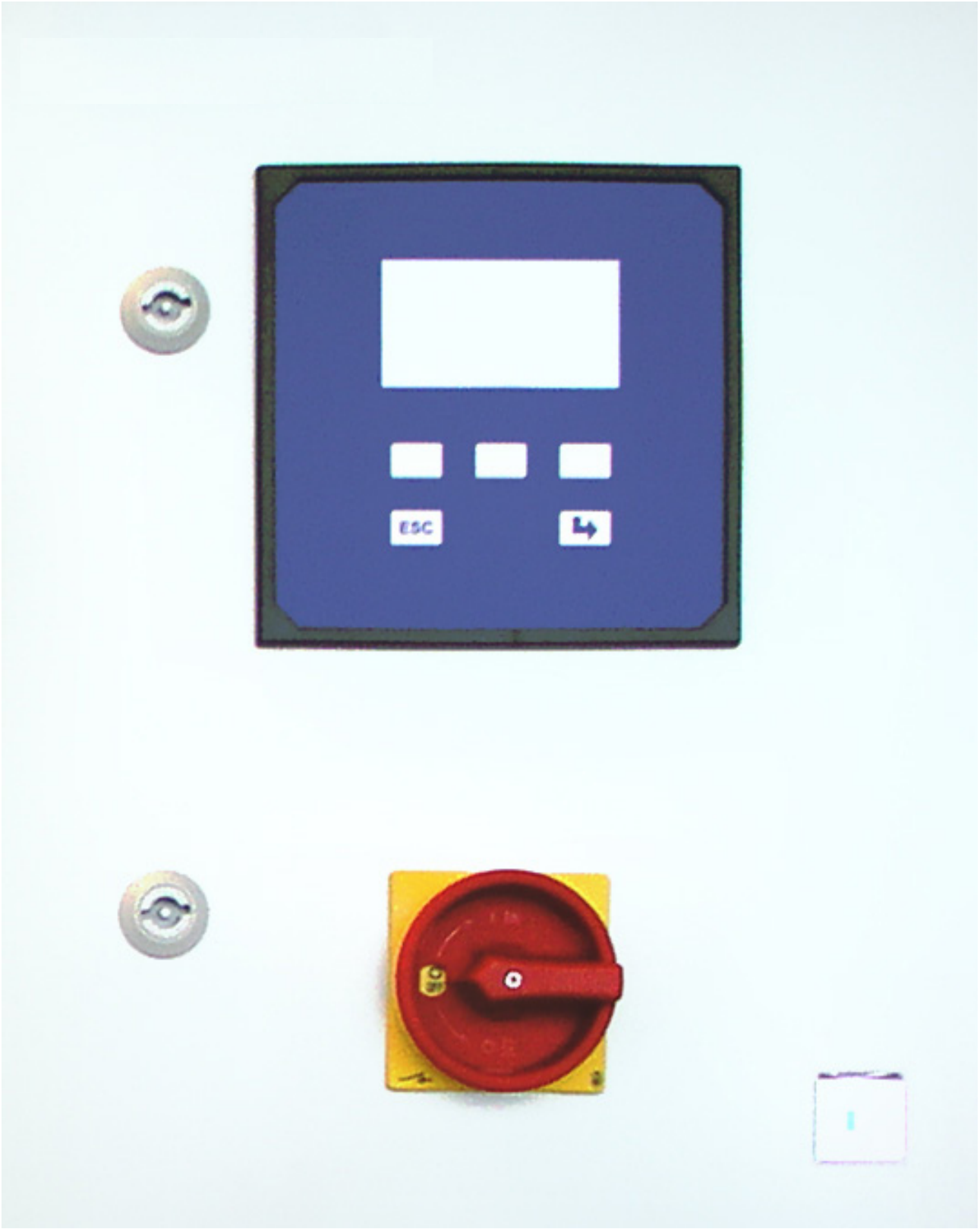
Instruction Manual

RF20C (EXmatic 460)
Control unit

EXNER PROCESS EQUIPMENT



YOKOGAWA

IM 12B06K07-E-E
1st Edition

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1. Safety and protection measures

1.1 General notes on safety

The control unit RF20C (EXmatic 460) is designed in such a way that the product does not present any risk if the operating instructions are adhered to.

- Read the operating instructions first.
- Only assemble and operate the control unit if you have read and understood all notes on safe and proper use.
- Keep the operating instructions in order to consult it any time.
- Only operate the control unit and its accessories if they are in an impeccable condition.
- In addition, also observe the laws, ordinances, regulations and standards applicable in the country of use and at the place of use.

1.2 Intended use

The control unit RF20C (EXmatic 460) is used for controlling pneumatic retractable fittings. The RF20C (EXmatic 460) controls the movement of the retractable fitting from the measurement position to the service position and the process of the automatic rinsing of the sensor in the rising chamber of the fitting.

The design of the control unit must be suited to the used retractable fitting.

The control unit must be maintained on a regular basis.

- Establish a maintenance plan which is adjusted to your process.
- Only carry out maintenance work which is described in the operating instructions!
- The control unit may only be modified after consulting the manufacturer.


The manufacturer does not assume any liability for damages arising from improper or unintended use.

1.3 Danger areas and residual dangers

Control units control retractable fittings which are connected to containers and pipes which can be under pressure. Process fluid can only escape in case of careless actions or improper operation.

- Ensure prior to start-up that the connected retractable fitting is suited and able to function.
- Carefully read the operating instructions of the used retractable fitting and observe the notes on safety contained in it.
- Take appropriate protection measures before starting the control unit or connecting to the retractable fitting.

1.4 Resources

Only use checked and approved accessories and resources.

Supply voltage Make sure you have the correct supply voltage and follow the information in the chapter “technical data”.

Compressed air Filter (40 m), clean and deoil the compressed air. Make sure that the pressure is between 4 and 6 bar.

Rinsing fluid/ cleaning agent Use rinsing fluids and cleaning agents which are both adapted to the process, the retractable fitting and the sealing material and dispose of them properly.

1.5 Personnel

Qualification Trained skilled workers may operate and maintain the control unit only!

Protective clothing The operating personnel must wear suitable protective clothing during start-up and maintenance work.

Accident prevention rules Observe the rules and regulations concerning safety at work applicable in the country of use and at the place of use!

1.6 Disposal

Observe the rules and regulations concerning waste disposal applicable in the country of use and at the place of use.

1.7 Symbols and pictograms

Pictograms and symbols are used in the operation manual to provide better orientation.

DANGER! The safety note with the **DANGER!** signal indicates the risk of personal danger and high material damage in case of failure to observe the instructions.

CAUTION! The safety note with the **CAUTION!** signal indicates the risk of material damage in case of failure to observe the instructions.

Indicates an important note!

This sign indicates that the operations should be carried out in the specified order.

2. Product description

2.1 Control unit RF20C (EXmatic 460)

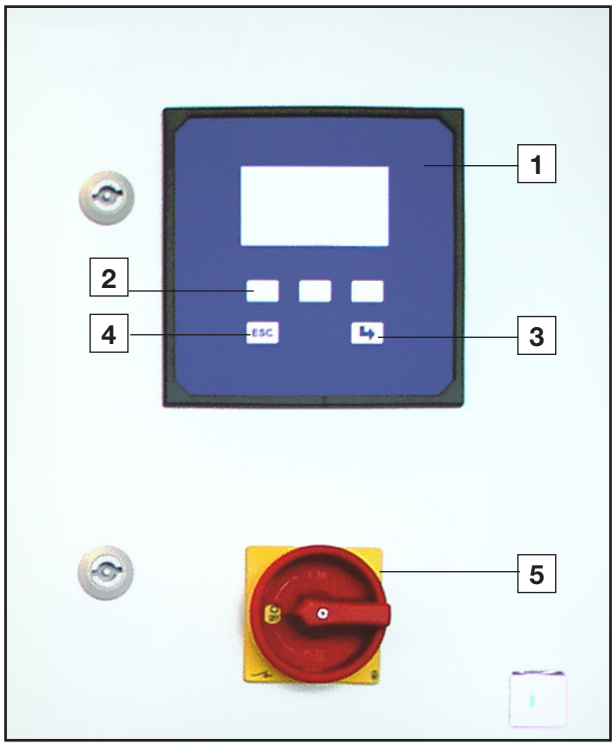


Figure 1: Control unit outside

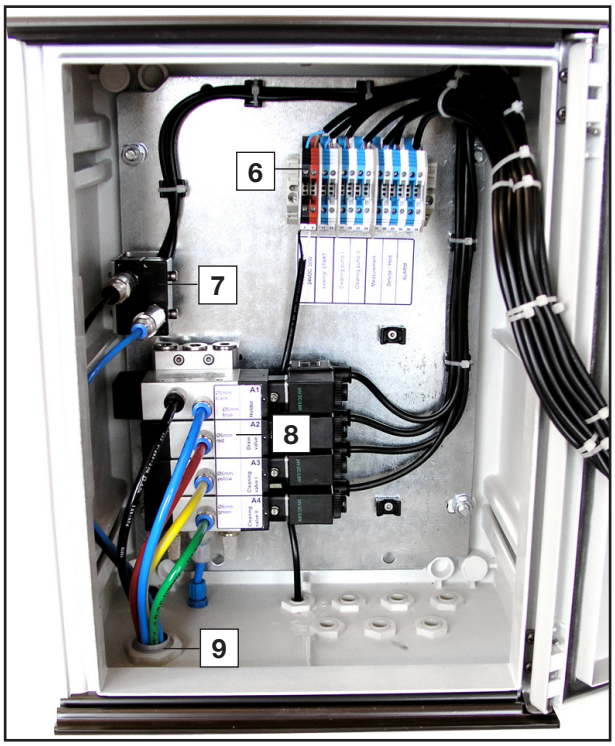


Figure 2: Control unit inside

View from outside

1 Operating panel
2 Function keys
3 Return button
4 ESC button
5 Main switch

View from inside

6 Terminal board
7 Indicator/pressure switch
8 Pilot valve
9 Input multi hose

Function The control unit RF20C (EXmatic 460) can fully automatically control and monitor the measuring and cleaning cycles of a pneumatic retractable fitting. For doing this, the cleaning times, measuring intervals and the starting times can be parameterized and adjusted to the respective specification.

Input The control monitors the respective position indication of the retractable fitting via integrated inputs.

Automatic cleaning can be started via an external input.

Output The respective condition of the retractable fitting and of the control can be transmitted to a higher process control system via three contact outputs.

Retractable fitting

The retractable fitting and the cleaning valves for controlling the cleaning solutions are connected to the control unit by means of pneumatic hoses. This should be done with the adjusted multi hose.

2.2 Process integration

The control unit RF20C (EXmatic 460) is supplied with 24V DC and with compressed air 4-6 bar. The connection of the retractable fitting and the cleaning and drain valves is realized by pneumatic hoses which are gathered in a multi hose.

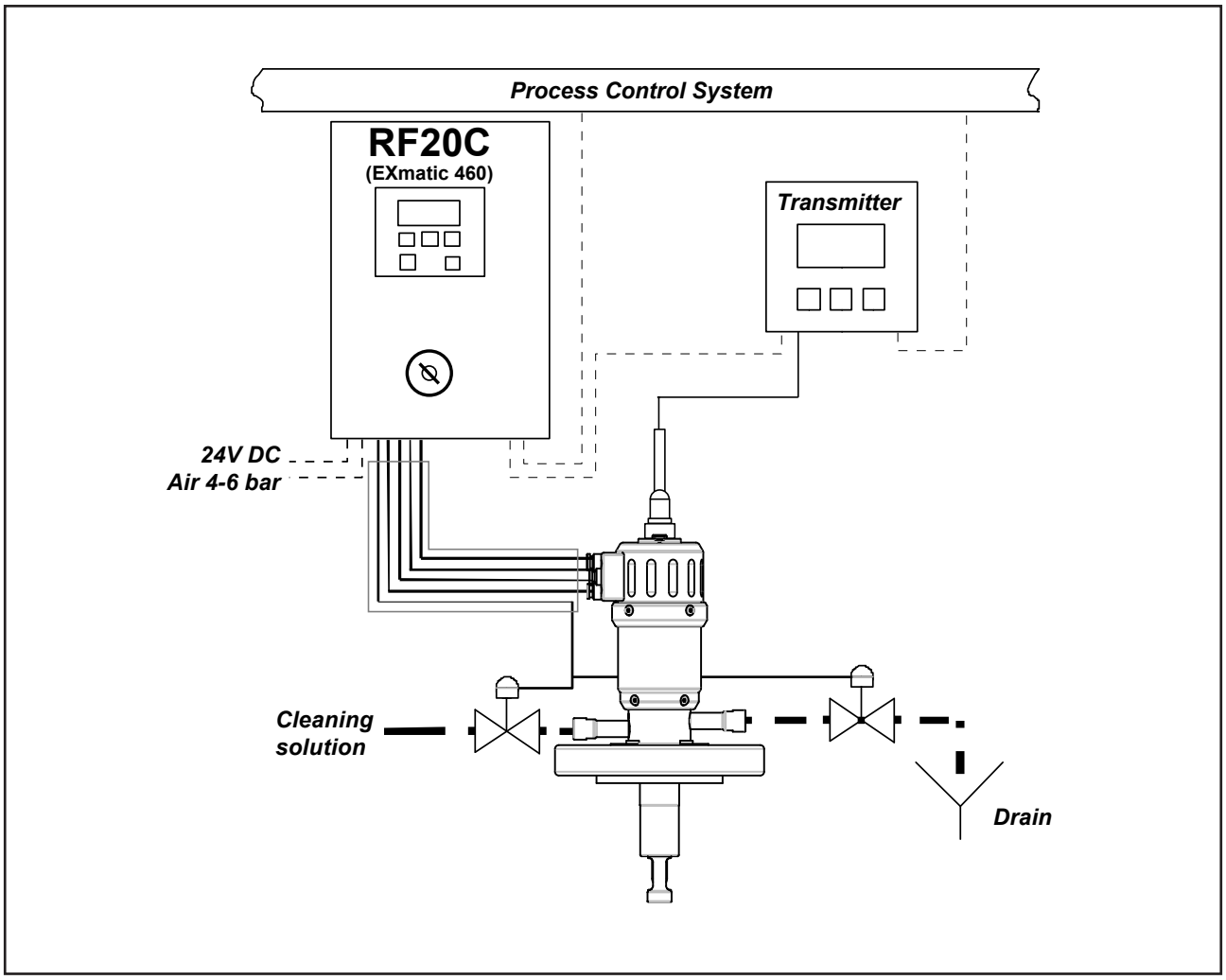


Figure 3: Process sequence

The respective status of the measuring unit (alarm status, measuring status, cleaning status) can be transmitted to a higher process control system by means of contacts.

A cleaning cycle can be started via an external trigger, e.g. from the pH transmitter.

The control unit RF20C (EXmatic 460) is a completely independent control unit and can principally be operated without any connection to a transmitter or a process control system.

The control unit has a manual as well as an automatic mode. The manual mode is for manually triggering the movement of the retractable fitting and the individual cleaning valves.

In automatic mode, a parameterized cleaning process is run after starting a cleaning cycle. After completion, the retractable fitting moves to the measurement position.

3. Program functions

3.1 Automatic start of cleaning

In principal, there are 3 different ways of starting an automatic cleaning cycle. They can also be combined in a useful manner.

Loop

A recurring cycle is run via the internal clock (loop). In doing so, after a parameterized measuring time, cleaning is started automatically, e.g. every four hours. After completion of the cleaning process, the retractable fitting moves to the measurement position and the cycle runs again.

Real Time Event

Automatic cleaning is started at a specific point in time which can be parametrized (Real Time Even), e.g. every day at 8.15 a.m., 12 noon and 4.30 p.m.. After completion of the cleaning process, the retractable fitting moves to the measurement position and stays there until the next Real Time Event starts.

External Trigger

Cleaning is started via an external trigger. After completion of the cleaning and after opening the external trigger, the retractable fitting moves to the measurement position and stays there until the external trigger is closed again.

Loop + Trigger

As described, cleaning is carried out in a defined cycle (loop). Further cleaning processes can additionally be started via an external trigger and the retractable fitting can be kept in the cleaning position. This function is used if the sensor is to be watered during operation and if the defined cycle is to be interrupted, or if the sensor is to be pulled back into the rinsing chamber for being protected while a strong agitator is running in the container.

Event + Trigger

As described, cleaning is carried out at defined points in time (Real Time Event). In addition, further cleaning processes can be started via an external trigger and the retractable fitting can be kept in the cleaning position. This function is used if the sensor is to be watered during operation and if the cycle is to be interrupted. Or if the sensor is to be pulled back into the rinsing chamber for being protected while a strong agitator is running in the container.

3.2 Seal water

For the short time during which the measuring window moves over the sealing elements, when the retractable fitting moves from the measurement position to the cleaning position or back, there is a connection between the measuring material and the rinsing chamber. To ensure that as little measuring material as possible can access the rinsing chamber and that the sealing elements are additionally rinsed during this time, a seal water function can be parameterized.

Function

If the seal water function is active, the “Cleaning I” valve always opens before the retractable fitting is moved. This means that if the water pressure connected to the “Cleaning I” valve is higher than the process pressure, the water (seal water) runs through the rinsing chamber to the process during the movement of the retractable fitting and thus prevents measuring material from accessing the rinsing chamber. The sealing elements of the rinsing chamber are rinsed at the same time.

The seal water function ensures a better cleaning of the sensor, maintenance of the sealing elements and increases the operating life of the sensor and of the sealings. The function should always be active, if possible.

If you do not want seal water running to the measuring material or if this is not admitted, the seal water function can also be deactivated. The general function of the retractable fitting and the control is not impaired by that.

3.3 Cleaning program

As soon as a cleaning program is started (see 3.1), the following functions are run one after the other:

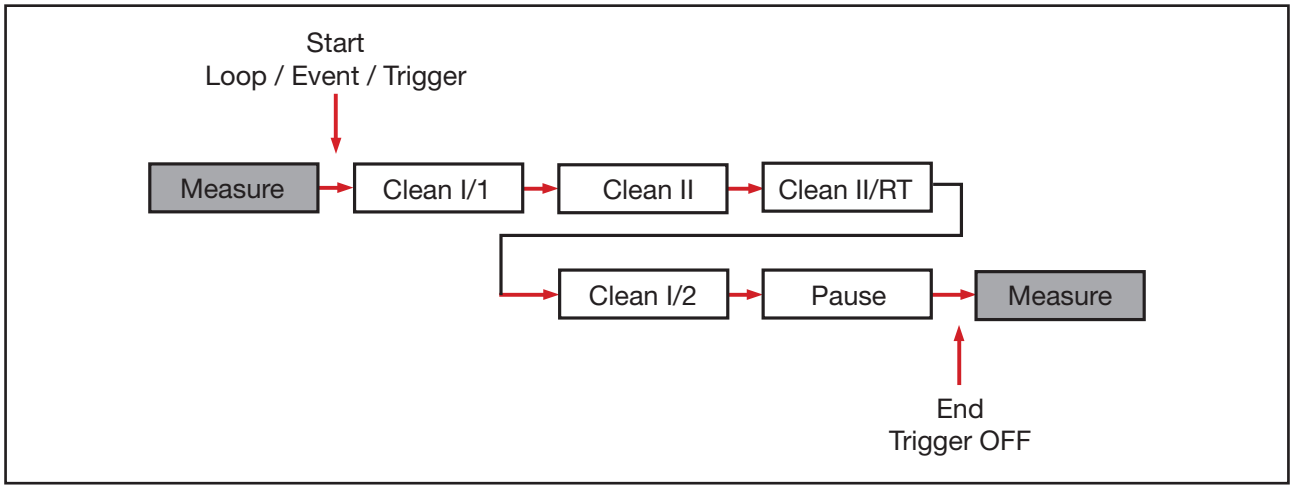


Figure 4: Program sequence

Cleaning I/1

Cleaning with 1. cleaning solution, e.g water. „Cleaning I“ valve and drain valve are opened and closed again after the preset time (10…300 seconds).

By opening the „Cleaning I“ valve, a delivery pump can be triggered via an outlet trigger (no. 21 + 22).

Cleaning II

Cleaning with 2. cleaning solution, e.g. acid.

„Cleaning II“ valve and drain valve are opened and closed again after the preset time (0…300 seconds). If this time is set to "0", this program step is left out completely.

By opening the “Cleaning II” valve, a delivery pump can be triggered via an outlet trigger (no. 23 + 24).

CLeaning II RT

Exposure time for 2. cleaning solution

Cleaning II RT is a reaction time for the 2. cleaning solution and provided so that the cleaning acid, which was put into the rinsing chamber, is able to react, for example.

All cleaning valves and the drain valve stay closed. After the preset time (0…300 seconds), the next program step follows. If this time is set to “0”, this program step is left out completely.

CLeaning I/2

Cleaning with 1. cleaning solution, e.g. water. “Cleaning I” valve and drain valve are opened and closed again after the preset time (0…300 seconds).

If this time is set to “0”, this program step is left out completely.

By opening the “Cleaning I” valve, a delivery pump can be triggered via an outlet trigger (no. 21 + 22).

Pause

If the sensor is not to be moved again into the process directly after cleaning, the pause time is activated.

This is particularly recommended if the measuring medium is especially aggressive and therefore the lifetime of the sensor is especially short. In this case, short measuring intervals and long pause times can minimize the dipping time of the sensor and thus increase the lifetime.

The sensor remains in the rinsing chamber, all cleaning valves and the drain valve remain closed. After the preset time (0…999 minutes), the sensor moves to the measurement position.
If the time is set to “0”, this program step is left out completely.

Measure

Measuring interval at parameterization “loop” or “loop + trigger”.

The sensor is moved to the measurement position and stays there for the preset time (1…999 minutes). This time can be interrupted in case of parameterization “loop + trigger” by an external trigger. After this time has elapsed, the next cleaning cycle begins.

4. Delivery

4.1 Delivery scope

The control unit is inspected in the factory and delivered ready for installation in a packaging which optimally protects the control.
The delivery consists of:

- control unit RF20C (EXmatic 460)
- key for control cabinet
- operating instructions

Depending on the version you have ordered, you also receive:

- Multi hose (installed)
- mounting angle for multi hose (installed)

Keep the control unit in the packaging. There, it is protected best until being assembled.

4.2 Delivery inspection

Before releasing the control unit for assembly, you must ensure that:

- packaging and unit are in an impeccable condition.
- the identification plate of the control unit corresponds to the data in the order form.

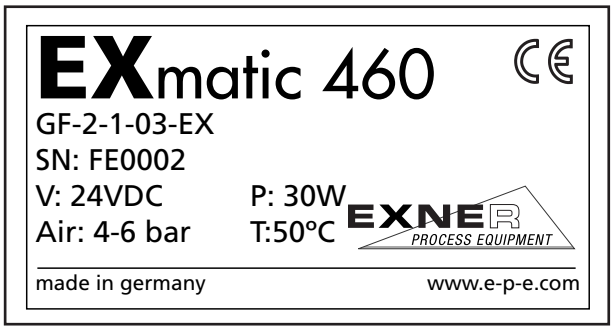


Figure 5: Identification plate
The identification plate is affixed to the inside of the cabinet door!

In case of questions, please contact Yokogawa.

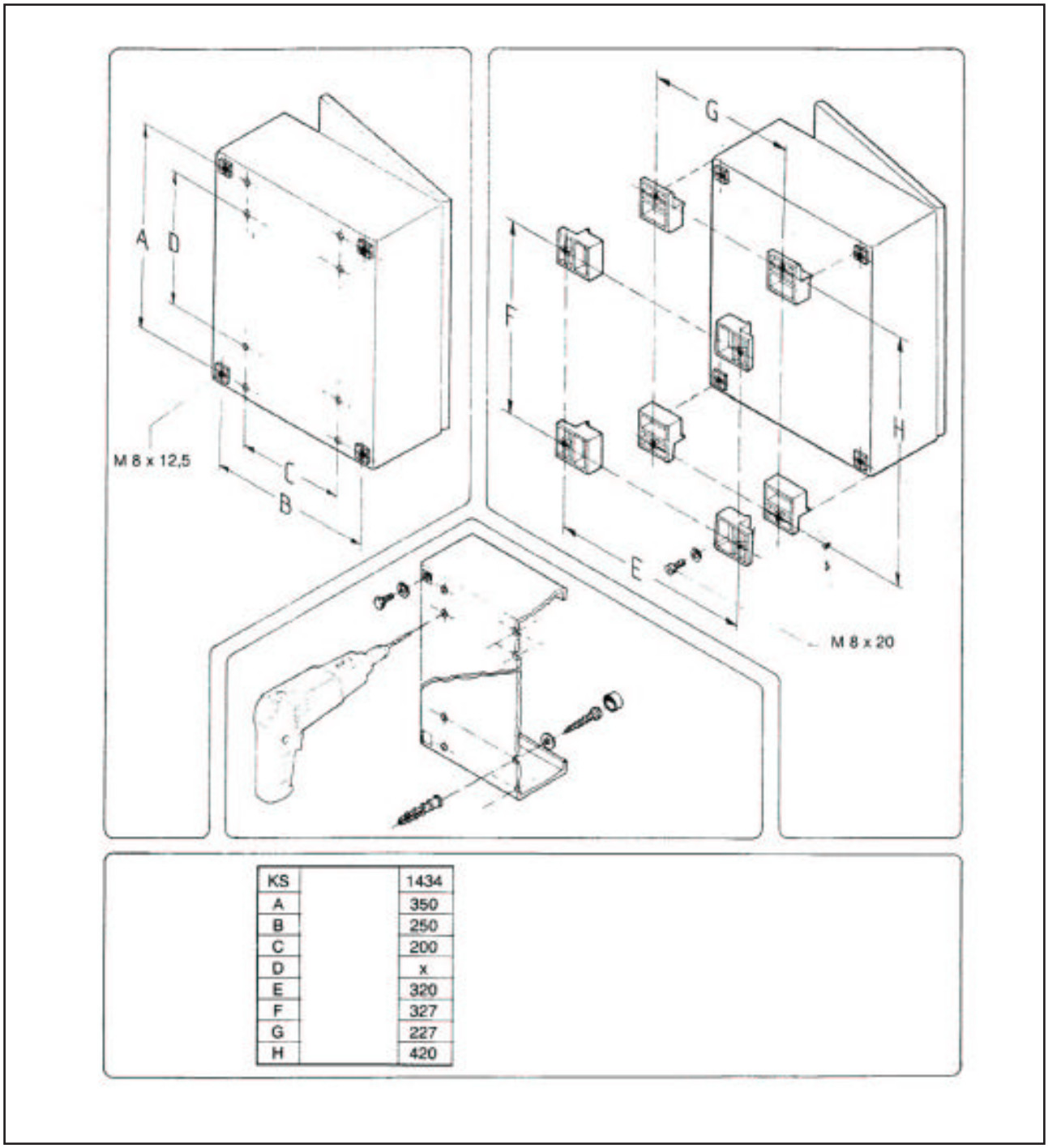
5. Assembly

5.1 Wall mounting

Ensure that

- there is enough working space for operating the control unit.
- possible voltage-supplying units are disconnected from the mains.
- you only use approved tools.

Mount the control cabinet as shown below:



KS		1434
A		350
B		250
C		200
D		x
E		320
F		327
G		227
H		420

Figure 6: Wall mounting

5.2 Electric connections

The control unit must be disconnected from the mains and the compressed air must be pressureless!

DANGER!

There is the risk for life and limb if the voltage supply is not disconnected!

Connect the control unit according to the circuit diagram:

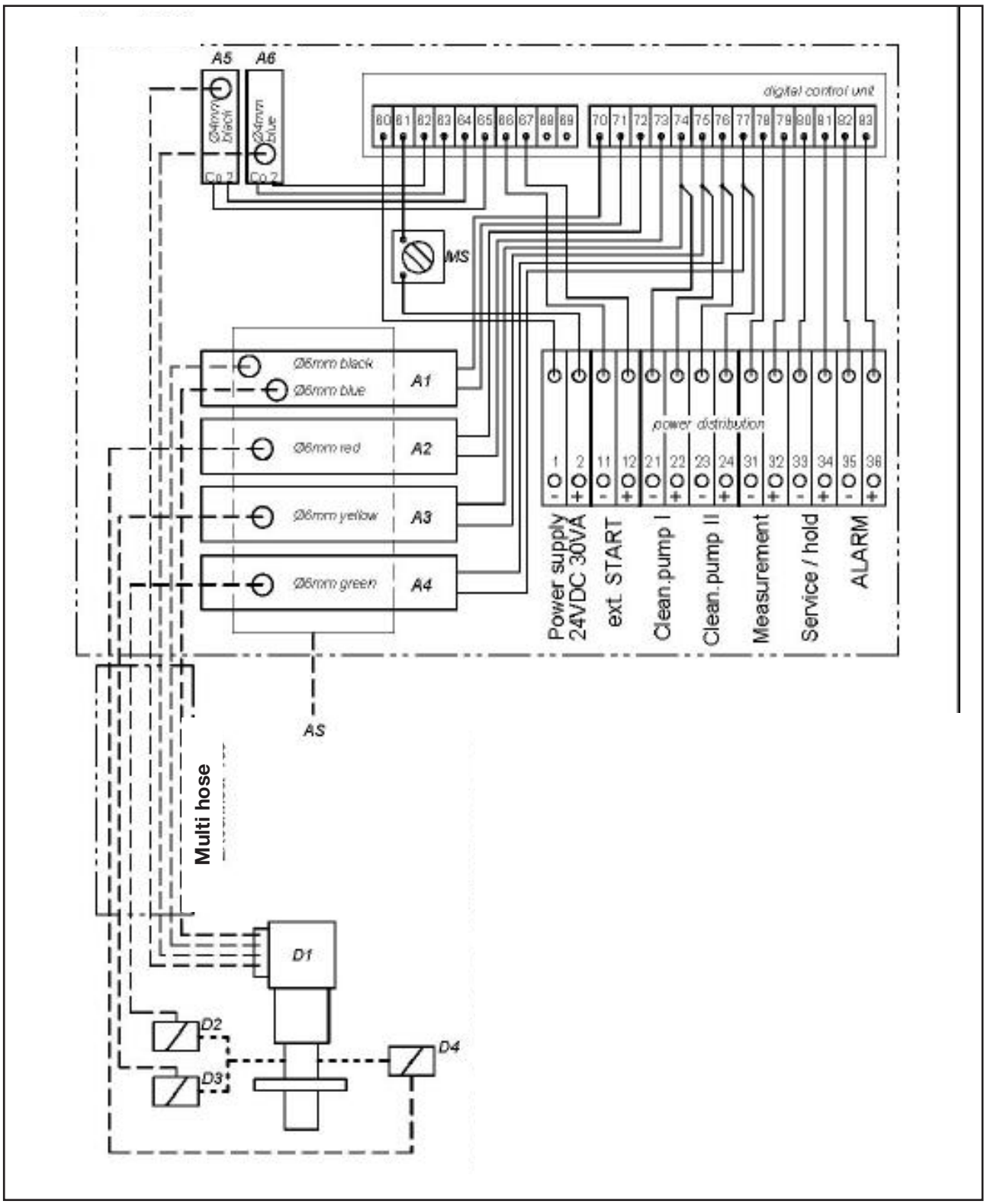


Figure 7: Connection diagram

Pin allocation:

Contact	Description
1	Main Power supply 24VDC 30VA -
2	Main Power supply 24VDC 30VA +
11	Input Start signal (24VDC - selfpowered)
12	Input Start signal (24VDC + selfpowered)
21	Output 24VDC - max.80mA Clean Pump I
22	Output 24VDC + max.80mA Clean Pump I
23	Output 24VDC - max.80mA Clean Pump II
24	Output 24VDC + max.80mA Clean Pump II
31	Output 24VDC - max.100mA measurement
32	Output 24VDC + max.100mA measurement
33	Output 24VDC - max.100mA service / Hold
34	Output 24VDC + max.100mA service / Hold
35	Output 24VDC - max.100mA Alarm
36	Output 24VDC + max.100mA Alarm

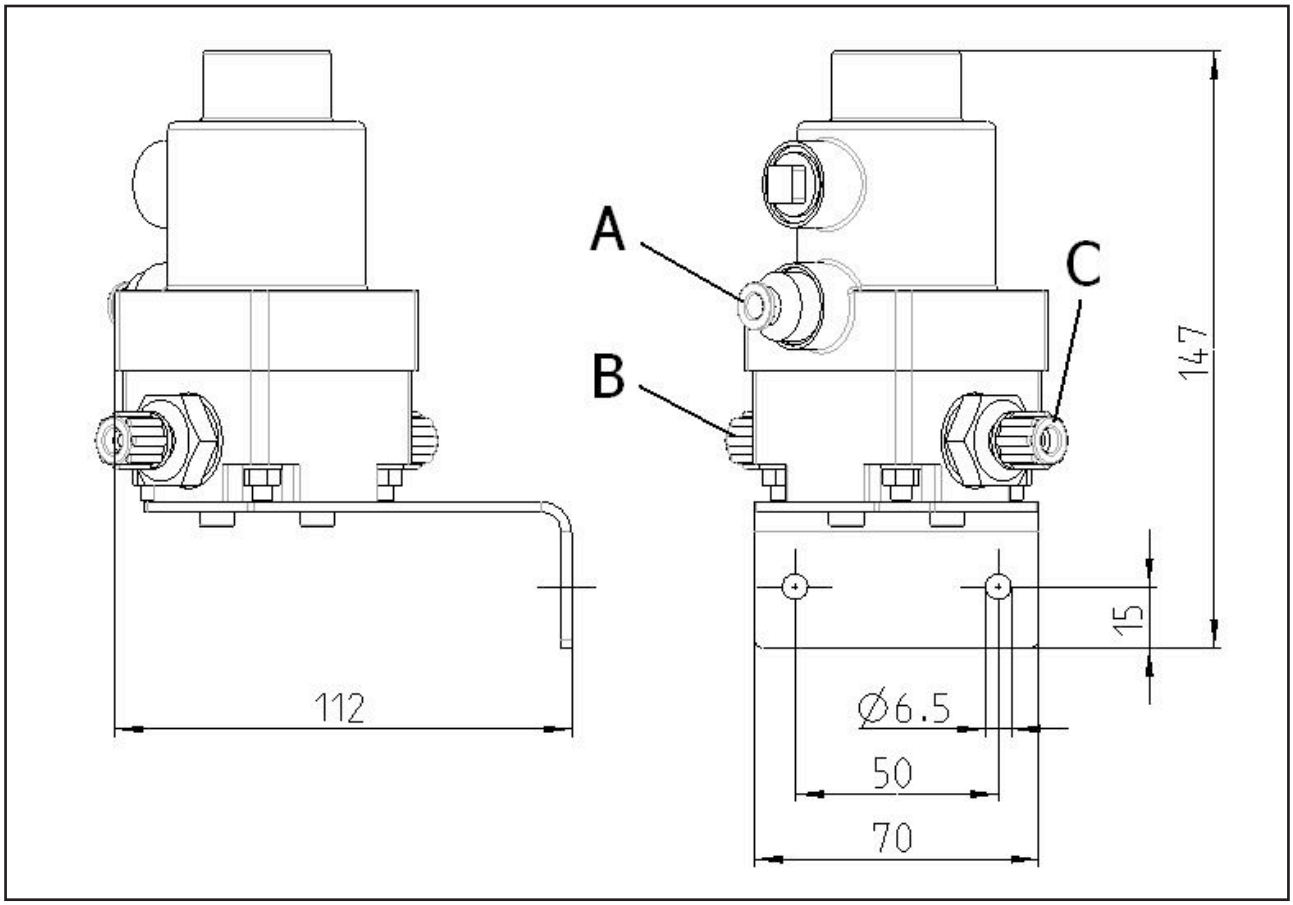
5.3 Pneumatic connections

Multi hose			
Control connection	**Hose dim./ colour**	**RF20H/M/C connection**	**Note**
A1 black	6mm black	1	service
A1 blue	6mm blue	2	measurement
A2	6mm red	D4	drain valve
A3	6mm yellow	D2	Cleaning I
A4	6mm green	D3	Cleaning II
A5	4mm black	3	indicator measurement
A6	4mm blue	4	indicator service

Supply		
Control connection	**Hose Dimension**	**Note**
AS	4/6mm	Filtered air 40µm, water and oil-free 4-6 bar

5.4 Rinse valve connections

Rinse valves (option)		
Connection	**Dimension**	**Designation**
Compressed air	4/6mm	A
Input rinse medium	Threaded hose connection 4/6 mm or 3/8“	B
Output rinse medium	Threaded hose connection 4/6mm or thread 3/8“	C



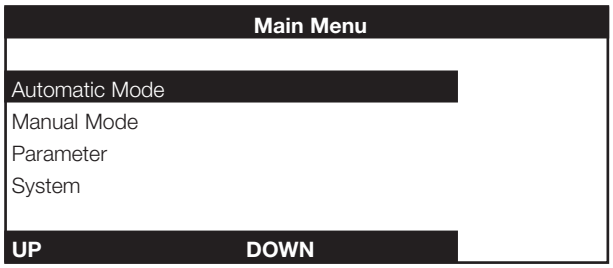
6. Parameterization

DANGER! There is the risk of damaging the system or that process fluid or cleaning solution issues in an uncontrolled manner!

- Wear suitable protective clothing
- Have the system only parameterized by instructed skilled personnel!
- Inspect all sealings and all connections of the fitting prior to running the process

Wear protective glasses and protective clothing when you start the system!

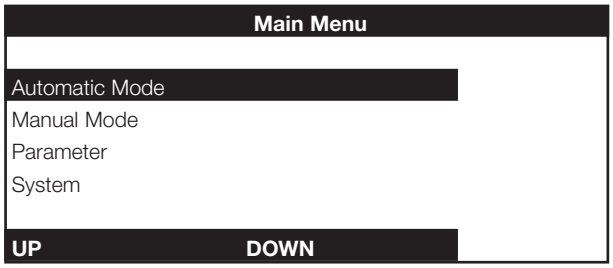
The control is generally operated as follows:



- The upper line shows the current menu.
- The lower line shows the functions of the soft keys.
- The function which can be selected is shown invertedly in the respective case and selected by means of the Enter button.
- The ESC button brings you back one menu each time.

6.1 Main Menu

In the Main Menu, you can choose between the individual processes.



- When you select the *Automatic Mode*, the parameterized automatic process in the control starts (see chapter 6.2).
- When you select the *Manual Mode*, you reach the level for manual operation (see chapter 6.3).
- When you select *Parameters*, you reach the parameterization (see chapter 6.4).
- When you select *System*, you reach the system control (see chapter 6.5).

6.2 Automatic Mode

The parameterized process runs in automatic mode and the display shows the following:

- The first line shows Automatic and the current time in HH:MM:SS.
- The middle shows the current function in big letters.
- Below, the time remaining until the next function or action starts is shown.
- The soft keys are assigned to the following parameters:
  Info Para Stop

Info Shows information relating to the control via preset times, the total time of a cleaning cycle and the state of the software.

Para Leads you to the parameterization of the cleaning and interval times (chapter 6.4).

Stop Automatic can be interrupted here.

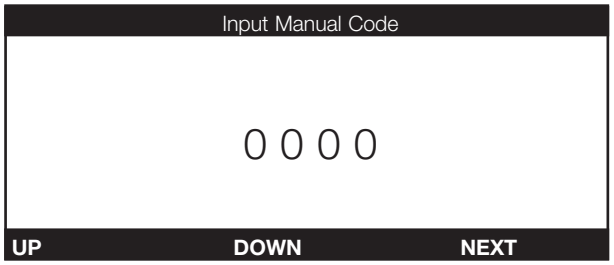
By pressing the stop button, you can select between an Emergency Stop and a “gentle” Stop.

In case of an Emergency Stop, the fitting immediately moves to the service position, stays there and is not rinsed.

In case of stop, the fitting moves to the service position and finishes with a parameterized rinsing process.

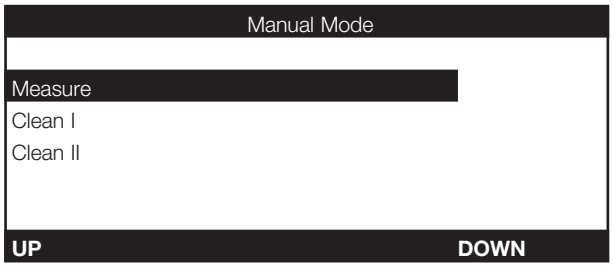
6.3 Manual Mode

In Manual Mode, the individual functions can be chosen manually.
If you have chosen the Manual Mode, you must now enter a pass code:

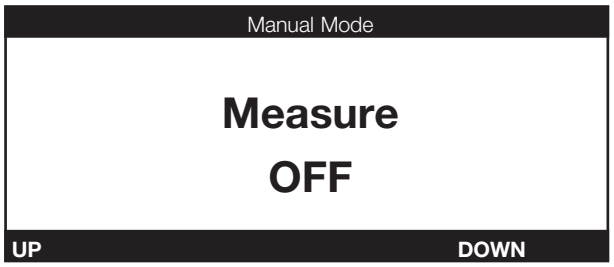


Enter the pass code by setting the digits by means of the UP or DOWN button and by skipping to the right by means of the NEXT button.

As soon as the pass code has been entered completely and correctly, you confirm with Enter and reach the menu of the manual mode. The following display is shown:



Select the desired function by means of the soft keys and confirm with Enter.



With the soft key **ON**, you switch the function on, with the soft key **OFF**, you switch it off again.

With the soft key **Stop**, you stop the function in its original state.

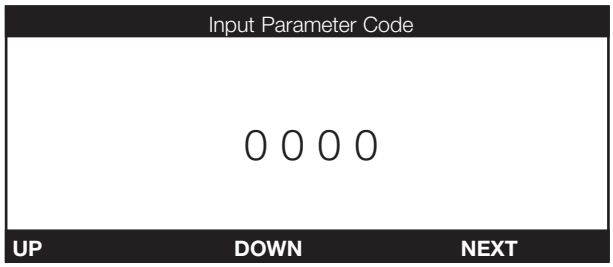
ESC brings you back to the menu.

Process correspondingly for the functions Clean I and Clean II!
For the detailed description of the function, please refer to chapter 3.

6.4 Parameters

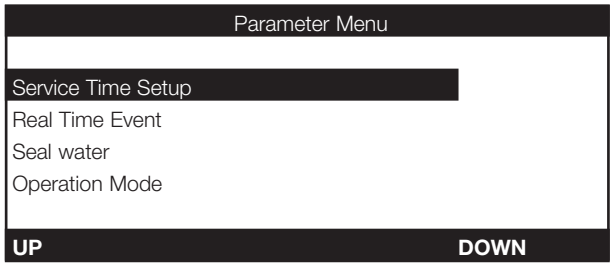
You can parameterize the times and the functions of the control in the parameters menu.

If you have chosen *Parameter* in the main menu or during the automatic mode, you must now enter the pass code:



Enter the pass code by setting the digits by means of the UP and DOWN buttons and by skipping to the right by means of the NEXT button.

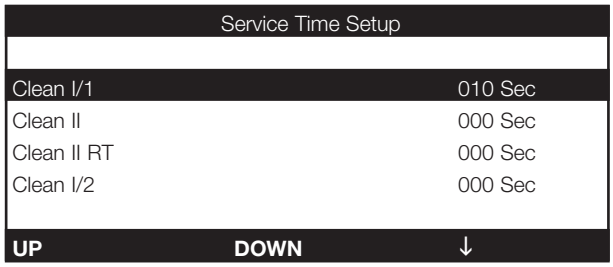
As soon as the pass code has been entered completely and correctly, you confirm with Enter and reach the menu of the parameters menu. The following display is shown:



Select the desired function via the soft keys and confirm with Enter.

Service Time Setup

In the Service Time Setup the respective times of the functions are set. The following display is shown:



The individual times are shown with the respective time which is currently set. By means of the button ↓ you can access additional times.

If you want to change times, select the desired time by means of the soft keys and confirm with Enter. The following display is shown:

The first line shows the admissible time range, the next line shows the currently set value.

You can change this value by means of the soft keys. Keep a soft key pressed for 2 seconds, then the value starts changing automatically. By pressing the Enter button, you save the changed value.

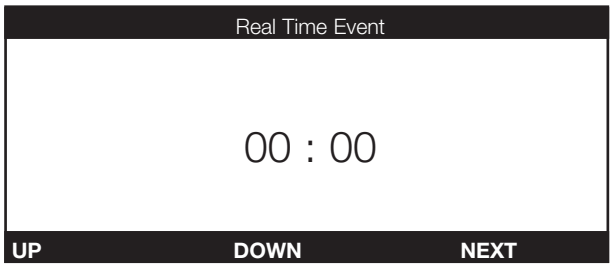
By pressing the ESC button, you leave the menu without saving!

Proceed correspondingly for the remaining times! For the detailed description of the function please refer to chapter 3.

Real Time Event
In the *Real Time Event* the defined starting times for a rinsing process are set. The following display is shown:

The defined times for 5 starting times are shown. By means of the ↓ button you get access to further starting times (max. 15).

If you want to change the times, select the desired point in time by means of the soft keys and confirm with Enter. The following display is shown:

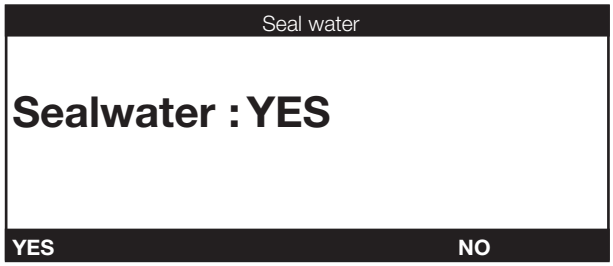


The first line shows the currently set starting time. You can change this value by pressing the soft keys. Keep one soft key pressed for 2 seconds and then, the value starts changing automatically.
By pressing the NEXT button, you switch between hours and minutes and vice versa.
By pressing the Enter button, you save the changed value.

By pressing the ESC button, you leave the menu without saving!

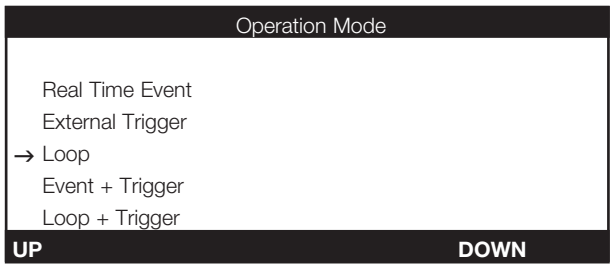
Please proceed correspondingly for the remaining points in time! For a detailed description of the function, please refer to chapter 3.

Seal water
In the menu point *Seal water* you can switch the seal water function on and off.
Upon selection the following display is shown:



Switch the seal water function on (YES) or off (NO) by means of the two soft keys.
By confirming with the Enter button, you save the changed value.
By pressing the ESC button, you leave the menu without saving!

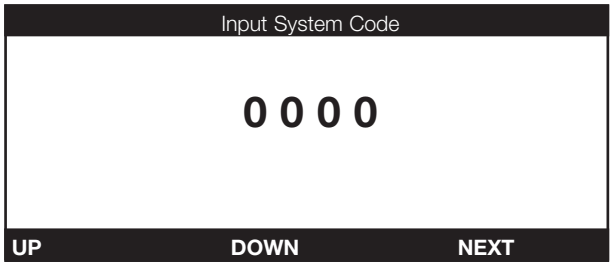
Operation Mode
In the menu point *Operation Mode* you can set the mode of operation of the control.
Upon selection the following display is shown:



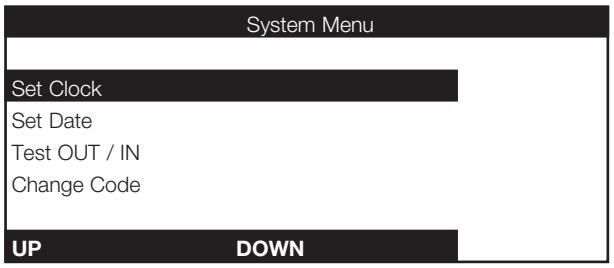
The arrow shows you the currently set mode of operation.
You can change the mode of operation by pressing the soft keys.
By confirming with the Enter button, you save the changed mode of operation.
By pressing the ESC button, you leave the menu without saving!

6.5 System

In the menu point *System* you can parameterize the system settings.
Upon selecting *System* in the main menu, you must enter the pass code:

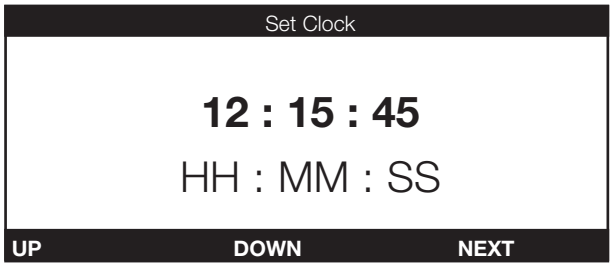


Enter the pass code by setting the digits via the UP and DOWN buttons and skip to the right by means of the NEXT button.
As soon as the pass code has been entered completely and correctly, confirm with Enter and you reach the menu of the system menu. The following display is shown:



Select the desired function by means of the soft keys and confirm with Enter.

Set Clock
In the system mode *Set Clock*, the time can be set. The following display is shown:

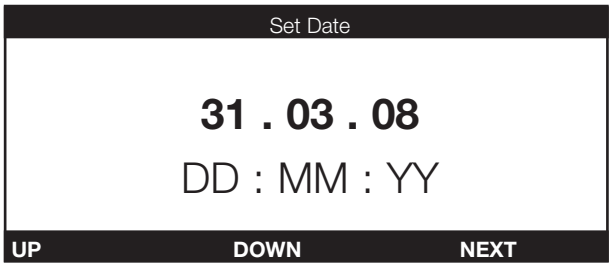


You can change the time by pressing the soft keys. Keep a soft key pressed for 2 seconds and the value starts changing automatically. By pressing the NEXT button, you switch from hours to minutes and seconds and back.

By confirming with Enter, you save the changed value.

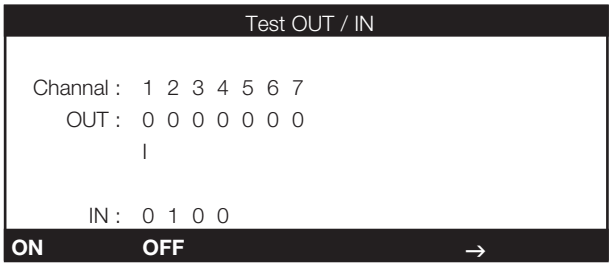
By pressing the ESC button, you leave the menu without saving!

Set Date
In the system mode *Set Date*, the date can be set. The following display is shown:



You can change the date by means of the soft keys. Keep a soft key pressed for 2 seconds and the value starts changing automatically. By pressing the NEXT button you can switch from day to month and to year and back.
By confirming with Enter, you save the changed value.
By pressing the ESC button, you leave the menu without saving!

Test OUT / IN
In the system mode Test OUT / IN, you can test the inputs and the outputs of the control.
The following display is shown:



Select the channel via the → button. The marking shows you the channel you have selected. By pressing the soft keys ON and OFF, you switch the outputs on (1) or off (0). The IN line shows you the current status of the inputs.

By pressing ESC you leave the menu and the outputs are reset again.

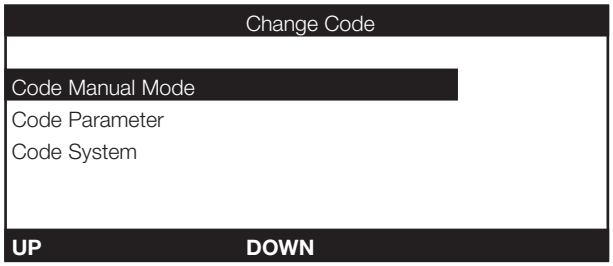
The outputs and the inputs are assigned as follows:

No.	Output	Connection
1	Fitting drive 0=Service 1= Measurement	70/71
2	Drain valve	72/73
3	Cleaning I and Cleaning Pump I valve	74/75 21/22
4	Cleaning II and Cleaning Pump II valve	76/77 23/24
5	Output Measurement	78/79 25/26
6	Output Service	80/81 27/28
7	Output Alarm	82/83 29/30

No.	Input	Connection
1	Indication measurement	62/63
2	Indication service	64/65
3	Input Start signal	11/12 66/67
4	not assigned	

Change Code

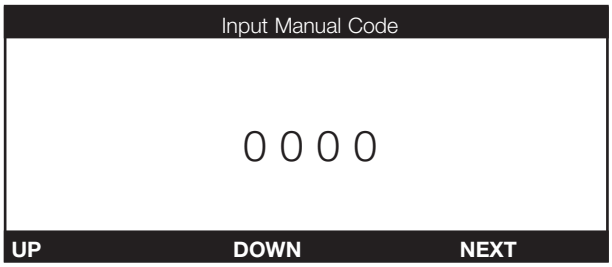
In the system mode *Change Code*, the pass codes are set. The following display is shown:



DANGER! If you change or forget a pass code, you block the system access. Write the set values down and store them at a safe place.

Select the desired function by means of the soft keys and confirm with Enter.

The following display is shown:



Enter the pass code by setting the respective digits with the UP and DOWN buttons and by switching to the right with the NEXT button.
As soon as the pass code has been entered completely and correctly, save the new code by confirming with Enter.
By pressing the ESC button, you leave the menu without saving!

Proceed correspondingly for the remaining pass codes!

7. Maintenance

7.1 Important notes on maintenance

- Prepare a maintenance plan which is adjusted to your process!
- Maintenance work may only be carried out by skilled personnel.
- Always wear protective clothing during maintenance work.
- Only carry out maintenance work or repair which is described in the operating instructions!
- Constructional modifications may only be carried out after consulting the manufacturer.

7.2 Maintenance work

Yearly inspections.

- Check the compressed-air connections for tightness
- Check the multi hose connections for tightness and for a stable fit at the fitting and the control valves
- Retighten the clamps in the control cabinet

7.3 Disposal

Control unit
Make sure that the control unit is free of hazardous and toxic substances. The individual components must be disposed of separately corresponding to their material.

Observe the rules and regulations relating to waste disposal which are applicable in the country of use and at the place of use.

Packaging
The packaging material is cardboard and can be disposed of as waste paper.

8. Technical data

8.1 Standards

Noise immune according to the standard EN 61000-6-2
Noise-suppressed according to the standard EN 61000-6-4

8.2 Material

Control cabinet			
Casing	glass-reinforced plastic		
	stainless steel	option	
Control unit	glass-reinforced plastic	casing	
	plexiglass	protection cove	

8.3 Connected loads

Connected loads	
Voltage supply	24V DC 30 VA
Input for external trigger	24V DC internal power supply for potential-free contact
Output for external relais, Cleaning Pump I and Cleaning Pump II	24V DC 80mA max.
Output for status and alarm contacts	24V DC 100mA max.
Triggering pneumatic valves	24V DC 80mA max.

8.4 Ambient conditions

Temperature	
Ambient temperature	0…+55°C
Transport and storage temperature	-10…+60°C

Ambient	
Relative humidity	10…95 % not condensing

Type of protection	
Casing	IP 54
Control unit with safety guard	IP 54 with the safety guard closed

8.5 Pneumatics

Pneumatic hoses	**outer ø**	**inner ø**
for control air	6 mm	4 mm
for position indication	4 mm	2 mm

Compressed air	
	filtered 40µm, water and oil-free
	4 - 6 bar
	no permanent air consumption!

8.6 Rinse valves (option)

Connections	**outer ø**	**inner ø**
Compressed air	6 mm	4 mm
Rinse medium	6 mm	4 mm

8.7 Dimensions

Dimensions	**Plastic**	**Stainless steel**
Width	300 mm	300 mm
Height	400 mm	400 mm
Depth	250 mm	250 mm

8.8 Order structure RF20C (EXmatic 460)

Modelcode	**Suffixcode**			**Description**
RF20C (EXmatic 460)				
Casing	GF			Plastic glass-reinforce plastic
	SS			Stainless steel
Cleaning		C1		for one cleaning solution
		C2		for two cleaning solutions
Drain valve			ND	Without drain valve
			N1	With drain valve
Multi hose			NH	Without multi hose
			03	With 3m multi hose
			05	With 5m multi hose
			10	With 10m multi hose
Mounting angle				NF Without mounting angle
			EX	EXtract mounting angle
			RE	Retractex mounting angle
				Order number

9. Spare parts and accessories

Spare parts		
Control	**Spare part**	**Order number**
RF20C (EXmatic 460)	Complete control unit	9-110-00-001
	Solenoid valve 5/2-way G ¼“ 24VDC 3,8W (without plug and cable)	9-091-10-001
	Solenoid valve 3/2-way G ¼“ 24VDC 3,8W (without plug and cable)	9-091-10-002
	Plug with cable for solenoid valve	7-098-20-001
	Pressure switch (indication)	9-096-00-001

Accessories		
Control cabinet	**Accessory**	**Order number**
	wall mounting plastic cabinet	2-083-70-001
	wall mounting stainless steel cabinet	2-083-70-002
	pipe mounting cabinet (plastic/stainless steel)	2-083-70-003
Cleaning valves	**Accessory**	**Order number**
Membrane valve	1 valve for cleaning solution or drainage	2-095-70-001
PVDF/FPM G 3/8“, DN12	2 valves for cleaning solution and drainage,	
PN6, pneumatic,	mounted to mounting angles with all connections and PTFE hose	2-095-70-002
pressureless closed (NC)	3 valves for two cleaning solutions and drainage,	
	mounted to mounting angles with all connections and PTFE hose	2-095-70-003

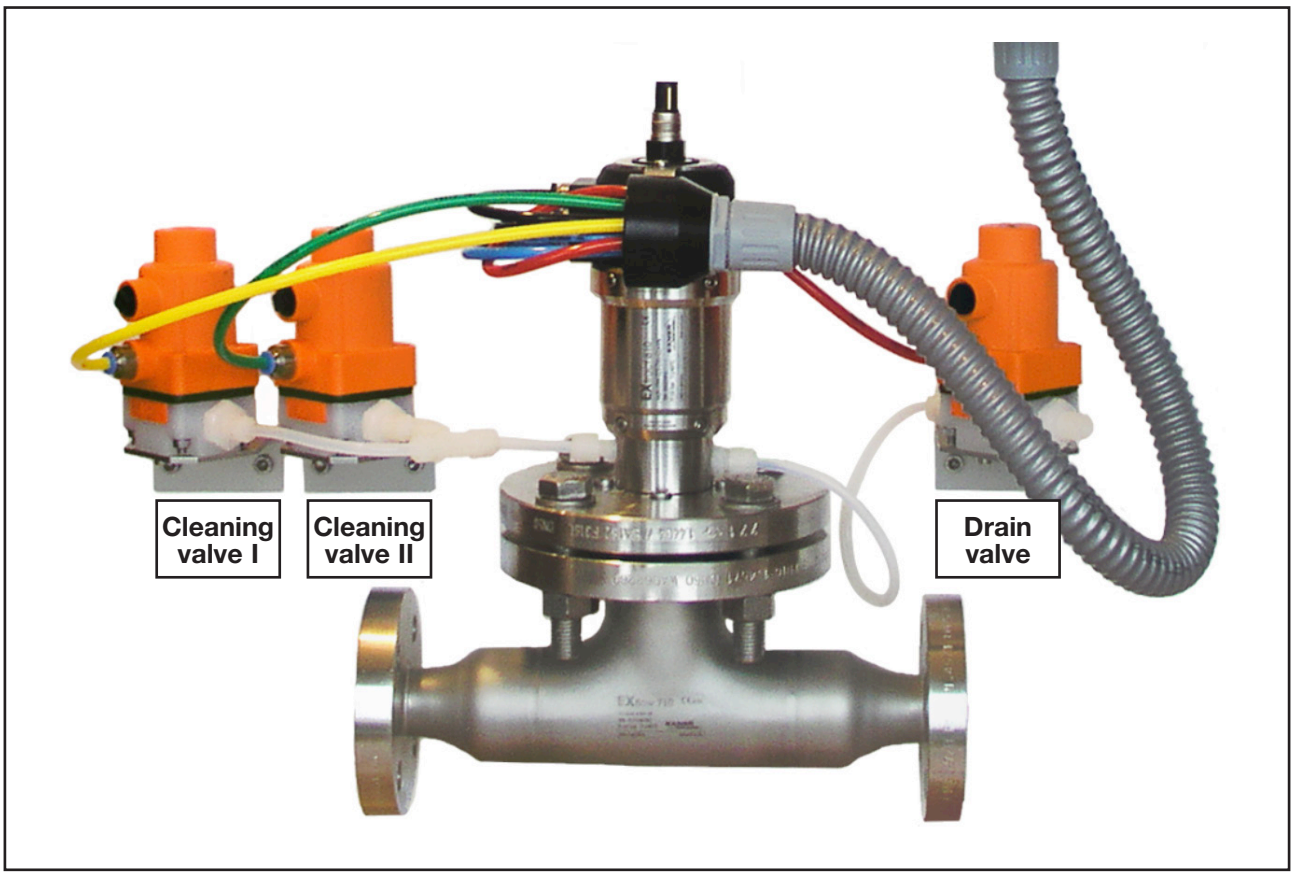


Figure 8: Membrane valves as accessories for the retractable fitting

Please indicate the serial number of your fitting if you order spare parts or accessories.

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