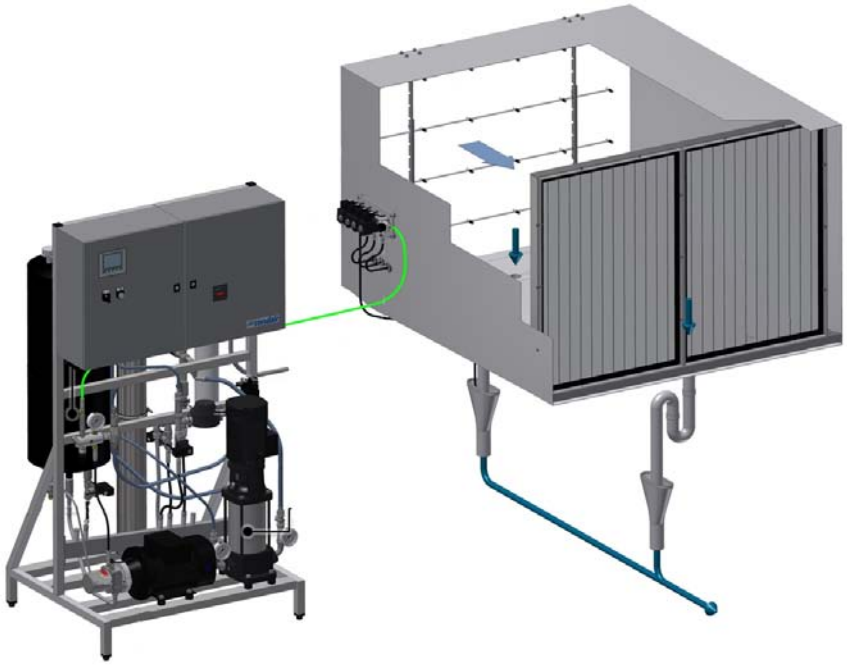
XXXXXXX EN 1501



CONTROLLER MANUAL

Adiabatic humidification system
Condair **HP/HPRO**

Humidification and Evaporative Cooling

Thank you for choosing Condair

Installation date (MM/DD/YYYY):
Commissioning date (MM/DD/YYYY):
Site:
Model:
Serial number:

Manufacturer
Condair A/S
Parallelvej 2, DK-8680 Ry
phone +45 8788 2100
condair.dk@condair.com, www.condair.dk

Contents

1 Introduction

1.1 Notes on the controller manual

This manual is an addendum for the operation of the Condair HP/HPRO controller and must be read in conjunction with the installation and operation manual for the Condair HP and HPRO.

Every person operating the Condair HP controller must have read and understood this controller manual, and the installation and operation manual of the Condair HP.
Knowing and understanding the contents of the manuals is a basic requirement for protecting the personnel against any kind of danger, to prevent faulty operation, and to operate the unit safely and correctly. All safety notes in the installation and operation manual for the Condair HP and HPRO must be observed and adhered to.

All work described in this controller manual **may only be carried out by well trained personnel which is authorized by the customer**.

If you have questions after reading this documentation, please contact your Condair representative. They will be glad to assist you.

2 Overview cabinet

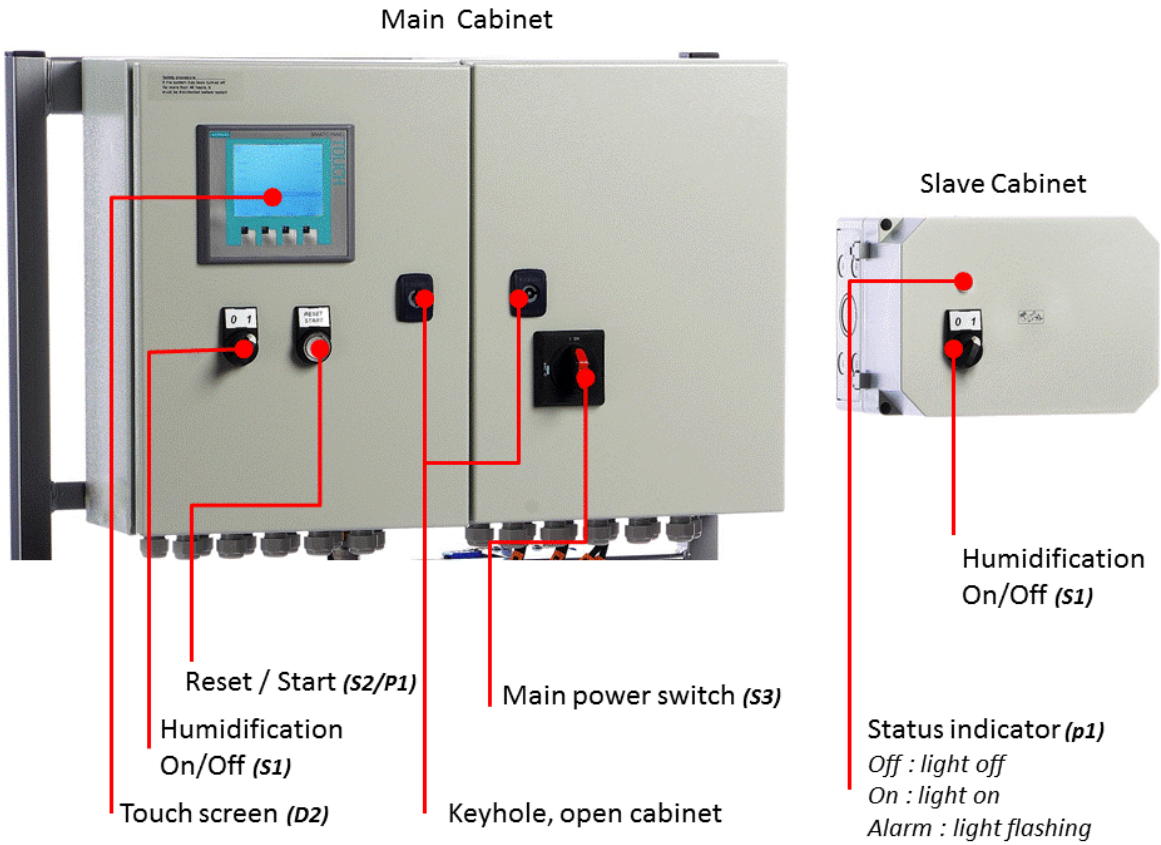


Fig. 1: Overview cabinet

3 Equipment protection

3.1 Pressure switch (inlet water)

The HP and HPRO have a pressure switch which monitors the inlet water pressure.

If the inlet water pressure drops, the controller will stop the pump, thus protecting the pump(s) against dry running. If the water pressure drops, the screen will show “PM Water pressure too low”

3.2 Max. Hygrostat to protect against excessive humidification (option)

It is possible to connect a Max. Hygrostat to the control cabinet. If humidity levels rise to a value that exceeds the value set on the Max. Hygrostat, the system will stop and the alarm lamp flashes. The system will not restart until the alarm is acknowledged by pressing ‘Alarm reset’. If this function is not required, the input will short-circuit on the terminal block.

3.3 Temperature switch

The high-pressure pump is protected against overheating by a temperature circuit that measures the current temperature in the pump. The temperature limits can be set individually.

Default settings:

1. If the temperature exceeds 30 °C, the control unit will initially attempt cooling by starting the water treatment part and filling up the tank with cold water. – If this makes the temperature drop to below 30 °C, this function will reset and everything will continue unchanged. While the tank is being filled, the high-pressure pump will continue unaffected.
2. If instead the temperature continues to rise to above 40 °C, the pump will stop and start emptying the tank of overheated water and produce new water in the tank. During this process and until the start level has been reached, the pump will remain idle with the alarm text displayed. The pump will start automatically once the start level has been reached.
3. If the temperature exceeds 50 °C, the pump will stop immediately and must be reactivated via the reset button once the temperature has dropped again.

3.4 Phase sequence relay

The control unit is equipped with a phase sequence relay, which protects against incorrect connection of the supply cable. Both LEDs on relay E1, which is located in the cabinet to the right, must be lit.

When both LEDs are lit, the pumps will run correctly. The relay also protects against fuse breaking.

3.5 Description of Touch Screen

The screen is equipped with four F keys. Each of the keys is used to navigate between the different screen images. When these are used, the individual key's function is indicated in the description directly above the key.

The actual touch screen can be operated by gently tapping a finger or a fingernail against the required 'buttons' on the screen.

If you want to change a numerical value, press the relevant number key. This will make a numerical keyboard appear on which the new value can be entered. Remember to enter any comma that may be needed. In case you make an incorrect entry, this can be deleted by means of the Backspace button. Once a new value has been entered, press Enter at the bottom right of the image using the numerical keyboard.

3.6 Protection against unwanted changes

On the display, the control unit settings are protected against unwanted changes by means of passwords. The different user groups have different passwords and different rights.

– User – no password – can read operational information and alarms.
– Master – password 8599 – as above + option choices.
– Technician 8788, as above + service menu.

Additionally, there are areas of the screen that are protected by extra passwords, to which only ML System has access.

When a password is required in order to change parameters, a screen will appear where the password can be entered. Change to numerical keyboard by means of the key 0-9.

Once the password has been entered, the system will remain unlocked at the relevant level for five minutes.

4 Alarm messages

This page shows alarms and operational messages. The alarm display contains information about when an alarm was triggered and when it was reset. The page shows active alarms and previous alarms. Please note that the system does not have a backup memory, which means that previous alarms will be lost in case of power failure.

4.1 Alarm message display

Max. Hygrostat

Max. Hygrostat has dropped out because humidity is too high. The system has stopped and must be restarted once the humidity level has dropped.

Water pressure too low

The water pressure of the water inlet to the pump station is too low.

Sensor error

The signal from one of the humidity sensors is outside the expected range of 20 to 80 % RH. In order to ensure that it will be possible to start in very dry surroundings, the 20 % limit is reduced to 5 % RH for the first 10 minutes after the system is switched on. If an alarm is triggered, only the affected sections will be stopped.

Emptying tank - water too hot

The water is too hot – above 40 ºC. The tank will be emptied to start level and filled with cold water. The pump will run unchanged in the meantime.

Stop - Pump too hot

The water is too hot – above 50 ºC. The system has stopped and must be restarted once the temperature has dropped.

Tank full

The water level in the tank is too high.

- Lower the water level and reset the system.
- Check that the inlet valve closes tightly when the system is idle.

Thermo relays error

The protective motor switch for the high-pressure pump is disengaged.

- Engage the relay and try restarting.

FD error

Communication with frequency drive is lost.

- Check frequency drive has power
- Check the frequency drive display for error indications

Pressure to high

High pressure above the high limit set point (only VFD versions have a high pressure sensor)

- Check settings in 2.12 HP control are correct, and the pressure shown is approx. the same as the analogue manometer at the high pressure manifold shows. If the measured pressure differs from the analogue manometer, this could indicate that the pressure transmitter is damaged.
- Check the pressure relieve valve is set correct and is working probably.
- Check high pressure valves are opening

Pressure to low

High pressure below the low limit set point (only VFD versions have a high pressure sensor)

- Check for leaks, which could cause a pressure loss
- Check that the settings in 2.12 HP control are correct, and the pressure shown is approx. the same as the analogue manometer at the high pressure manifold shows. If the measured pressure differs from the analogue manometer, this could indicate that the pressure transmitter is damaged.
- Check the pressure relieve valve is set correct and is working probably.
- Check no nozzles are missing or flush valve is leaking.

4.2 Operational message display

Water level below start level

The water level in the container is too low for the pump to start. Once an adequate level has been reached, the system will start automatically.

Pump will start automatically after delay

The pump has been set on pause, e.g. after disinfection. The pump will start automatically after the expiry of the set time.

Service

Pre-set service interval has been reached. System must be serviced!

UV lamp error

The UV bulb or ballast is broken.

UV lamp soon to be changed

Warning 3 weeks prior to UV lamp change / service.

UV lamp error to old

Replace UV lamp and reset service interval.

5 Operating the controller

5.1 Menu overview

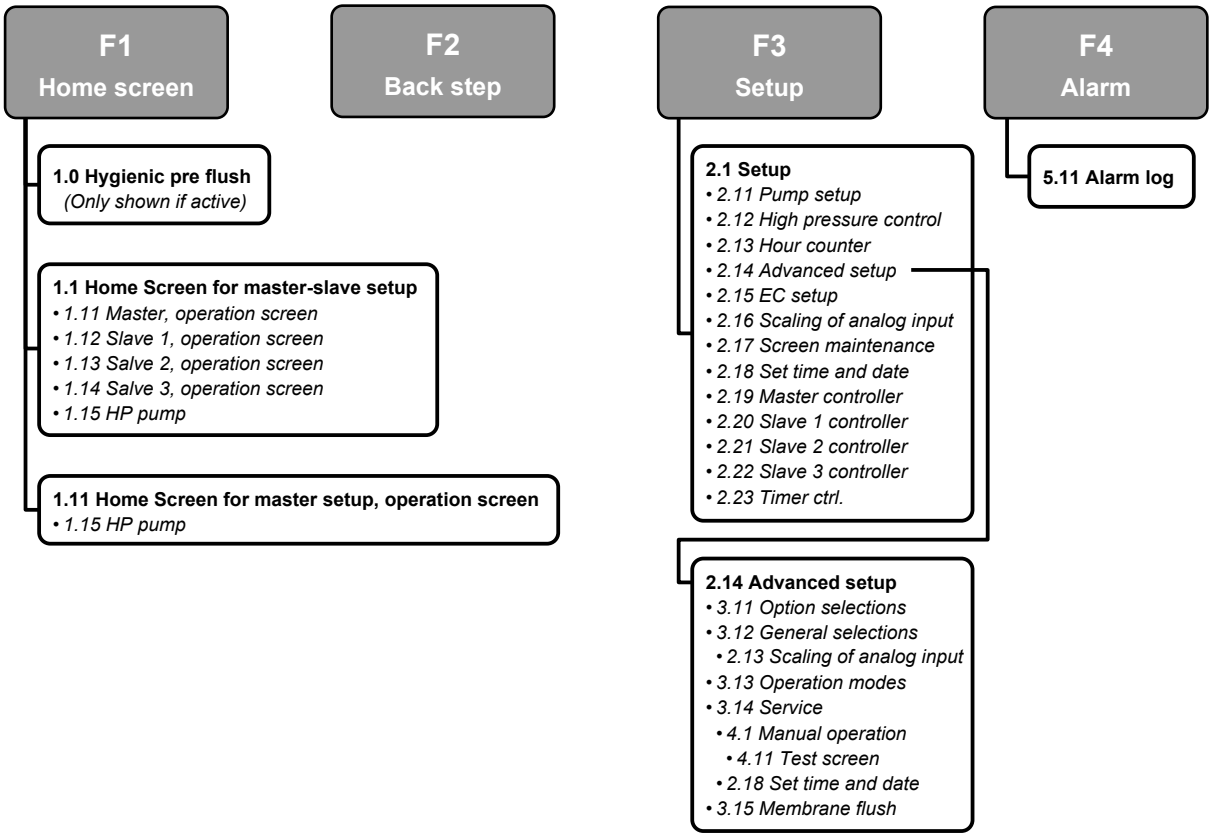
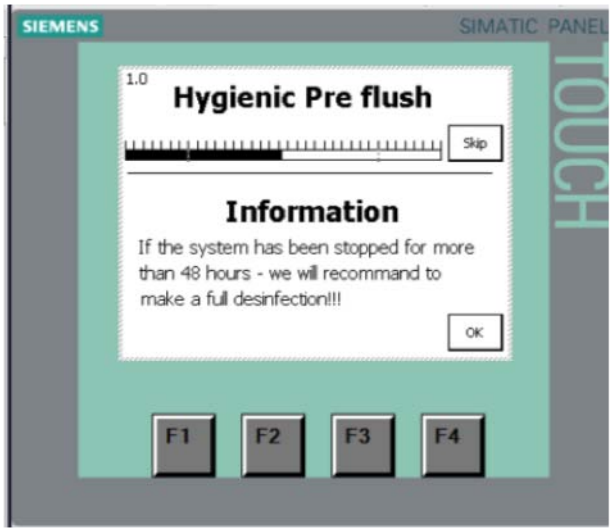
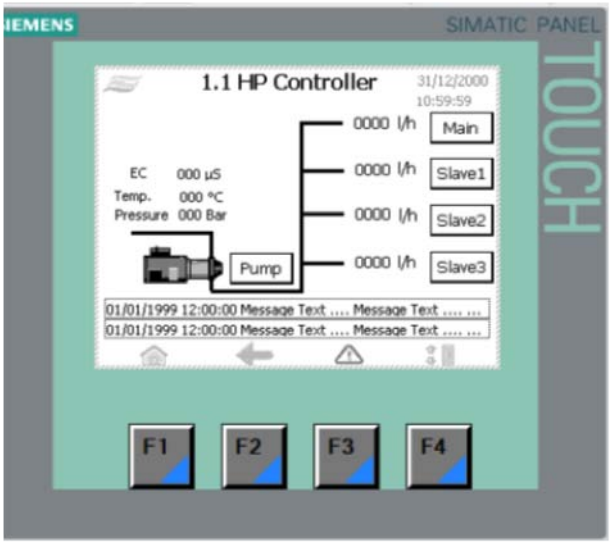


Fig. 2: Menu overview

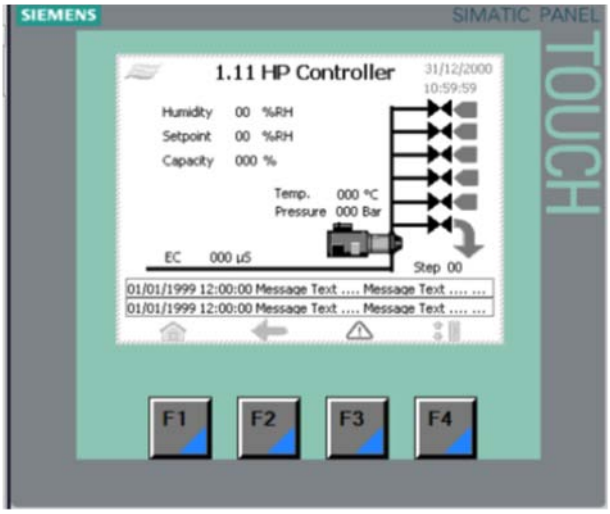
5.2 1.0 - Hygienic pre flush

1.0 - Hygienic Pre flush	
	This screen appears every time the pump has been switched off for more than 48 hours and therefore not has been able to perform the continuous flush cycle (2.11). As default the hygienic pre-flushing time is set to 10 minutes (3,13) To start the pre-flush, switch on main power, when this screen appears turn Humidification on/off (S1) to 1 (On). This starts the high pressure pump and opens the MV5 flush valve/bypass valve. It is possible to manually skip the hygienic pre-flush by pressing skip, and entering operator password 8599. The remaining flush time is indicated by a status bar. After end of flush cycle the OK button is shown together with a warning to disinfect. Press OK to go to HP controller screen

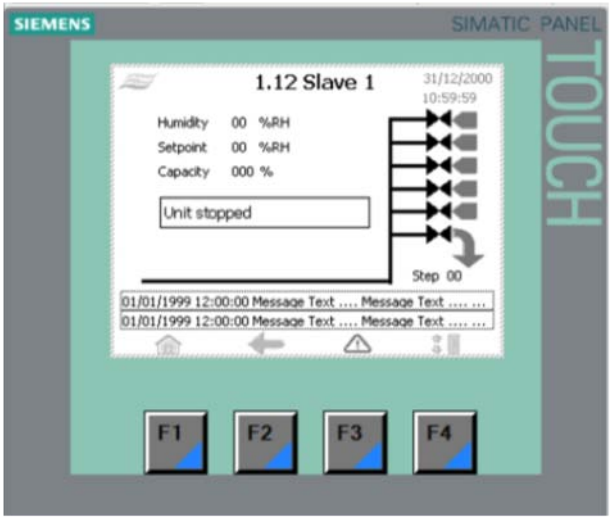
5.3 1.1 - HP Controller (F1 - home screen)

1.1 - HP Controller (F1 - home screen)	
	This screen is shown when the system is setup for slaves (3.12). If no slaves are chosen screen 1.11 is shown. Above the pump icon the current pump temperature is shown. If the pump is fitted with frequency drive or EC monitoring, messured values are shown here. Right to the pump icon is a link to more detailed pump data (1.15). If you press the wave logo in the upper left corner the language and units change (US imperial / english metric). In the upper right corner time and date are shown. On the right side of the screen links to each spray unit and their individual loads are shown. In the bottom of the screen the latest two warnings or alarms are shown: By pressing the Reset/Start button on the main cabinet, these lines are erased and the alarm reset.

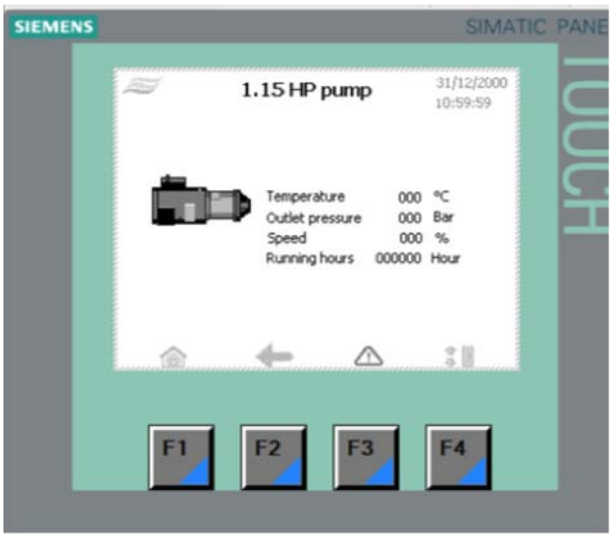
5.4 1.11 - HP Controller (F1 - home screen)

1.11 HP Controller (F1 - Home screen)	
	This screen is shown when the system is setup without slaves (3.12). If slave(s) are chosen screen 1.1 is shown. Above the pump icon current pump temperature is shown. If the pump is fitted with frequency drive or EC monitoring, messured values are shown here. Right to the pump icon is a link to more detailed pump data (1.15). If you press the wave logo in the upper left corner the language and units change (US imperial / english metric). In the upper right corner time and date are shown. On the right side of the screen the current status for each step/valve is shown. In the bottom of the screen the latest two warnings or alarms are shown, by pressing the Reset/Start button on the main cabinet, these lines are erased and the alarm reset.

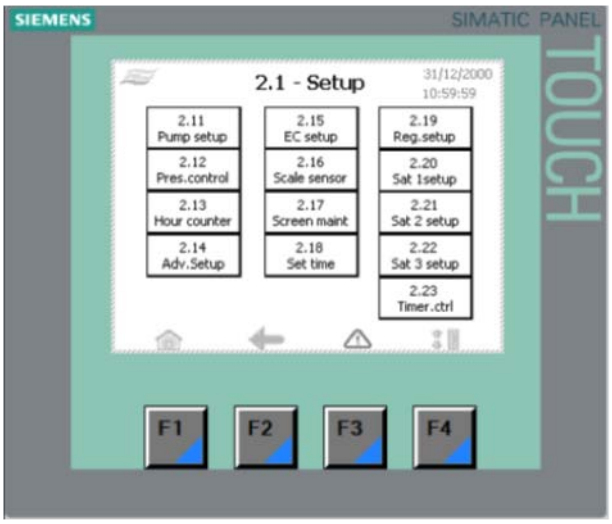
5.5 1.12/1.13/1.14 - Slave 1...3

1.12/1.13/1.14 Slave 1...3	
	In the left corner incomming signals and setpoints according to the chosen method of regulation (3.13 Operation) are shown. Unit started/stopped indicates whether the start/stop switch on the slave cabinet is activated. On the right side of the screen the status for each valve/step is shown.

5.6 1.15 - High pressure pump

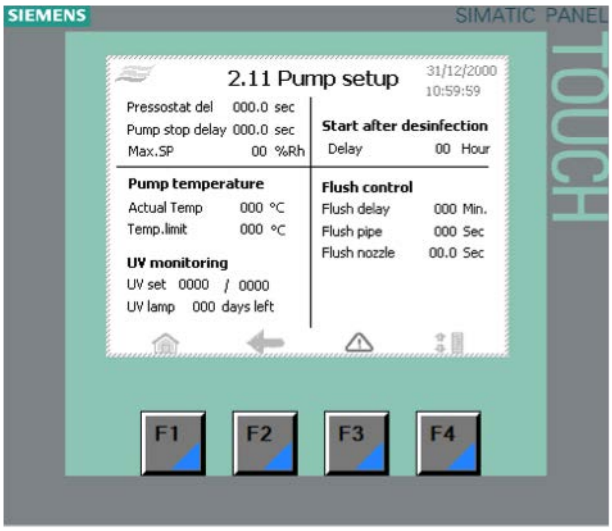
1.15 HP pump	
	Operation information NB! Some info is only available if pump has the optional hardware.

5.7 2.1 - Setup

2.1 Setup	
	Press any link to enter a sub menu

5.8 2.11 - High pressure pump setup

2.11 Pump setup



Pressostat del
Alarm delay for inlet pressure (PS1) < 1 bar.
Default: 10 sec.

Max.SP
Maximum allowed humidity, only shown if humidity controlled capacity has been chosen (3.13), if the entered value is exeeded system goes in alarm and stops the pump.

Pump temperature

Shows actual pump temperature and it is possible to change the temperature limit of the pump.
Default: 40°C

WARNING!
Raising the temperature limit above 40°C may cause damage to the high pressure pump.

Flush control

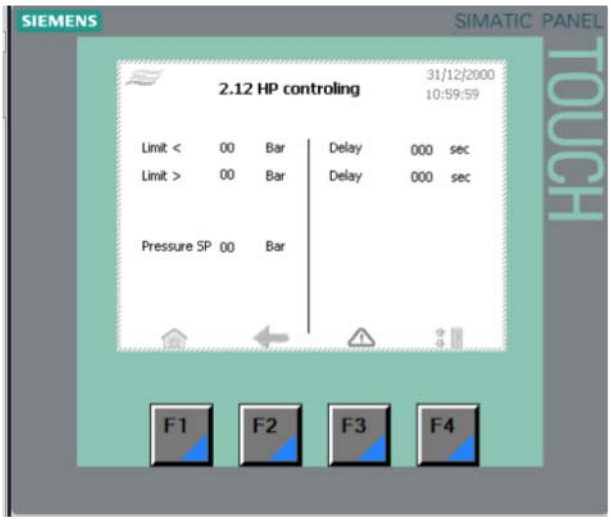
To reduce the risk of germs and harmfull bacteria developing in the system, all the water in the system must be changed 2-4 times every 24 hours. This is done by opening MV REG and/or MV5 flush valves and running the pump for a short period at preset intervals. The flush sequence is only active if humidification it self is not ennough to change the water.

If the external clearance signal is off the pump only preforms flush thru the flush valve MV5
We strongly advice to always keep the system turned on in order to run the flush continuously and thereby reducing the risk of contaminating the system/air with harmful organisms.

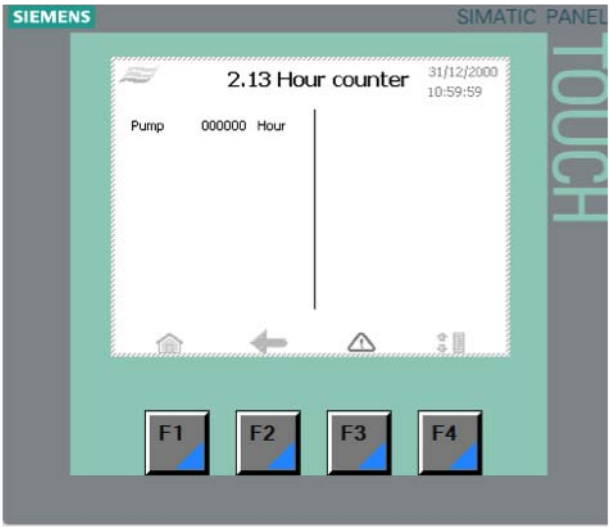
– Flush Delay
  Sets the time in minutes, between each flush sequence.
  Default: 30 minutes.
– Flush Pipes
  Time the pump opens MV5 flush valve. The MV5 flush valve gives approx 50 L/h.
  Default: 10 sec.

	– Flush nozzle Time each REG valve REG1, 2, 3 or 4 opens. The water sprays thru the nozzles and into the duct. The system monitors if a nozzle line has been running in the last flush delay period. If not it will be flushed. Start after desinfection This function is used to delay start of humidification after end of desinfection. UV monitoring (option) – UV set This function is used to monitor that the UV light bulp is working. The value to the left (0000/0000) shows the actual power consumption of the UV light bulb. If the power consumption drops bellow the manually entered value on the right, the system gives a warning. The entered value should be 15 % lower than the messured value. E.g.: after changing the UV light bulb UV setting shows: UV set 5654 / 7000 • Press the 7000 and change to (5654 * 0,85) = 4805 • Press start/reset – UV Lamp xxx days left Counts down from 365 to 0. 21 days before countdown reaches 0 days the system gives a warning. At 0 days the system shows an alarm in the display. UV-timer can be reset / altered in 3.14 service.

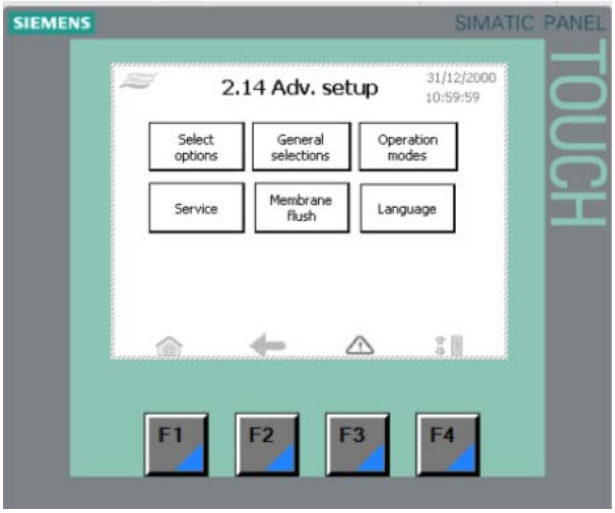
5.9 2.12 - High pressure control

2.12 High pressure control	
	Only for pump units with frequency drive **Limit** Set high and low pressure alarm limit and delays Default: Limit < 70 bars. Delay 10 sec. Limit > 40 bars. Delay 10 sec. **Pressure SP** Pressure set point for the frequency drive. Default: 70 bars NB! The high pressure is also influenced by the mechanical pressure regulator R2.

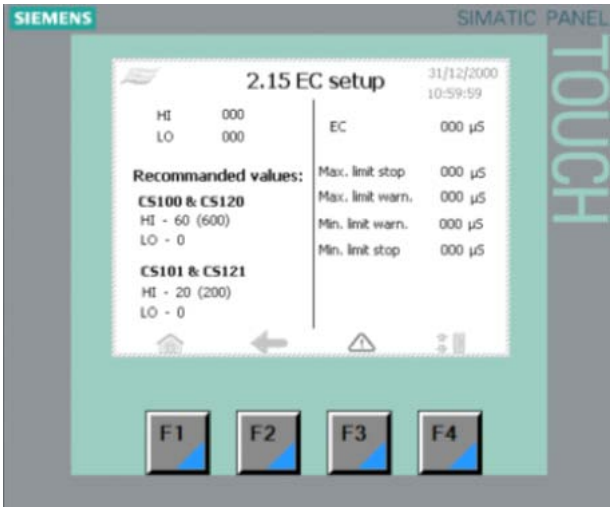
5.10 2.13 - Hour counter

2.13 Hour counter	
	Shows running hours for the high pressure pump.

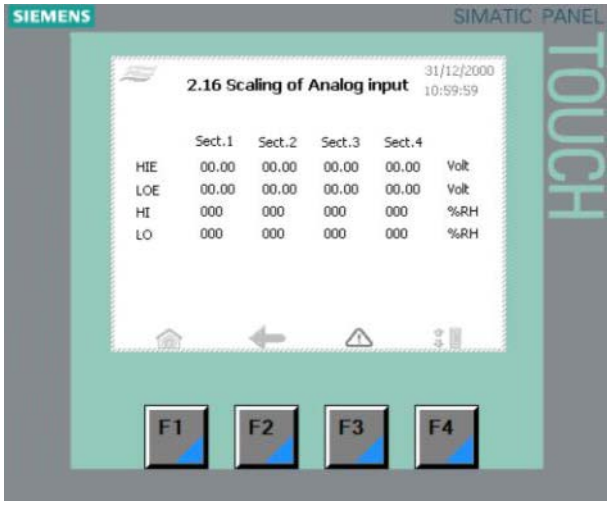
5.11 2.14 - Advanced setup

2.14 Adv. setup	
	Password protected menu. Press any link to enter a sub menu.

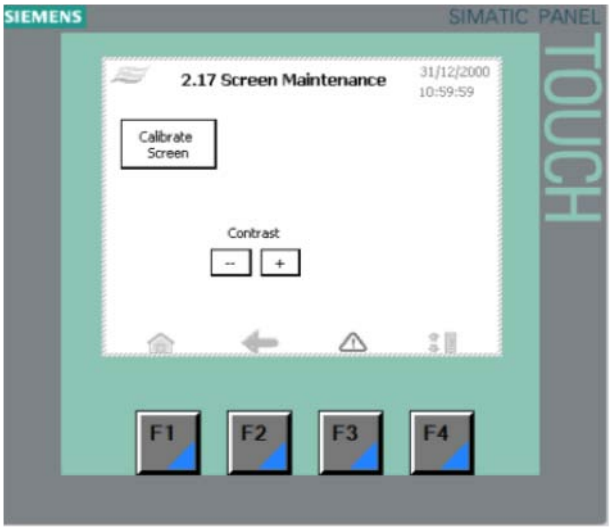
5.12 2.15 - EC setup (conductivity sensor)

2.15 EC setup (conductivity sensor)	
	Only if the pump is fitted with EC sensor, conductivity measurement and alarm. In the left column, scaling of sensor HIE: Highest electrical input LOE: Lowest electrical input HI: Highest reading in disply LA: Lowest reading in display In the right column the measured conductivity high/low alarm and warning settings

5.13 2.12 - Scaling of humidity sensors

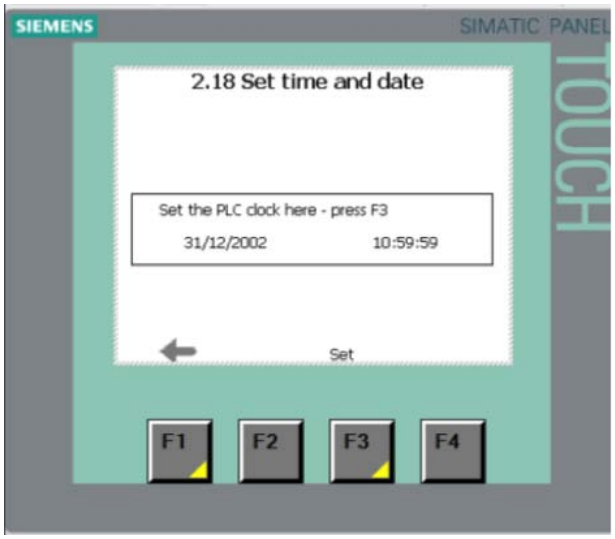
2.16 Scaling of analog input	
	(Only if the pump is regulated directly by Condair HP humidity sensors) HIE: Highest electrical input (volt) LOE: Lowest electrical input (volt) HI: Highest reading in disply LA: Lowest reading in display

5.14 2.17 - Screen Maintenance

2.17 Screen Maintenance	
	Calibrate screen: Adjusts the viewing angle, so you can stand upright and operate the screen. When calibrating do not lean forward in order to get a better glimpse. You will not get the desired effect.

5.15 2.18 - Set time and date

2.18 Set time and date

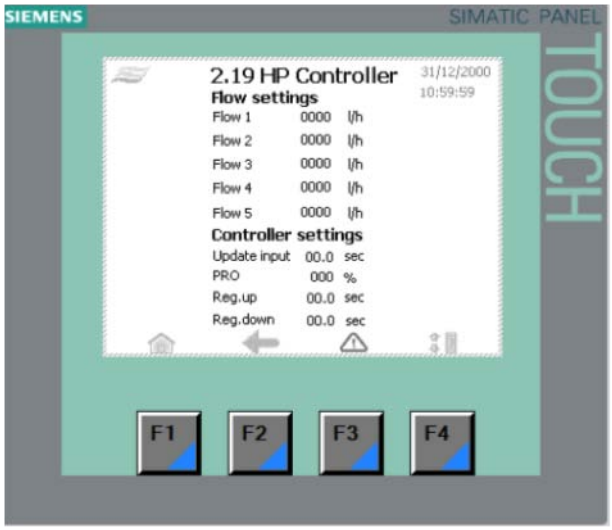


Tap the date/time or press set to set the clock or date.

Time format will change according to the language chosen.

5.16 2.19 - HP Controller

2.19 HP Controller



Flow settings
Enter value in l/h for each step valve.
e.g.
*flow 1: 6*4,5 l/h nozzles = 27 l/h*
*flow 2: 12*4,5 l/h nozzles = 54 l/h*
*flow 3: 24*4,5 l/h nozzles = 108 l/h*

Controller settings

– Update input (direct control cap.)

  Sampling time for the input signal.

– PRO (humidity control cap.)

  Proportional band standard 20%. For a more aggressive regulation lower PRO to *e.g. 15%.*

– Reg.up

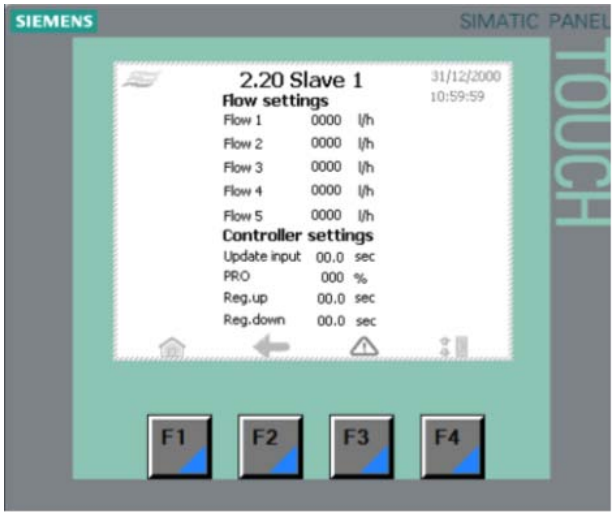
  Delay time for step jumps up.

– Reg.down

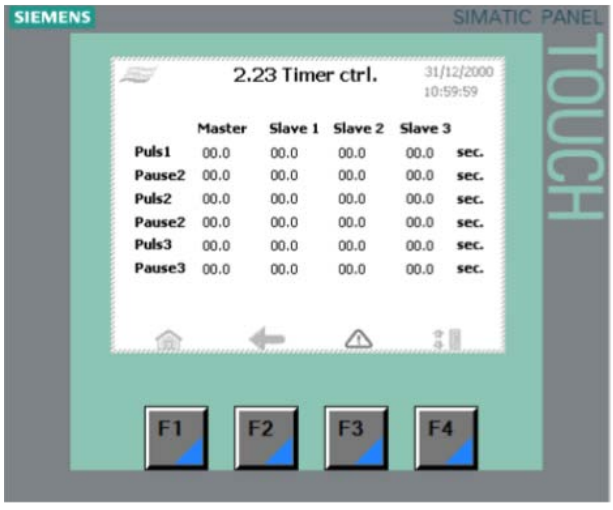
  Delay time for step jumps down

If the system switches steps on and off rapidly, raising the delay time could correct this.

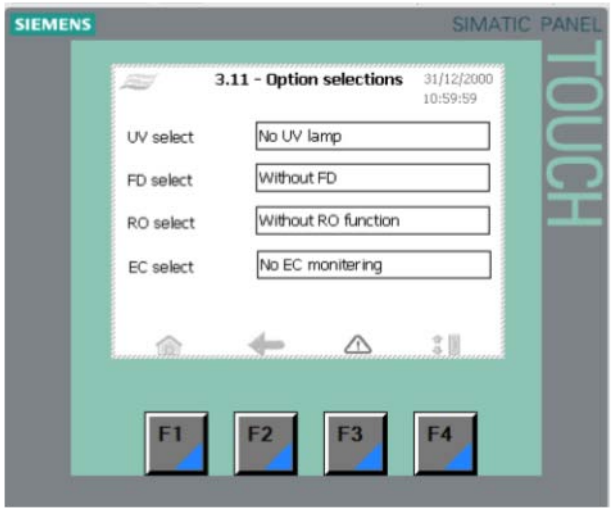
5.17 2.20/2.21/2.22 - Slave 1...3

2.20/2.21/2.22 Slave...3	
	Flow settings Enter value in l/h for each step valve. e.g. *flow 1: 6*4,5 l/h nozzles = 27 l/h* *flow 2: 12*4,5 l/h nozzles = 54 l/h* *flow 3: 24*4,5 l/h nozzles = 108 l/h* Controller settings – Update input (direct control cap.) Sampling time for the input signal. – PRO (humidity control cap.) Proportional band standard 20%. For a more aggressive regulation lower PRO to e.g. 15%. – Reg.up Delay time for step jumps up. – Reg.down Delay time for step jumps down. If the system switches steps on and off rapidly, raising the delay time could correct this.

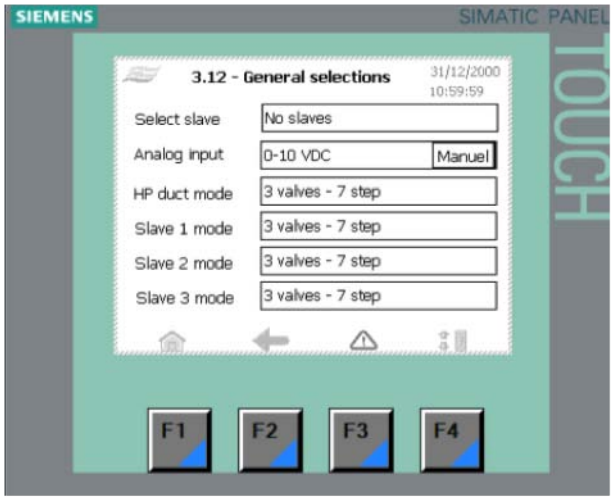
5.18 2.23 - Timer Control

2.23 Timer ctrl.	
	Timer controlled capacity can be chosen under general selections 3.13. In this mode the HP can be set to open each valve with a time interval. This can be a useful feature when commissioning.

5.19 3.11 - Option selections

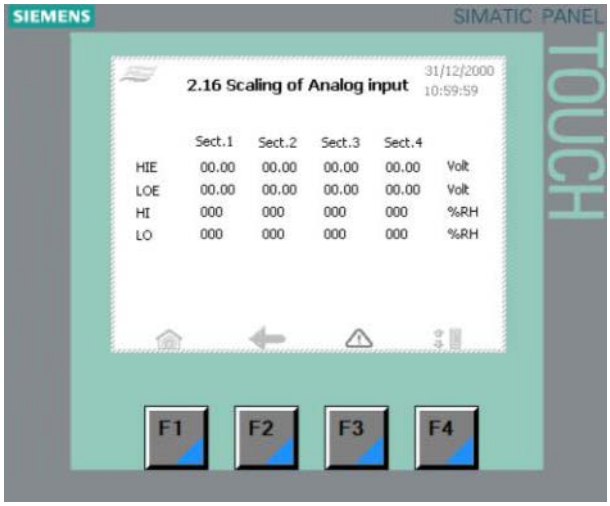
3.11 Option selections	
	UV select (Ultra Violet lamp) – No UV lamp – UV Monitoring FD select (Frequency Drive) – Without FD – With FD RO select (Reverse Osmosis) – Without RO function – With RO function EC select (Conductivity monitoring) – No EC monitoring – EC monitoring + alarms (option) --- *EC monitoring + al + RV/CO2 (not selectable)* *EC monitoring + al + MB + RV/CO2(not selectable)* al= Alarms RV/CO2= Raw water mixer / CO_2 for conductivity control MB= Mix Bed filtration (ultra-pure water)

5.20 3.12 - General selections

3.12 General selections	
	Select Slave – No Slave – 1 Slave – 2 Slaves – 3 Slaves Analogue input – 0-10 VDC – 2-10 VDC – 4-20 mA (NB! Insert 500 Ω resistor between input terminals) – 0-20 mA (NB! Insert 500 Ω resistor between input terminals) – 0-10 VDC scaled 20-80 %RH (humidity sensor signal) – 4-20 mA scaled 20-80 %RH (humidity sensor signal) – Manuel scaling (3,121 Manuel scaling) HP duct mode / Slave mode – 3 valves – 7 step – 4 valves – 15 step – 5 valves – 31 step

5.21 2.16 - Scaling of analog input

2.16 Scaling of analog input



HIE:
Highest electrical input, preset 10 V.

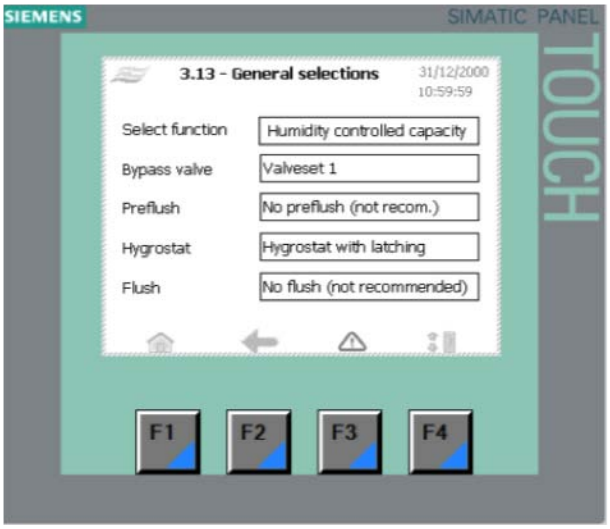
LOE:
Lowest electrical input, preset 0 V.

HI:
Highest reading in display. Adjust this value up or down, until meassured value (EC) shows correct value corresponding to the handheld and calibrated conductivity tester used by the installer.

LO:
Lowest reading in display. Shuld be preset to 0.

5.22 3.13 - General selections

3.13 General selections



Duct hum control
- Direct controlled capacity (default)
- Humidity controlled capacity
- Timer controlled capacity

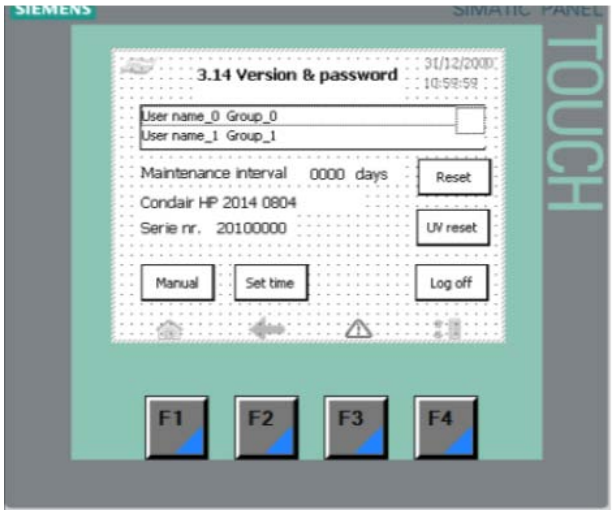
Bypass valve (flush valve)
- Valve set 1
- Valve set 2 (slave1)
- Valve set 3 (slave2)
- Valve set 4 (slave3)

To secure the most effective flushing of the system choose the valve set farthest away from the pump station.

Pre-flush
- No pre-flush
- 1 minute pre-flush
- 5 minutes pre-flush
- 10 minutes pre-flush (default)
- 20 minutes pre-flush

5.23 3.14 - Version & password

3.14 Version & password (technician menu)



Username
Show / change logon profile

Maintenance interval
Enter maintenance intervals by pressing *oooo days* and enter the number of days between maintenance. Press reset button after completing service and the pre-set countdown interval starts over again. Condair recommends that the system is serviced every 180 days according to service instructions.

UV reset
Reset the UV service timer interval.

Log off
Locks all password protected menus.

Set time
Tap the date/time or press set, to set the clock or date.

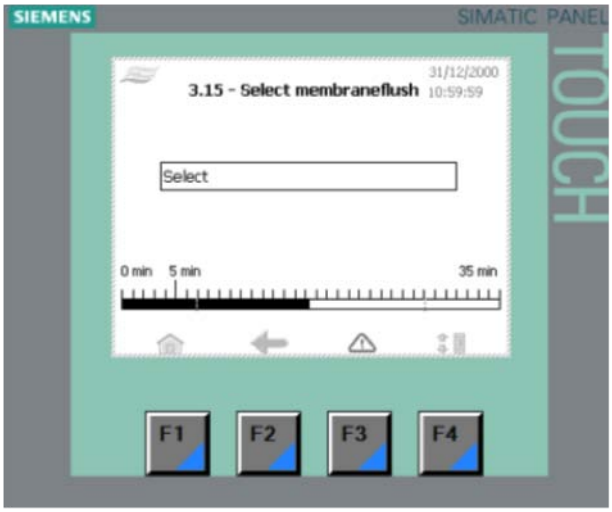
Time format will change according to the language chosen.

Clock: 24 hour
Date: dd/mm/yyyy

Manual (operation)
Go to the 4.1 manual operation

5.24 3.15 - Select membrane flush

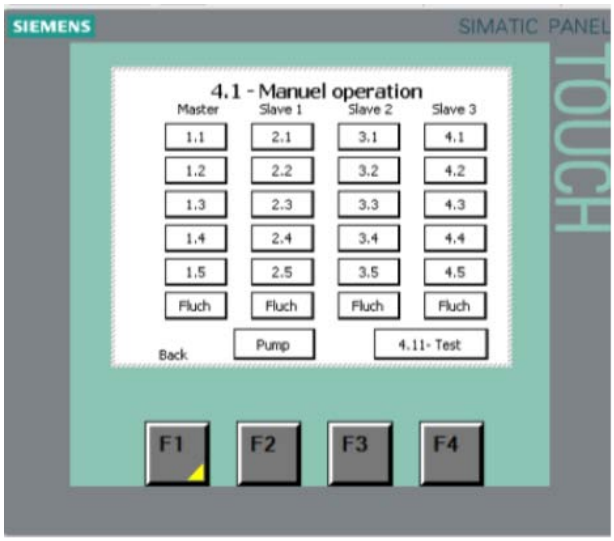
3.15 Select membrane flush



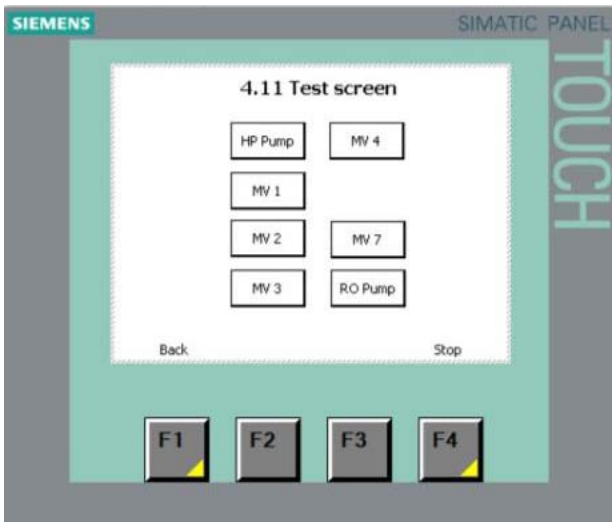
Always perform a membrane flush in the following situations:
– first time the RO system is set into operation
– after changing RO membrane(s)
– if RO has been shut off for a longer period.

Condair recommends that the system is disinfected if it has been shut off for more than 48 hours.

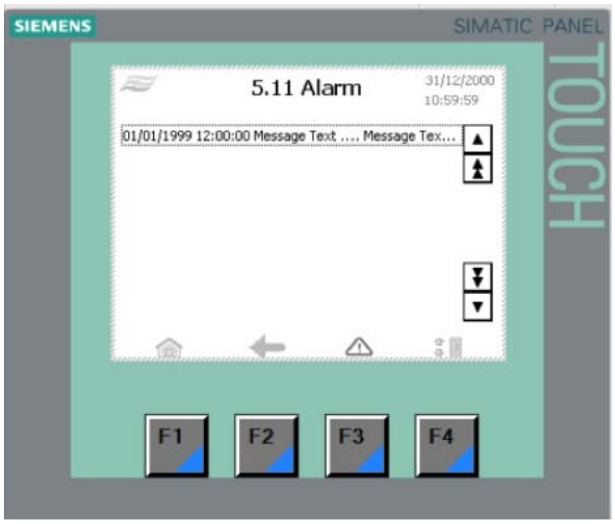
5.25 4.1 - Manual operation

4.1 Manuel operation	
	Operate valves on master and each slave unit. The Pump button starts the high pressure pump. Go to manual operation of the pump unit by pressing the 4.11-Test button in the lower right corner.

5.26 4.11 - Test screen

4.11 Test screen	
	Operates valves. Start/stop pump(s).

5.27 5.11 - Alarm

5.11 Alarm	
	Shows alarms and warning history.

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