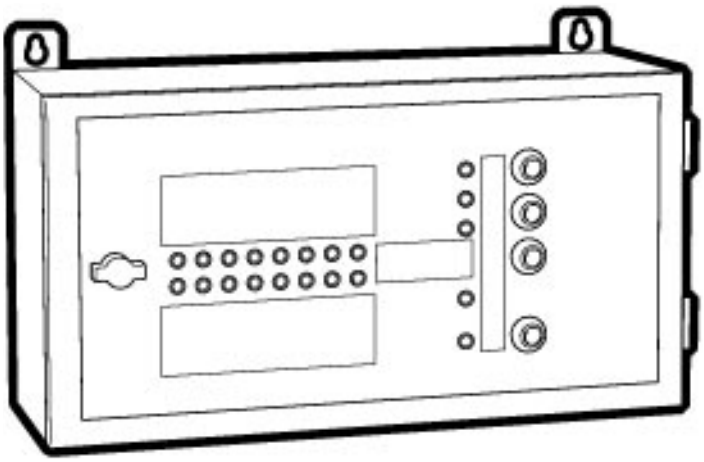
Component Description

Alfa Laval

EPC-41
Control Unit



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Contents

1 Overview

EPC-41 control unit is used within a separation system for automatic control of the separation process.

The unit is microprocessor based and comprises output functions for control of ancillary equipment and input functions for monitoring and alarm. The EPC-41 is programmable to suit different separator systems and different operation conditions. The programming can easily be adjusted to new conditions or new experience.

2 Function Description

2.1 Application

The EPC-41 control unit is used in clarifier and purifier separation systems.

2.2 Working Principle

The EPC-41 is used for monitoring and control of the separation process. It controls starting, separation, sludge discharge and stopping sequences.

The process is monitored via input signals from sensors, etc., and an alarm is given if preset values are exceeded.

The unit also contains a PI-controller for temperature control which can operate an Alfa Laval Heatpac electric heater or a steam heater or any other heater with control valve (for steam / hot water /thermal oil).

The control unit can be programmed for different separator systems and for different conditions within the system. The programming is made by setting parameters, such as type of equipment, temperature limits, times, etc. Some parameters are set at installation whilst process parameters are easily accessible for adjustment during operation.

2.3 Design

2.3.1 Front Panel

The front panel of the EPC-41 control unit provides a display and LEDs (light emitting diodes) for alarm and process information, and push-buttons for on/off and manual process control.

Four push-buttons are located to the right on the panel. The upper three (1–3) are used for process functions and the lower (4) is used for alarm reset. The push-buttons are also used for parameter selection and setting.

On and off functions corresponding to the push-buttons are indicated on the LEDs (6–8) above the display. The LEDs under the display (9–10) are used for alarm indications.

The five digit display (11) shows process information during operation and alarm codes at certain alarms. It is also used for parameter selection and setting.

The left part of the front panel contains two rows of LEDs. The upper row (12) indicates alarms. The alarm source is indicated on the upper schematic diagram (13).

The LEDs in the lower row (14) indicate when an output from the control unit is active. The valve or other unit connected to each output is indicated on the lower schematic diagram (15).

The schematic diagrams can be replaced in case of system changes or updates.

The front panel can be swung open like a door by opening the lock (16) to the left.

1. *Heater on/off push-button*
2. *Control program on/off push-button*
3. *Sludge discharge push-button*
4. *Alarm reset*
5. *Function symbols*
6. *LED for heater (green)*
7. *LED for control program running (green)*
8. *LED for stop sequence running (yellow)*
9. *LED for faulty switch (red)*
10. *LED for common main alarm (red)*
11. *Display*
12. *LEDs for alarm inputs (red)*
13. *Schematic diagram, alarm inputs*
14. *LEDs for output functions (green)*
15. *Schematic diagram, outputs*
16. *Door lock*

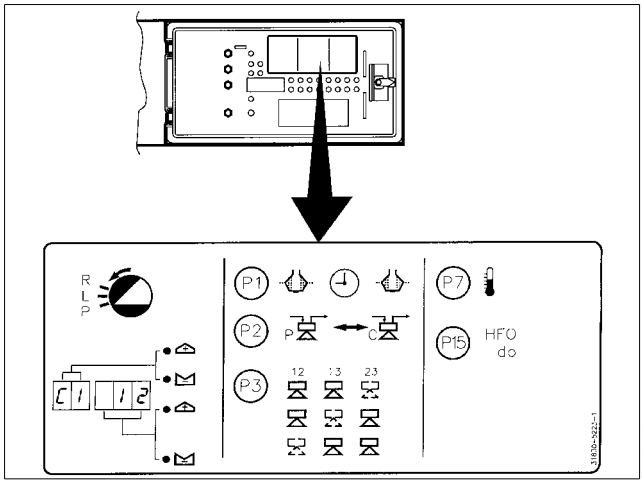
An on/off switch combined with a fuse is located behind the front panel. The power is intended to be permanently on. When work is to be carried out in the control unit the mains supply should be externally switched off.

2.3.2 Label Inside the Front Panel

A label on the inner side of the front panel, serves as a quick reminder for parameter setting in the EPC. It shows:

- the positions of the mode switch
- the connection between the display and the push buttons
- the meaning of some parameters (P)

To make use of the label you must be familiar with parameter setting, see section “Operation” in this manual, and parameter values, see the “Parameter List” manual.

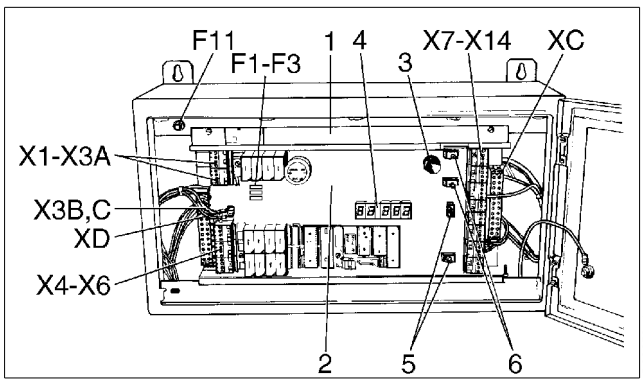


2.3.3 Control Module

All electronic components are grouped on a circuit board which is mounted in a hinged aluminium frame, forming an easily accessible control module (1) inside the cabinet. The module is fastened by two screws, making it easy to remove and service.

Electrical output and input connections to the module is made by cables terminated with multi-plugs that fit into sockets on the circuit board.

The circuit board controls the operating sequences. It holds the operating push-buttons (5, 6), mode switch (3) and display segments (4).

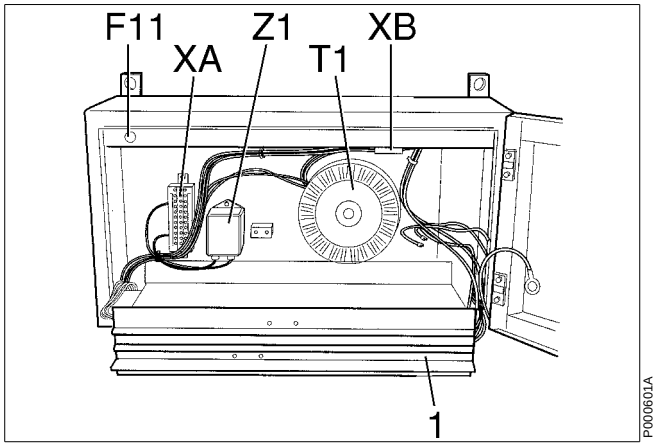


1. Control module
2. Circuit board
3. Mode switch
4. Display
5. Push buttons (for parameter setting)
6. Push buttons (for parameter selection)
F1–F3 Fuses
F11. Main switch/main fuse
X-. Terminals

It also contains built-in relays, which are used e.g. for the output signals to ancillary components, stop signal to the separator motor starter and control signals to an optional heater.

2.3.4 Power Supply

Inside the cabinet, behind the control module, there is a mounting plate with terminals (XA), power line filter (Z1) and a transformer (T1).



1. Control module (folded out)
F11 Main switch/main fuse
T1 Transformer
Z1 Power line filter
XA Terminals

3 Operation

3.1 Process Operation

The process operation is described in the “Operating Instructions” manual.

3.2 Parameter Setting

The parameter setting is performed initially at installation, and also when required during operation.

How to set parameters is described below, while the meaning and values of the parameters are described separately in the Parameter List for each system.

The parameters are divided into two groups. Each group begins with a code; C1 and C2.

- Process parameters (C1): 1 – 19
- Installation, timer sequence and service mode parameters (C2):

  –Installation parameters: 20 – 49

  –Timer sequence parameters : 50 – 89

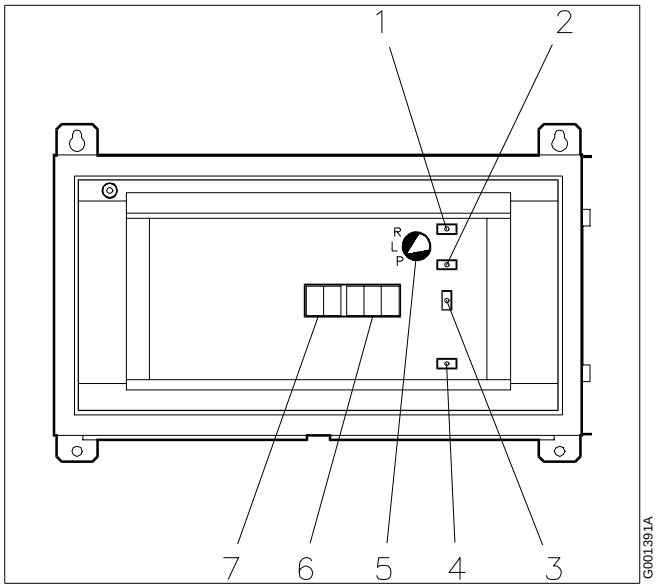
  –Service mode parameter: 90

The settings of process, installation and timer sequence parameters are similar and are described together, while the handling of the service mode parameter is somewhat different, and is described separately.

3.2.1 Overview

The method of parameter setting is:

1. Set the mode selector in position P (programming).
2. Select parameter number or code with the two upper push buttons (“1” for increasing and “2”for decreasing the number). The number or code is shown in the left part of the display (7).
3. Set the desired value for each parameter with the two lower push buttons (“3” for increasing and “4” for decreasing the value). The value is shown in the right part of the display (6).



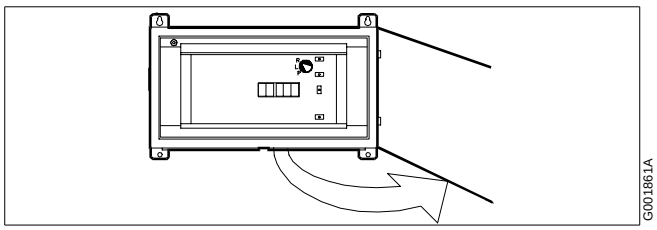
1 Parameter selection - increase number
2. Parameter selection - decrease number
3. Parameter setting - increase value
4. Parameter setting - decrease value
5. Mode selector
6. Parameter value indication
7. Parameter number indication

3.2.2 Setting Procedure

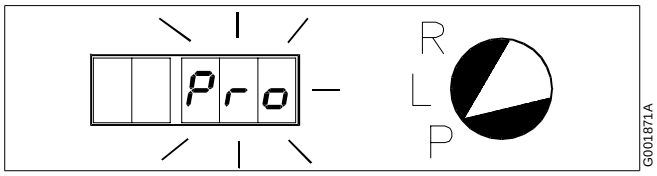
Setting of parameters is described below (service mode parameter 90, is described in 3.2.3):

The installation parameters must be set before the process parameters. If the installation parameters are OK, and you just want to change process parameters, follow the sequence:1-3, 9, 6-7, 11-12.

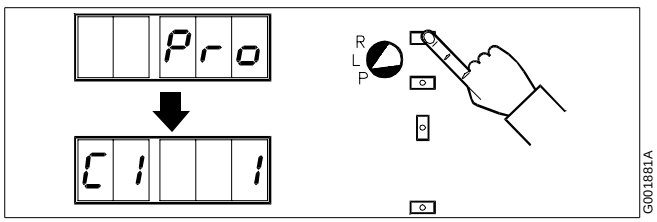
1. Open the front panel.



2. Turn the mode selector to P (programming) position.
   “Pro” flashes on the display.

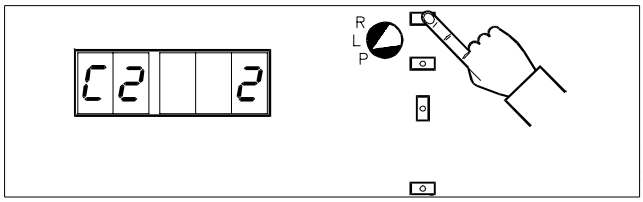


3. Press the upper selection push button. The code C1 1 is displayed. This indicates process parameters.

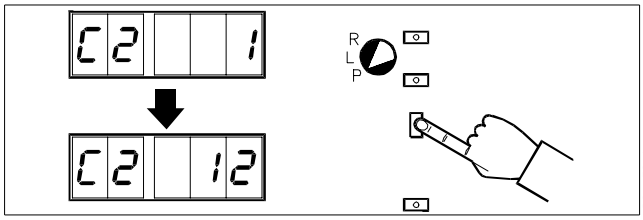


Installation Parameters

4. Press the same button again and keep it pressed until code C2 2 appears. This indicates installation parameters.



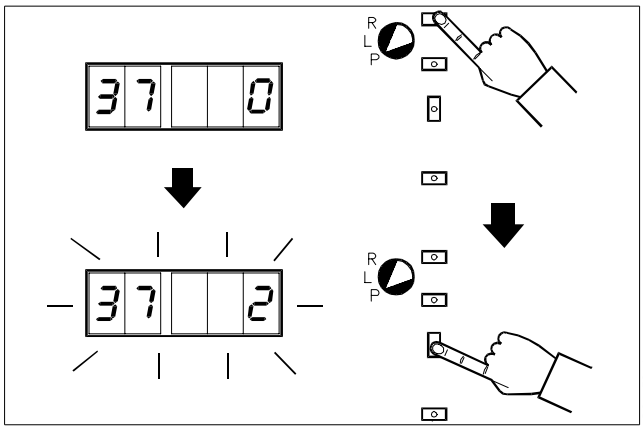
5. Change the code to C2 12 using the parameter value push button. This makes it possible to change the values of the installation parameters.



6. Press the upper selection push button again. The first installation parameter (20) is displayed. Keep the button pressed until you reach the desired parameter. To step down the parameters, press the lower parameter selection button.

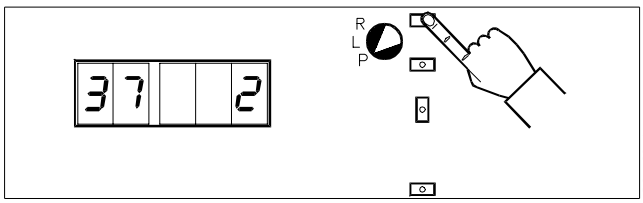
   Adjust the value of the selected parameter, using the parameter value push buttons. (See the " Parameter List" manual for an explanation of parameters and recommended values.

   The display flashes.



7. Confirm the new value by pushing the upper parameter selection push button.

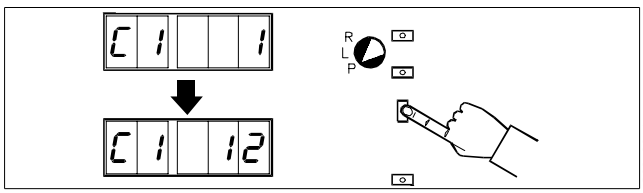
   The display stops flashing.



8. When all installation parameters are properly set, return to process parameter code C1 1:
   - Switch the the mode selector to L and back to P, and then press the upper parameter selection push button.

Process Parameters

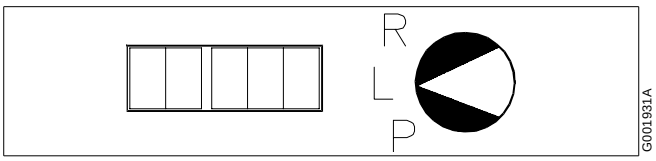
9. Set the code to C1 12, using the parameter value push buttons. This makes it possible to change the process parameter values.



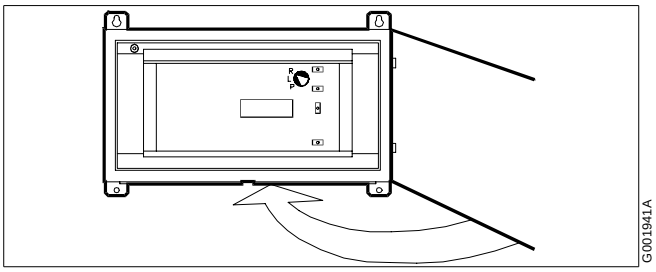
10. Set the process parameters in the same way as the installation parameters, see points 6 and 7.

End of Parameter Setting

11. When all parameters are appropriately adjusted, switch the mode selector to L (local).



12. Close the front panel.



4 Maintenance

The EPC-41 has a test program for self testing and separation system testing. For information about this, see the “Alarms and Fault Finding” manual.

4.1 Preventive Maintenance

It is recommended to carry out a lamp (LED) test once a month. No other regular maintenance is required.

4.1.1 Lamp Test

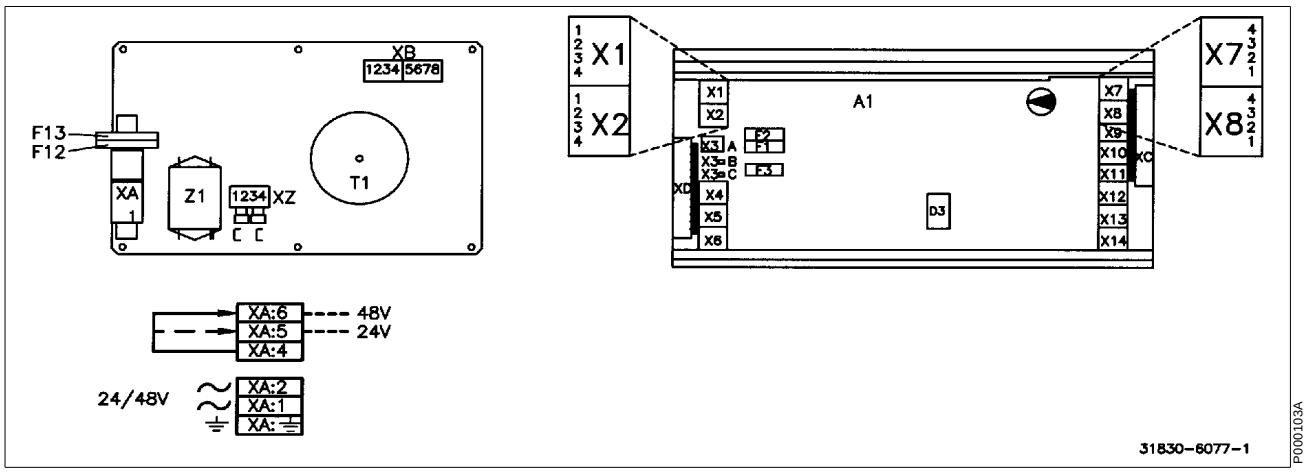
- Press the alarm reset button for five seconds. (This can be done during operation.)

- Check that all LEDs are lit.

4.2 Corrective Maintenance

4.2.1 Fuses and Related Functions

Fuses are located on the front board and the power terminal.



Front board (A1)

Fuse	Functions influenced	Alarm
F1	10 V AC supply to the board	Remote alarm Display black (A4 when new fuse installed)
F2	20 V AC supply to the board Analog/digital conversion Pt-100 inputs	A1-4 A2-6 C/F EEE
F3	All outputs	PS42

Power terminal

Fuse	Functions influenced	Alarm
F12, F13	Power to the EPC-41	Display black

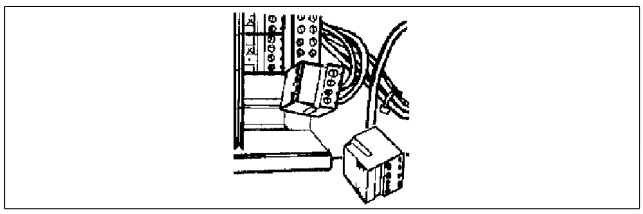
4.3 Replacement of Control Module

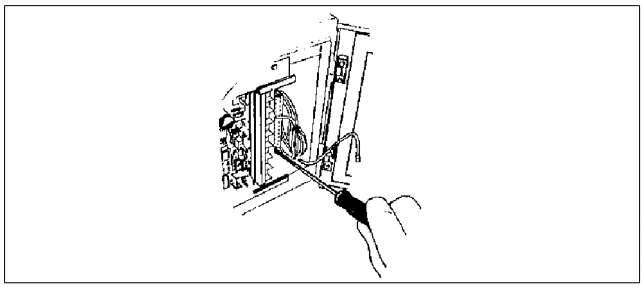
If a persistent fault is found in the control module it must not be repaired, but must be replaced and sent to an Alfa Laval representative for repair.

1. Make a note of all the actual parameter settings.
2. Switch off the power to the EPC by the main switch on the starter.
3. Open the panel door.
4. Pull out the wire terminal sockets by hand

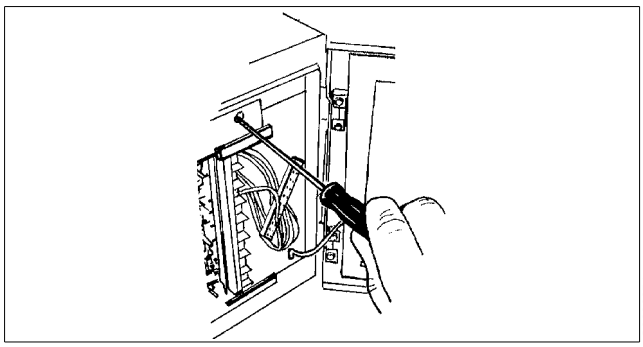
   Remove terminals XC and XD using a screwdriver.

Note: both terminal and sockets are marked with terminal numbers.

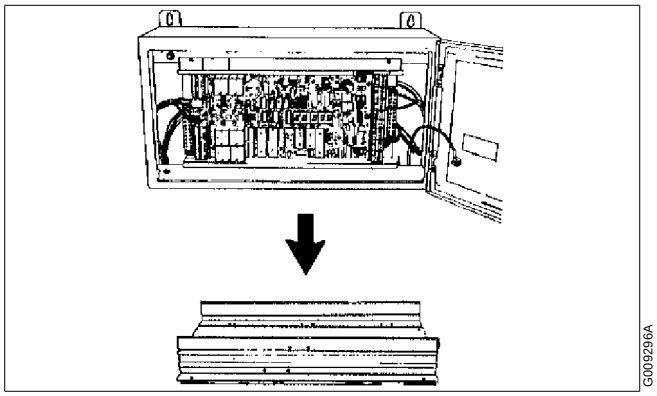




5. Remove the two screws holding the module and fold the module out.



6. Lift off the control module from the cabinet and replace it with a spare module.



7. Fit the spare module in reverse order.
8. Switch on the power.
9. Set the parameters to the values noted.
10. Fill in the report form on the rear of the faulty module and send it for repair.

5 Technical Data

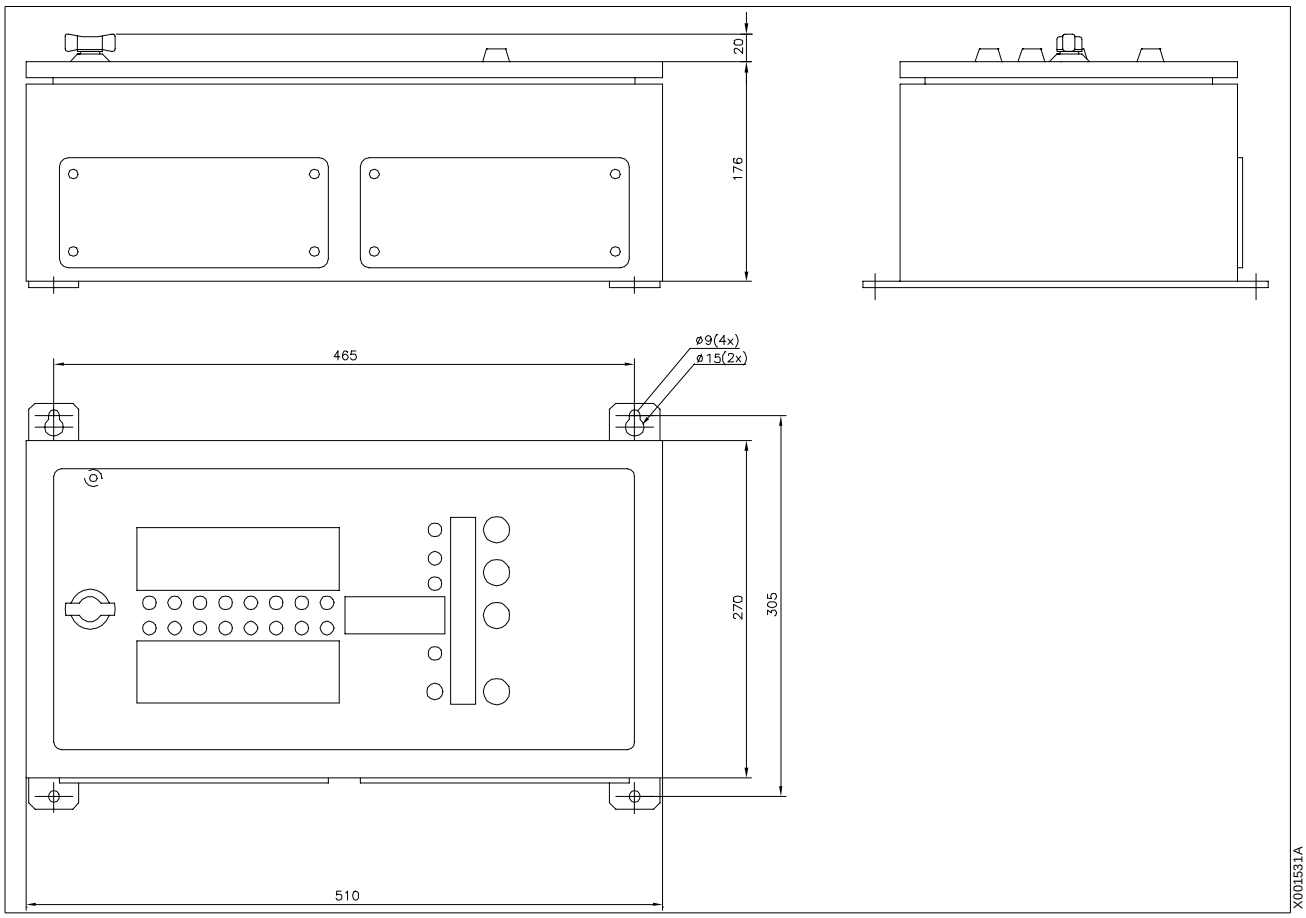
5.1 Specification

Mains voltage	48 V AC +10 % –15 %
Total power requirement	During separation: max. 110 VA During sludge discharge: max. 200 VA
Power requirement for outputs	Inrush: max. 5 x 45 VA Continuous: max. 5 x 23 VA
Frequency	50/60 Hz ±5%
Max. cable area	1.5 mm^2
Outputs for valves	Five relays, connected for 48 V AC at delivery
Outputs for oil heater	Three potential-free relays: max 0.5 A One triac: max. 100 mA (If the steam control valve is applicable, two relays are used for increase/decrease signals 24 V AC)
Motor stop function	One potential-free relay: max. 50 V, 1 A
Alarm inputs	Five potential-free contacts One Pt-100 temperature sensor
Temperature control inputs	One for Pt-100 temperature sensor
Remote input signals	Six potential-free contacts
Remote alarm output	One potential-free relay: max. 50 V, 0.5 A
Communication	One current loop, 20 mA, one RS232 C
Fuses	Built-in automatic fuse 3.0 A for power supply combined with power switch Fuse 1.6 A for 24 V AC supply to external electronic units, max. total load 0.5 A Glass fuses 500 mA, 2.5 A, 5 A
Weight	18 kg

Ambient temperature	Max. 55 °C
Degree of protection	IP 65

Ref. 1762575 Rev.10

5.2 Dimensions



Ref. 1762575 Rev. 10

Article No.	Type	Separator type
31830-5086-1 31830-5087-1	EPC-41	MMPX 303/304
31830-5086-2 31830-5087-2	EPC-41	MOPX

6 Installation

The installation instructions contain *specifications*, which are compulsory requirements, and *recommendations*, which are guidelines indicating ways of improving installation quality.

NOTE

If the specifications are not followed, Alfa Laval cannot be held responsible for any malfunction of the installation.

6.1 Mounting

Recommendation

The EPC is wall-mounted by means of two keyhole lugs and two fastening lugs. For hole dimensions, see dimensioned drawing.

- Do not use rubber dampers when mounting the EPC. The vibration may be amplified instead of damped.

6.2 Cable Routing

Recommendation

Correct routing inside the EPC cabinet:

- Keep cables short inside the cabinet.
- Keep signal and power cables separate.

6.3 Location of Cable Entries

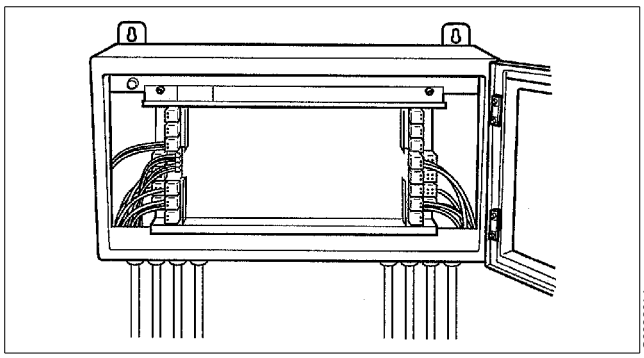
Specification

To prevent the reception of electrical noise inside the cabinet it is essential that all cables are routed correctly.

Cables that are to be connected to the left-hand terminals must enter from the LEFT.

Cables that are to be connected to the right-hand terminals must enter from the RIGHT.

Any other way of routing or mixing cables is completely unacceptable.



6.4 Terminal Protectors

Specification

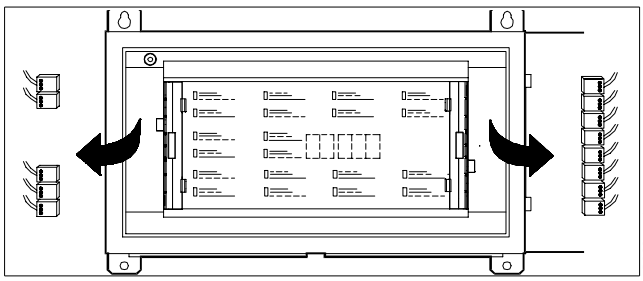
The terminal protectors must NOT be removed until the separator system is about to be commissioned.

During installation, terminal protectors shield the EPC's circuit board against possible damage from welding currents, etc.

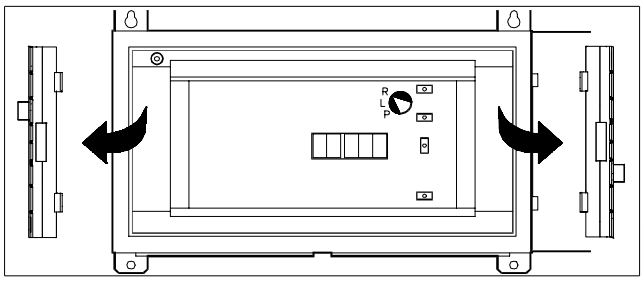
Cables entering the cabinet can still be connected to their plugs, whilst the terminal protectors prevent the plugs being connected to the circuit-board.

To connect the EPC control unit:

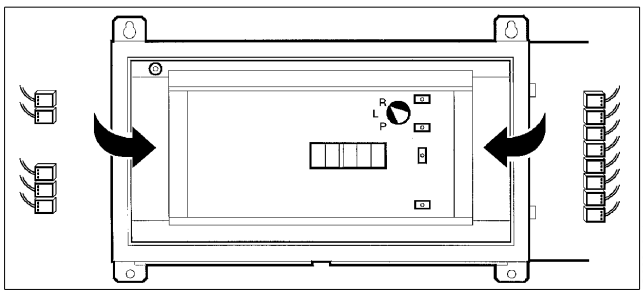
- Remove the plugs (green) from the terminal protectors (red).



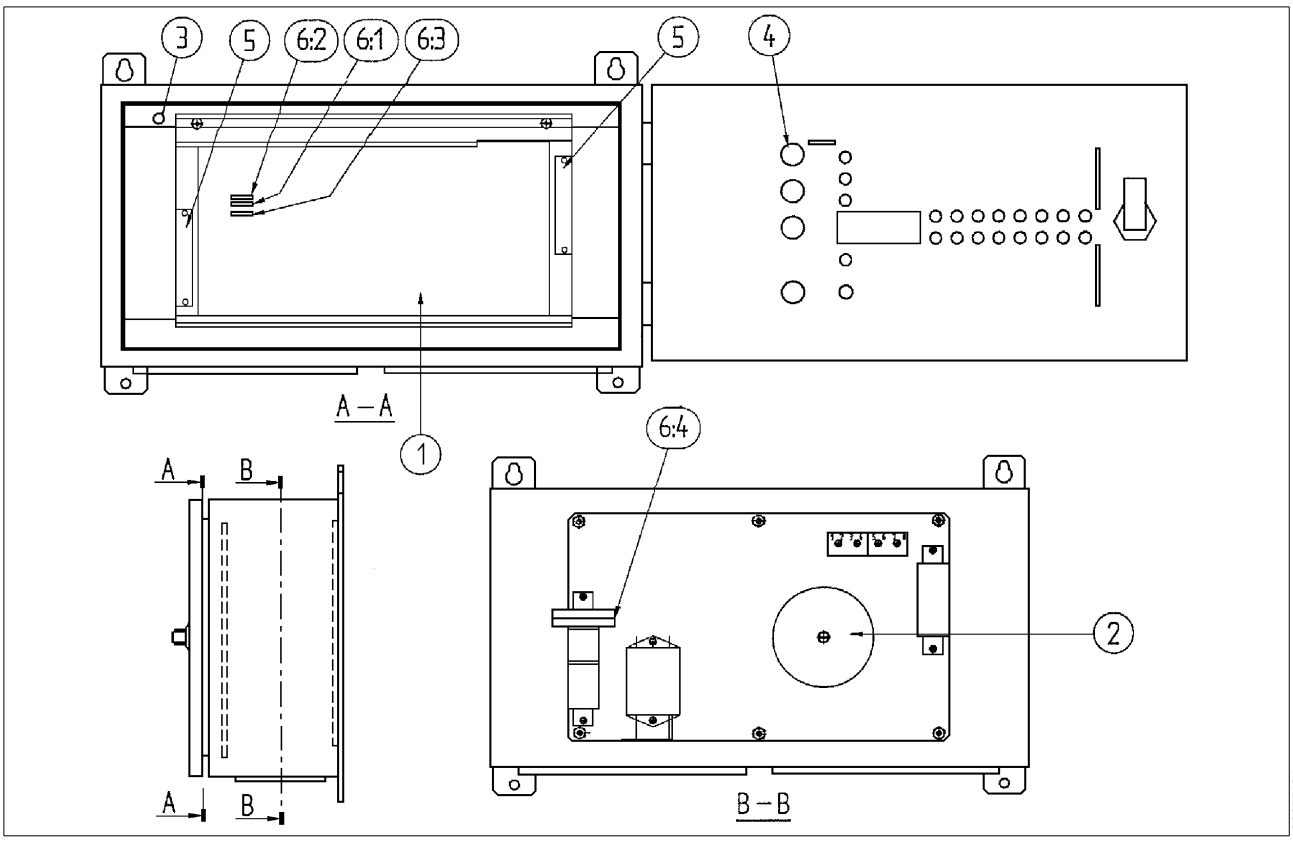
- Remove the terminal protectors.



- Fit the plugs, with cables, on the terminals.



7 Spare Parts



Item	Qty	Article No.	Description	Remarks
1	1	31830-5009-2	Control module	1)
2	1	4900795-18	Transformer	21–48V/10–20–24 V
3	1	4900860-26	Circuit breaker	3.0 A with push-push
4	1	4901008-02	Rubber push button extension	
5	1	4901156-03	Screw terminal	
	1	31830-5021-1	Spare parts kit, including:	1) 2)
6:1	5	4900850-21	Fuse, slow acting	2.5A, 5x20
6:2	5	4900850-14	Fuse, slow acting	500 mA, 5x20
6:3	5	4900850-24	Fuse, slow acting	5 A, 5x20
6:4	5	4900850-19	Fuse, slow acting	1.6 A, 5x20

1. Parts recommended for 3 years of operation
2. Included in delivery