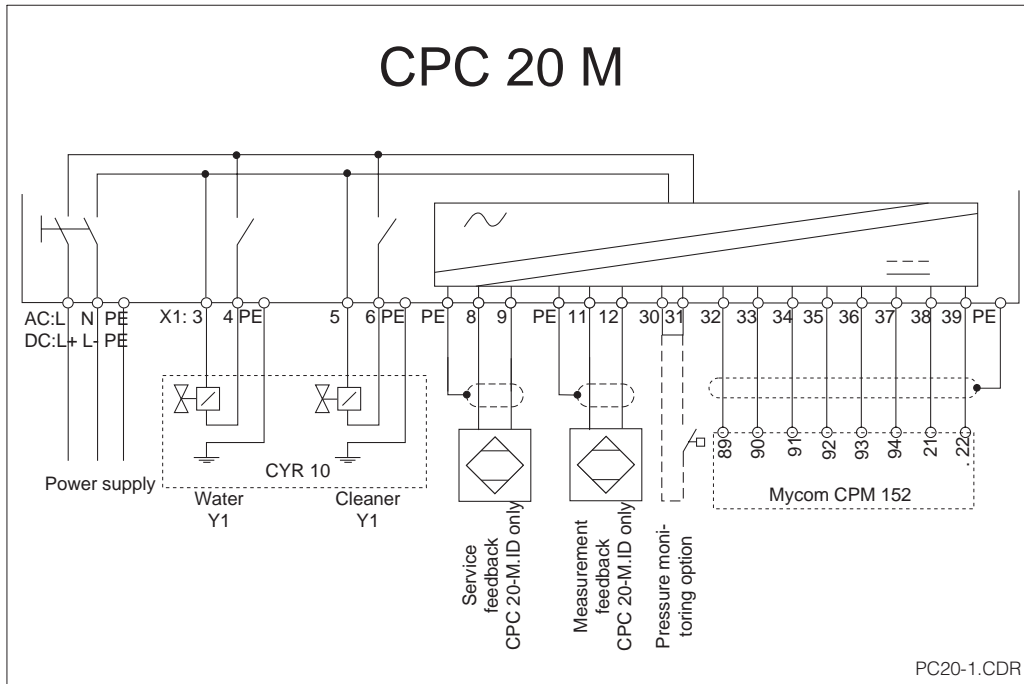


Fig. 4.6 Connection diagram for CPC 20-M

Terminals	Assignment
L1 / N / PE	Power supply: 230/110/100 V AC
L+ / L- / PE	Power supply: 24 V DC
1 / 2 / PE	Loop-through primary supply downstream from main switch
3 / 4 / PE	Water valve CYR 10
5 / 6 / PE	Cleaner valve CYR 10
8 / 9	(8+) (9-) proximity switch connection for Service feedback
11 / 12	(11+) (12-) proximity switch connection for Measurement feedback
30 / 31	Connection for optional pressure switch (make contact) for compressed air monitoring
32-37	Control signal connection on CPM 152 variants
38 / 39	Power supply and feedback on CPM 152 variants

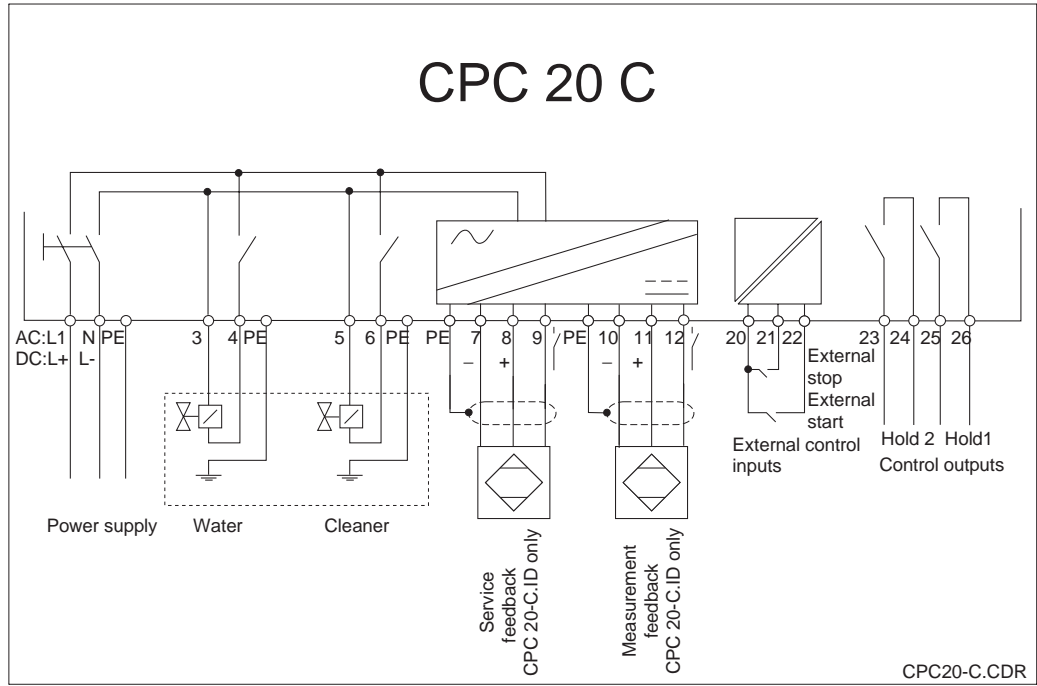


Fig. 4.7 Connection diagram for CPC 20-C

Terminals	Assignment
L1 / N / PE	Power supply: 230/110/100 V AC
L+ / L- / PE	Power supply: 24 V DC
1 / 2 / PE	Loop-through primary supply downstream from main switch
3 / 4 / PE	Water valve CYR 10
5 / 6 / PE	Cleaner valve CYR 10
7 / 8 / 9	(7-) (8+) proximity switch connection for Service feedback
10 / 11 / 12	(10-) (11+) proximity switch connection for Measurement feedback
20 / 21	External stop
20 / 22	External start
23 / 24 and 25 / 26	Potential-free hold output

### 4.6.3 Installation in Ex area

#### General notes for installation in hazardous areas

Versions of the unit identified by the letter Z (which stands for the German term 'Zertifikat', i.e. 'certificate') in the type designation have been manufactured and tested according to the harmonised European regulations (CENELEC) for »Electric equipment for explosive atmospheres«. These units comply with the basic requirements stipulated in directive 94/9/EC of March 23, 1994. A copy of the certificate of conformity (BVS) is supplied with the device.

Installation and operation are subject to the applicable national regulations.

The Autoclean CPC 20 Z control system built according to Ex regulations may be installed in Ex zone 1.

**Note:**

The Endress+Hauser basic information brochure GI 003/11/e, »Explosion protection of electric equipment and systems« contains helpful information on installation and operation of electric equipment in hazardous areas.

This brochure can be ordered from the Endress+Hauser sales offices.

**Warning:**

Only the CYR 10 Z-E12 injector with 12 V piezoelectric valves may be connected to the CPC 20 Z.



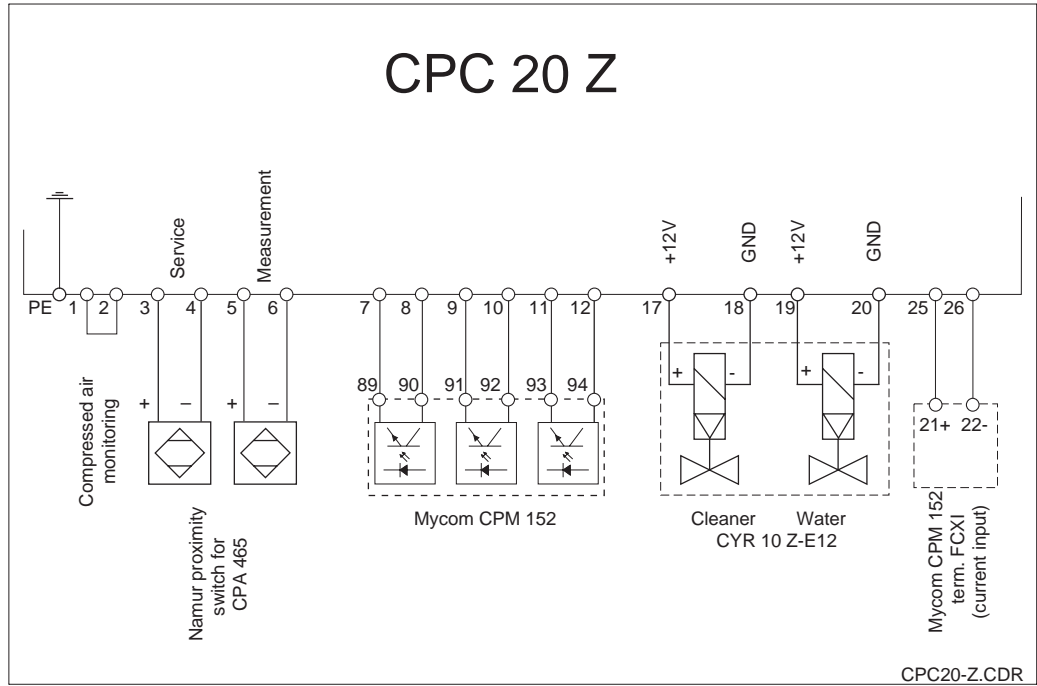


Fig. 4.8 Connection diagram for for CPC 20 Z

Terminals	Assignment
1 / 2	Pressure switch connection (make contact) for compressed air monitoring
3 / 4	(3+) (4-) proximity switch connection for Service feedback
5 / 6	(5+) (6-) proximity switch connection for Measurement feedback
7-12	Connection of binary control signals from CPM 152
17 / 18	(17+) (18-) piezoelectric cleaner valve
19 / 20	(19+) (20-) piezoelectric water valve
25+ / 26-	Current input / feedback to CPM 152

## 4.7 Packaging and disposal

### Packaging

Packaging must provide shock and moisture protection. Optimal protection is provided by the original packaging materials.

### Disposal

**Note:**

Electronic components to be disposed of are considered special waste! Please observe local regulations for disposal!

## 5 Installation and start-up



### Caution:

Check that all connections have been properly made before powering up the system!

### 5.1 Installation for version C

1. Mounting of control cabinet, assembly and injector CYR 10.
2. Establish hose connections between assembly and control cabinet.
3. Establish hose or pipe connections between injector CYR 10 and cleaning port of assembly.
4. Establish drive water connection to injector CYR 10.
5. Connection of injector CYR 10 to terminal strip in control cabinet:
  - Water valve to terminals 3 and 4
  - Cleaner valve to terminals 5 and 6.
6. Connection of power supply (optionally 230/110/100 V AC or 24 V DC) to terminal strip in control cabinet:
  - Terminals PE, L1 and N (for AC).
  - Terminals PE, L+ and L– (for DC).
7. Where applicable, connection of:
  - Hold 1 to terminals 25/26
  - Hold 2 to terminals 23/24
  - External start to 20/ 21
  - External stop to 20/22
8. Version -.CID...:
  - Connection of proximity switches to terminals 7-, 8+ and 9 and 10-, 11+ and 12
9. Connection of compressed air to control cabinet and injector.
10. Connection of compressed air to control cabinet.

### 5.2 Installation for non-Ex version (version M)

1. Mounting of control cabinet, assembly and injector CYR 10.
2. Establish hose connections between assembly and control cabinet.
3. Establish hose or pipe connections between injector CYR 10 and cleaning port of assembly.
4. Establish drive water connection to injector CYR 10.
5. Connection of injector CYR 10 to terminal strip in control cabinet:
  - Water valve to terminals 3 and 4
  - Cleaner valve to terminals 5 and 6.
6. Connection of power supply (optionally 230/110/100 V AC or 24 V DC) to terminal strip in control cabinet:
  - Terminals PE, L1 and N (for AC).
  - Terminals PE, L+ and L– (for DC).
7. Connection of measuring transmitter to terminals 32-37 (for version M).
8. Version -MID...:
  - Connection of proximity switches to terminals 8+ and 9- and 11+ and 12-.
9. Connection of compressed air to control cabinet.

### 5.3 Installation for Ex version

1. Mounting of control system CPC 20 Z, assembly and injector CYR 10 Z-E12.
  - Water valve to terminals 19 and 20
  - Cleaner valve to terminals 17 and 18.
2. Establish hose connections between assembly and control cabinet.
3. Establish hose or pipe connections between injector CYR 10 Z-E12 and cleaning port of assembly.
4. Establish drive water connection to injector CYR 10 Z-E12.
5. Connection of injector CYR 10 Z-E12 to terminal strip in control cabinet:
  6. Connection of measuring transmitter to terminals 25/26 and 7-12.
  7. Version Z-MID...  
Connection of proximity switches to terminals 3+ and 4- and 5+ and 6-
  8. Connection of compressed air to control cabinet and injector.

### 5.4 Start-up



**Caution:**

Check that all connections have been properly made before powering up the system!



**Note:**

Please familiarise yourself with the operation of the Mycom CPM 152 before power-up.

1. Switch on the power supply.
2. Manual test of all functions.
3. Adjust cleaning times on built-in program sequencer or measuring transmitter CPM 152.
4. Test of automatic functions.

## 6 Operation

The Autoclean CPC 20 control system is available in the following versions:

- CPC 20-C  
Control via program sequencer CYR 20
- CPC 20-M / CPC 20 Z-M  
Control via measuring transmitter CPM 152.

Refer to the respective operating instructions for more detailed information on program sequencer CYR 20 and measuring transmitter CPM 152:

- BA 143C  
Mycom CPM 152.

The sections below describe the operation of the CPC 20.

### 6.1 Version C

Version C is operated via the keys of the built-in program sequencer CYR 20.

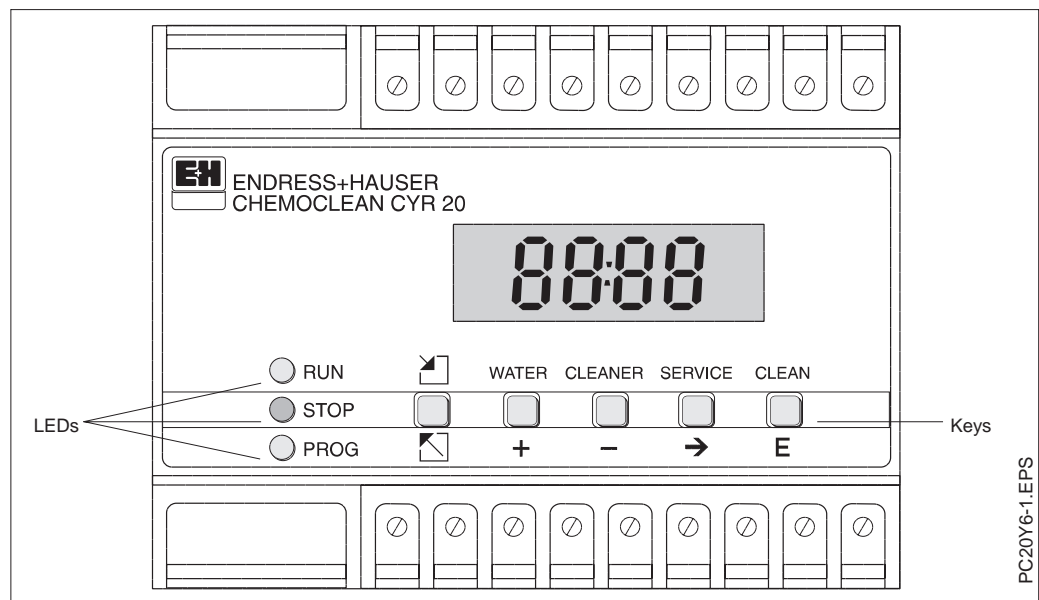


Fig. 6.1 Program sequencer CYR 20: front panel with display and control elements

#### 6.1.1 Operating modes

The program sequencer has three operating modes:

- Automatic
- Service (maintenance)
- Programming

##### Automatic

In the »automatic« mode, the cleaning functions are executed using the parameters set in the »programming« mode. A manual cleaning cycle can be started at any time independent of the starting times programmed while no cleaning cycle is in progress.

##### Service

Switching the unit to the »service« mode interrupts automatic operation. The pH electrode is moved to the »service« position. In service mode, you can perform manual water rinse and cleaning operations.



##### Note:

Once it has been started, a cleaning cycle (automatic, manual or external) is executed completely and cannot be interrupted. For this reason, the unit cannot be switched to the »service« mode during an ongoing cleaning cycle.

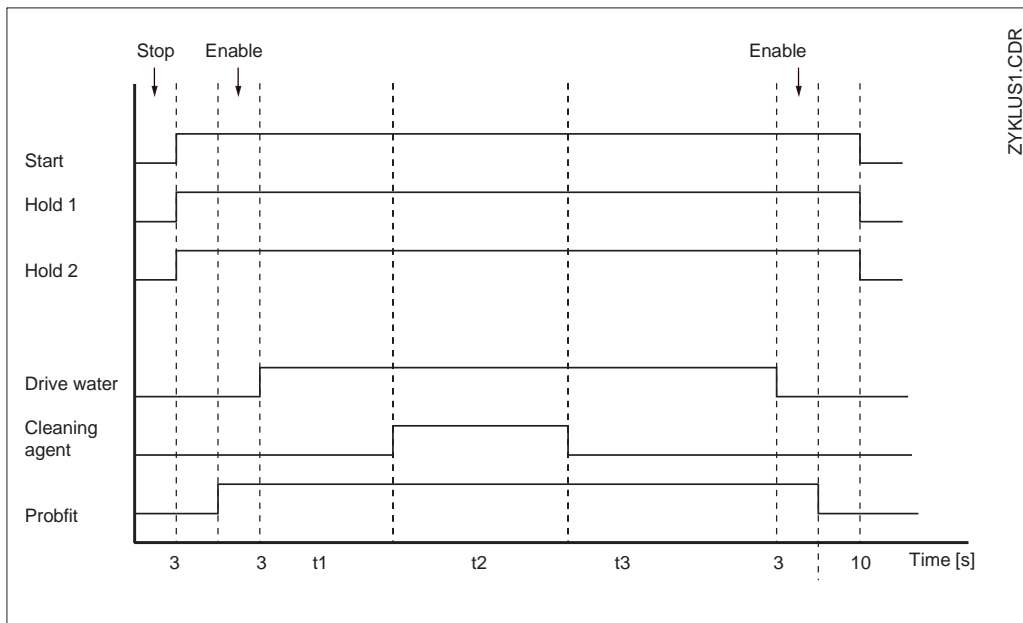


Fig. 6.2 Cleaning cycle sequence

**Programming**

In the »programming« mode, you can set the parameters for the automatic mode:

- Type of cleaning
  - Off
  - Interval cleaning with fixed intervals (10 min 99 h)
  - Weekly program with 12 starting times per day, individually adjustable for each day of the week
- Cleaning cycle
  - Pre-rinse time  $t_1$  (1.... 60 s)
  - Cleaning time  $t_2$  (1.... 60 s)
  - Post-rinse time  $t_3$  (1.... 60 s)
  - Economy function, i.e. every  $x^{\text{th}}$  cleaning cycle ( $x = 1 \dots 9$ ) is performed with cleaner; water rinse is used for remaining cycles
- Time of day (24-hour representation)

**6.1.2 External control**

The program sequencer is equipped with contact inputs and outputs for communication with other devices.

The inputs can be used to start a cleaning cycle externally or to inhibit the start of a cleaning cycle to prevent the cleaner from influencing important control processes.



**Note:**

- An ongoing cleaning cycle cannot be interrupted.
- An external start in the »service« mode is not possible.
- When an external stop has been issued, the unit cannot be operated via the keypad.

### 6.1.3 LEDs on CYR 20

#### Automatic mode

- RUN Green »RUN« LED is on.
- STOP
- PROG

- Cleaning cycle in progress

- RUN Green »RUN« LED flashes.
- STOP
- PROG

- External stop

- RUN
- STOP Red »STOP« LED is on.
- PROG

#### Service mode

- RUN
- STOP Red »STOP« LED flashes.
- PROG

#### Programming mode

- RUN
- STOP
- PROG Yellow »PROG« LED is on.

### 6.1.4 LEDs on CPC 20-C

- pH electrode in »measurement« position

- Position Messen measurement position »Measurement position« LED is on.
- Position Wartung/Service maintenance position
- Wasser water
- Reiniger cleaner

- pH electrode in »service« position

- Position Messen measurement position »Maintenance position« LED is on.
- Position Wartung/Service maintenance position
- Wasser water
- Reiniger cleaner

- Drive water valve is open


- Position Messen measurement position
- Position Wartung/Service maintenance position »Maintenance position« LED is on,
- Wasser water »water« LED is on
- Reiniger cleaner

- Cleaner valve is open

- Position Messen measurement position
- Position Wartung/Service maintenance position »Maintenance position«, »water« and »cleaner« LEDs are on.
- Wasser water
- Reiniger cleaner

### 6.1.5 Key functions



#### Automatic mode

-  Switch from Automatic → Programming
- CLEAN** Start cleaning cycle manually
- SERVICE** Switch from Automatic → Service

#### Service mode

- WATER** Open drive water valve (while key is held down)
- CLEANER** Open drive water and cleaner valves at the same time (while key is held down)
- SERVICE** Switch from Service → Automatic

#### Programming mode

-  Switch from Programming → Automatic or go back one programming level
- E** Confirm / store settings
-  Select decimal place
- +** Increase value / function selection within programming level
- Decrease value / function selection within programming level



6.1.6 Programming

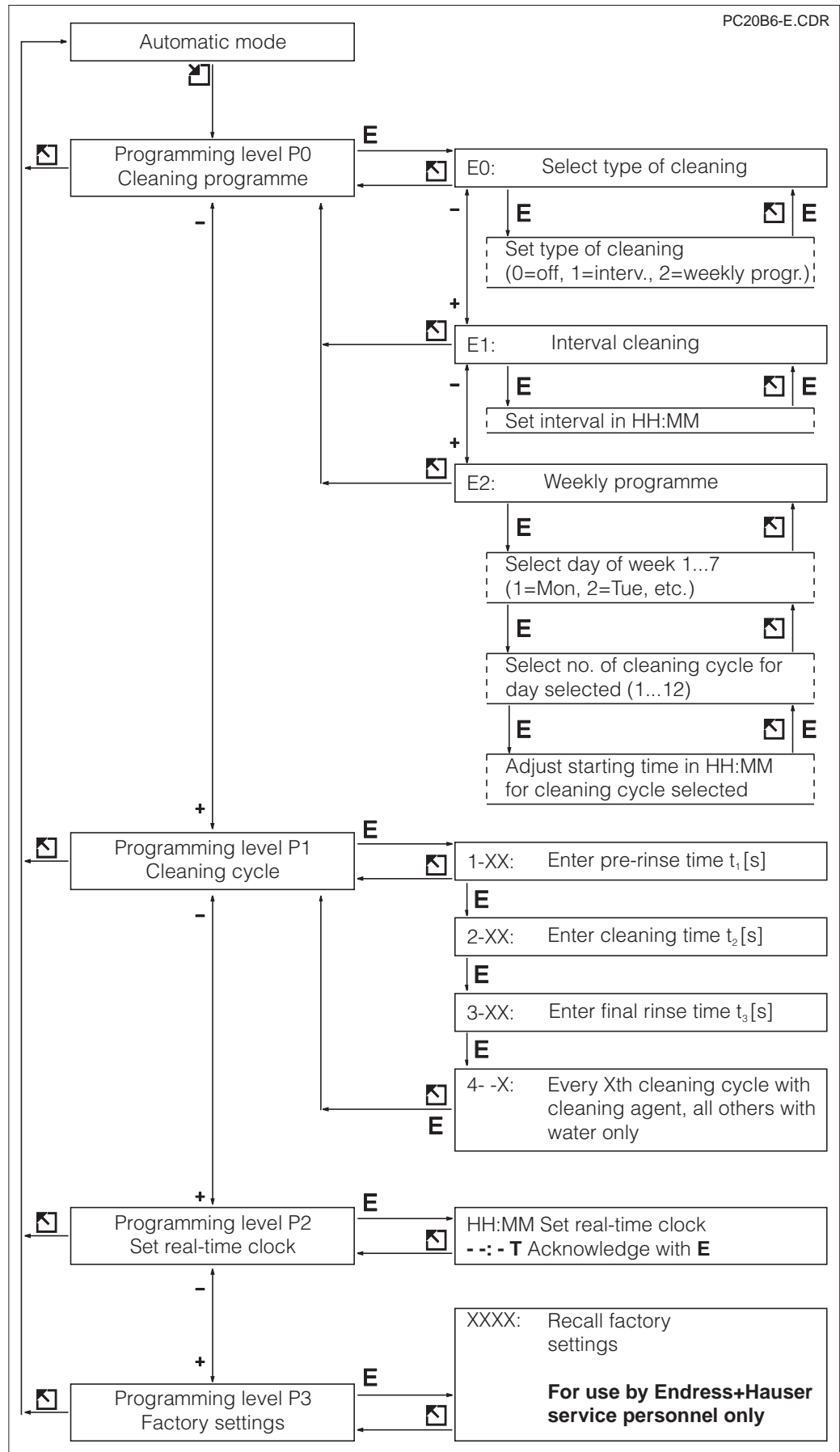


Fig. 6.3 Programming chart

## 6.2 Version M

Version M is operated via the keys on the measuring transmitter CPM 152. Please refer to Operating Instructions BA 143C (order no. 50077395) for key functions and the complete menu structure of the transmitter.

- In the »Instrument data / system configuration« menu, select the »Chemoclean« cleaning function under »Output contacts«.
- Set the parameters for the cleaning function in the »Instrument data / Chemoclean« menu. The options are similar to those available for programming of the CYR 20 (see sections 6-6.1.1).
- Under »assembly« in the »Quick operation« menu, you can move the assembly to the service position and start a cleaning cycle.

### 6.2.1 Interval cleaning / weekly program

After expiration of the time interval, a cleaning cycle is started at time  $t_0$ , then the system waits for another time interval to expire before

starting the next cleaning cycle. Fixed starting times are defined for each day of the week in the case of the weekly program.

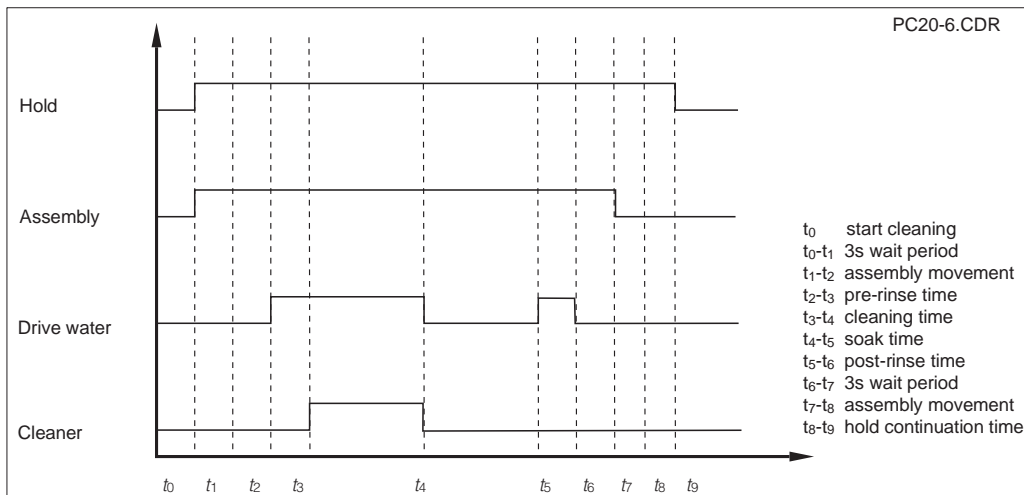


Fig. 6.4 Cleaning cycle sequence

### 6.2.2 Interval measurement

The electrode is outside the medium during the dwell time and is only moved to the measuring position for the duration of the measur-

ing time. Then the electrode is moved back to the service position and cleaned.

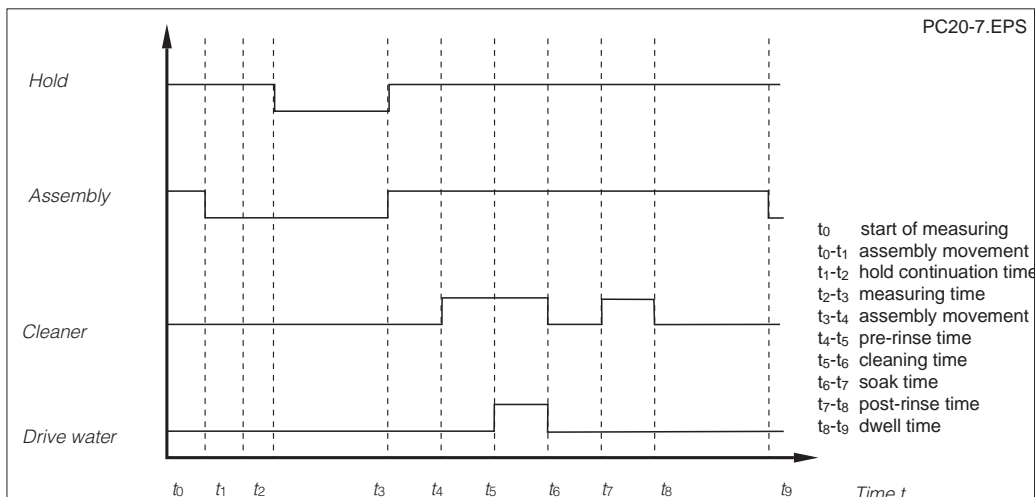


Fig. 6.5 Interval measurement sequence

## 7 Maintenance and service

### 7.1 Error messages

If an assembly error occurs in conjunction with the CPC 20-M or CPC 20 Z-M control, the CPM 152 transmitter indicates error no. E013. Check the assembly (compressed air supply, mechanical obstruction, power failure, position of main switch) to locate and eliminate the problem.

### 7.2 Cleaning

We recommend using solvent-free cleaners to clean the front panel.

Use filtered (5 µm), non-lubricated compressed air in the pressure range from 4 to 6 bar for further cleaning (e.g., to blow out the housing).

### 7.3 Repair

Repair work must be carried out directly by the manufacturer or by the Endress+Hauser Service Organization.

See the back cover of these operating instructions for an overview of the Endress+Hauser service network.

### 7.4 Accessories

- Inductive proximity switches (break contact) to NAMUR for CPC 20-M and CPC 20Z-M  
Order no.: 50087313
- Inductive proximity switches (make contact) for CPC 20-C  
Order no.: 50073993
- Pressure switch (make contact)  
Order no.: 50062030

## 8 Appendix

### 8.1 Technical data

<b>General</b>	
Maximum line length between assembly and CPC 20	10 m (standard: 5 m)
Control signals	on terminal strip
Environmental conditions	
Operating temperature	-5 ... +55 °C
Storage temperature	-40 ... +60 °C
Humidity	max. 90 %
Protection class	IP 54
Compressed air	4... 6 bar, oil-free, filtered (< 5 µm)
Min. flow rate	80 l / min (nominal)
Compressed air monitoring (option)	triggered at 2.5 bar ± 10%
Connection	
Compressed air	tube unions, ID 4 / OD 6
Inductive proximity switches	M8 x 1 thread
<b>CPC 20 (M or C version)</b>	
Power supply	optionally 230/110/100 V AC, 24 V DC
Power consumption (M/C versions)	6.5 W / 10 W
Tolerance	+10/-15 %
Frequency, AC	50/60 Hz
Housing dimensions (W x H x D)	326 x 370 x 211 mm
Power supply output for injector CYR 10	same as CPC 20 power supply
Weight (M/C versions)	3.9 kg / 7.5 kg
Pneumatic pressure switch / inductive proximity switch	
Version C	make contact
Version M	break contact to Namur
Terminals, max. cable cross section	2.5 mm <sup>2</sup>
<b>CPC 20 Z</b>	
Max. series resistance in supply circuit	300 Ω
Housing dimensions (W x H x D)	250 x 350 x 150 mm
Housing material	glass-fibre reinforced polyester
Weight	4.8 kg
Pneumatic pressure switch	break contact
Inductive proximity switch	break contact to Namur
	make contact for pressure monitoring
Power supply output for injector CYR 10Z-E12	12 V DC / 0.5 mA
Terminals, max. cable cross section	2.5 mm <sup>2</sup>

**CPC 20 Z (continued)**

Power supply . . . . . EEx(i) power supply through CPM 152  
 Intrinsically safe power supply . . . . .  $20\text{ V} \leq U \leq 28\text{ V DC}$   
 . . . . .  $15\text{ mA} \leq I \leq 66\text{ }\mu\text{A}$   
 . . . . .  $150\text{ mW} \leq P \leq 654\text{ mW}$   
 Hazardous area protection . . . . . EEx ib IIC T4  
 Ex conformity certificate . . . . . BVS 97.D.2069

Safety values according to EN 50020

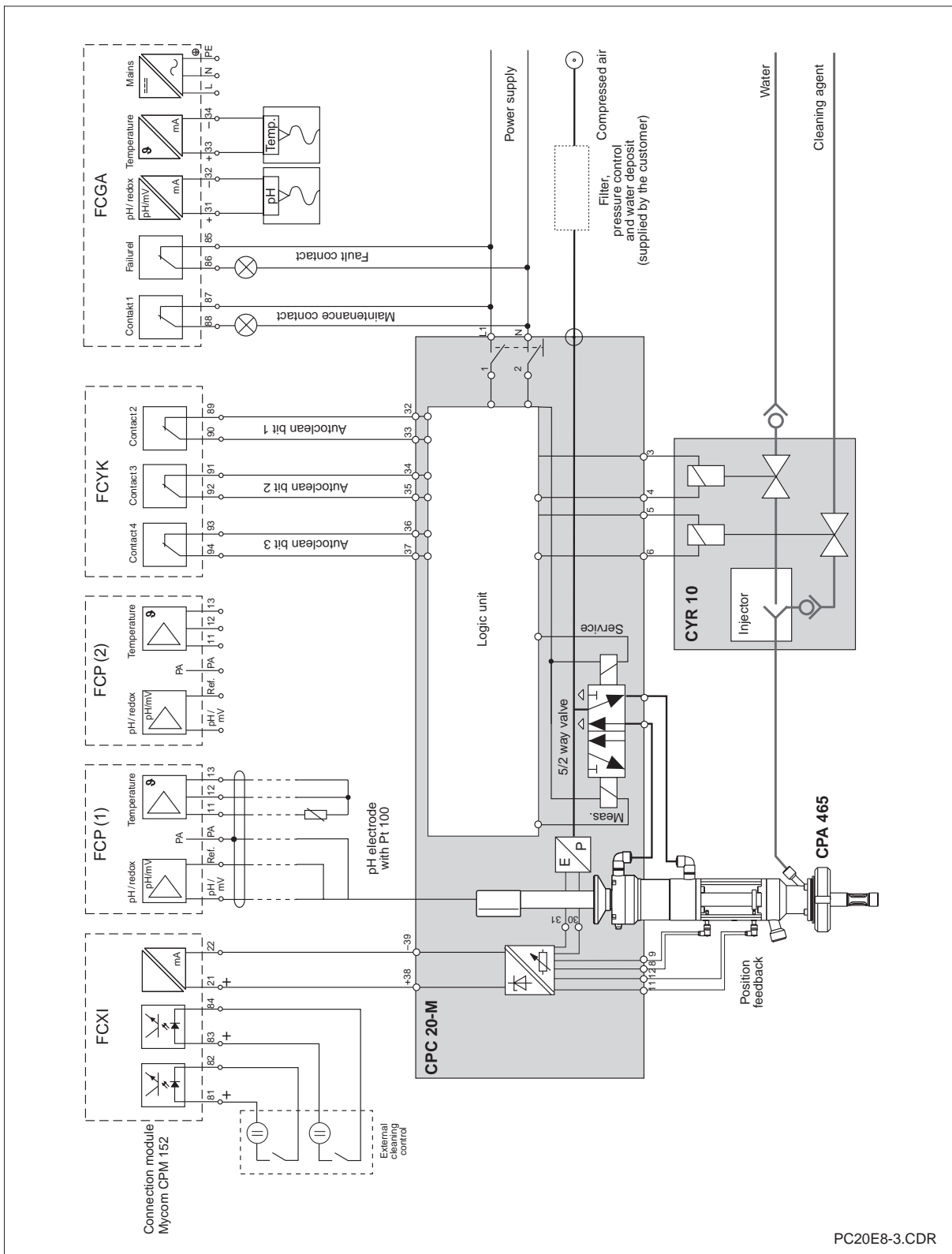
Designation	Terminals	U max.	I max.	P max.
Pressure monitoring	X 1/1 and 2	28 V	66 mA	654 mW
Feedback, maintenance	X 1/3 and 4	14 V	4 mA	12 mW
Feedback, measurement	X 1/5 and 6	14 V	7 mA	24.5 mW
Interface 1	X 1/7 and 8	28 V	66 mA	654 mW
Interface 2	X 1/9 and 10	28 V	66 mA	654 mW
Interface 3	X 1/11 and 12	28 V	66 mA	654 mW
Power supply circuit	X 3/25 and 26	28 V	66 mA	654 mW
Valve, measurement	X 2/13 and 14	28 V	66 mA	654 mW
Valve, cleaner	X 2/17 and 18	28 V	66 mA	654 mW
Valve, water	X 2/19 and 20	28 V	66 mA	654 mW
Valve, maintenance	X 2/21 and 22	28 V	66 mA	654 mW

Additional data for version C:

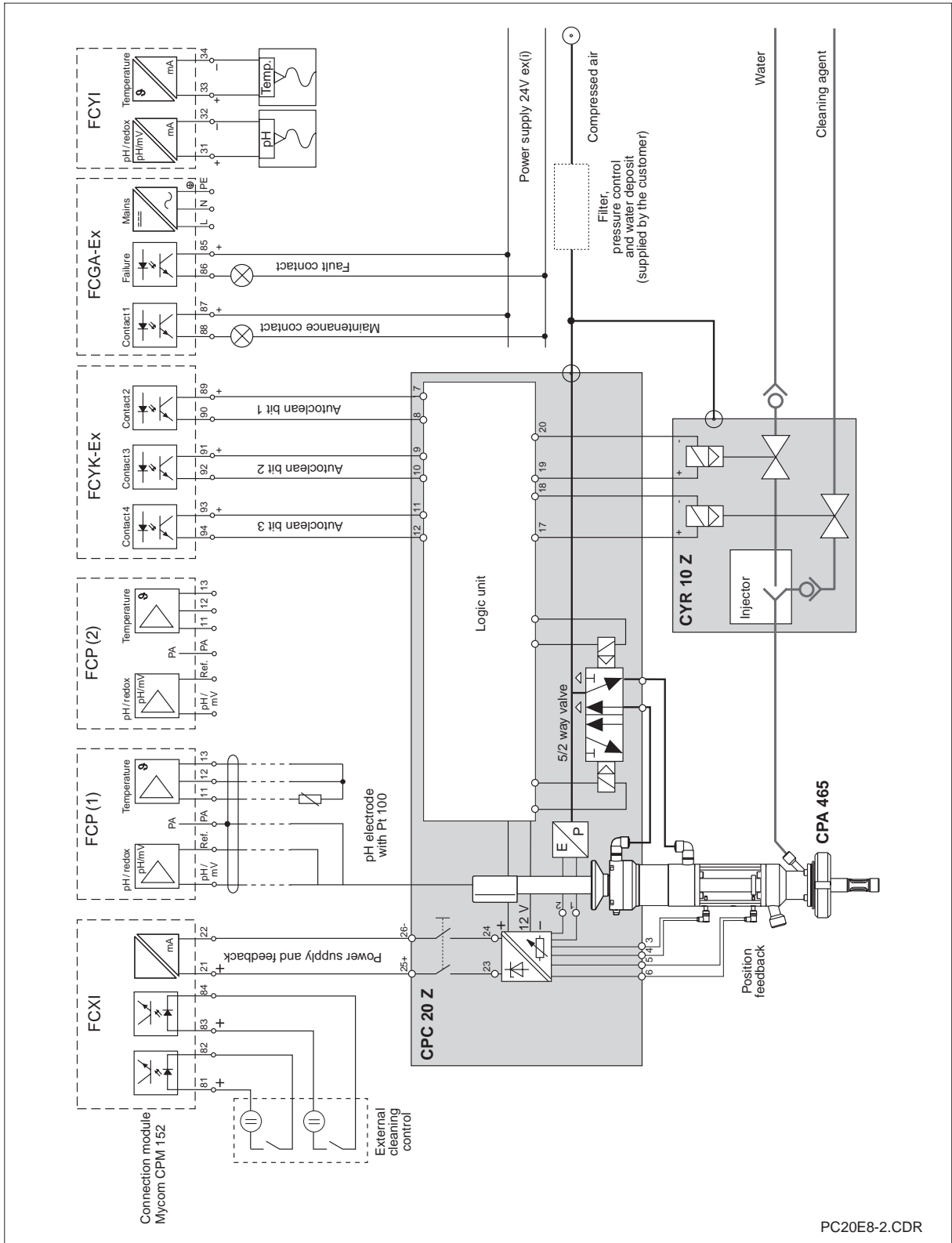
Operating Instructions BA 046C  
 Chemoclean plus CYR 10 / CYR 20

## 8.2 Examples for connection

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8.2.2 Ex version



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