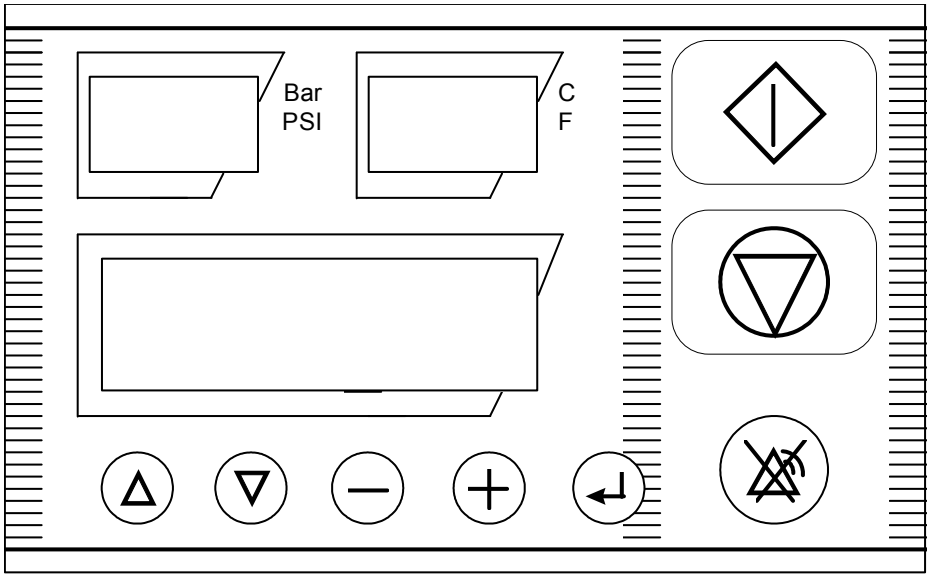
Aircon L1

Software L1 AF AP 08



Installation guide & user's manual

Nota 254

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1 General information

1.1 Introduction

The Aircon L1 controller has been developed for the control of medium to large size compressors. The full option model was designed to handle compressors with a virtually unlimited number of digital and analogue inputs and outputs. The controller can also be connected to a RS485 communication line for remote control and remote monitoring.

The Aircon L1 has a metal housing and can be mounted inside or outside the electrical cabinet of the compressor.

Two 3-digit LCD displays and an alphanumeric display with 2 lines of 16 characters permanently show the behavior of the compressor. We devoted special attention to the development of a simple user interface.

The Aircon L1 controller software was developed with the above requirements in mind. This document describes the software's functional and control related capabilities. The user interface and menu structure is described as well in the document. The most important aspect about this document is that it describes the AFAP08 version of the Aircon L1 software. It therefore does not describe or specify all the possibilities of the Aircon L1 unit.

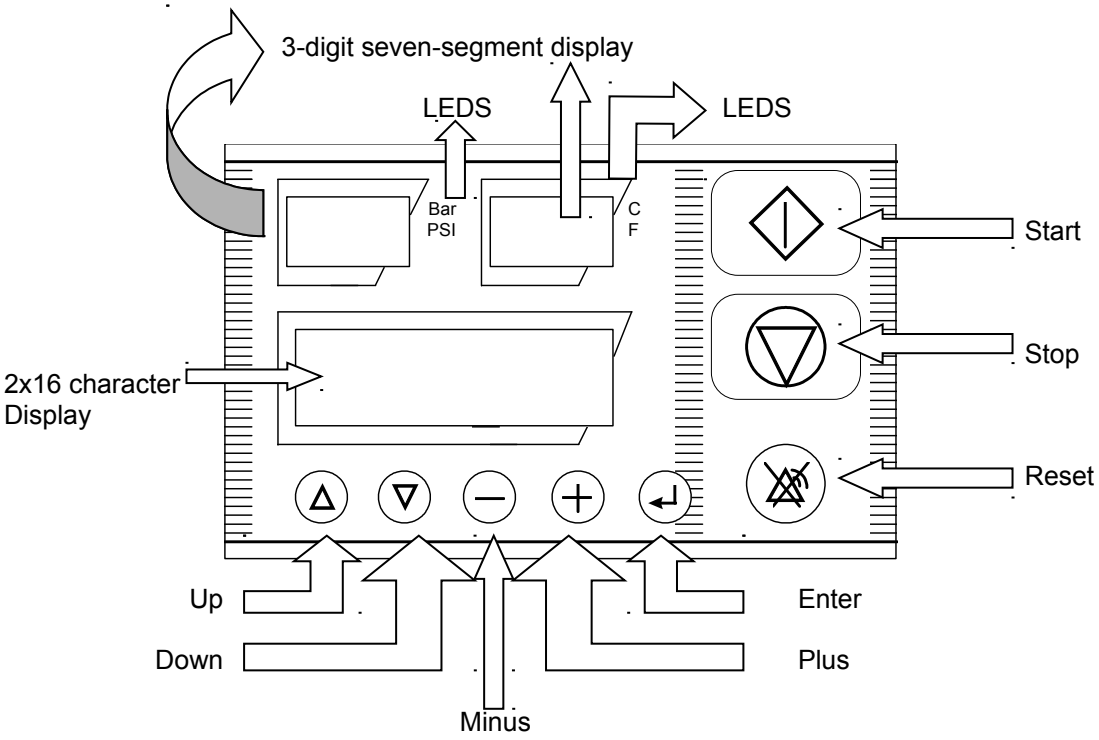
1.2 Disclaimer

The information in this document is subjected to change without notice. While manufactures assumes and believes the information contained herein to be accurate, the company assumes no responsibility for any errors or omissions.

1.3 Copyright notice

2 User interface

The Aircon L1 controller is equipped with three bottom-view-side-lighted displays, 8 push buttons and 4 LEDS.



2.1 Displays

The Aircon L1 is equipped with 3-bottom view - side lighted displays. Each display is dedicated for a specific purpose:

The following messages can be displayed:

Display type	Message	Meaning
3 digit seven segment (left display)	e.g. 40 - - -	• Current pressure is constantly being displayed. • Indicating a pressure sensor error. (see Table 4 on page 9)
3 digit seven segment (right display)	e.g. 25 - - -	• Current temperature is being constantly displayed. • Indicating a temperature sensor error. (see Table 4 on page 9)
Alpha numeric 2 lines 16 character	e.g. emergency stop. e.g. standby. e.g. oil service.	Error indications. Status indications. Service timers.

Table 1

2.2 Push buttons

The Aircon L1 is equipped with 8 tactile push buttons.

Button	Function
Arrow up	Select previous menu item.
Arrow down	Select next menu item.
Minus	Exit current menu (back to previous).
Plus	Entering the selected menu.
Enter	Modifying / confirming variable settings.
Green rectangular	Starting the compressor locally.
Red rectangular	Stopping the compressor locally.
Reset	Return to the basic menu or Reset the controller whenever an alarm/warning occurred.

Table 2

2.3 LED's

The Aircon L1 is equipped with 4 LEDS.

LED	Meaning
BAR	The pressure unit is set at BAR (see Table 7 on page 11).
PSI	The pressure unit is set at PSI (see Table 7 on page 11).
°C	The temperature unit is set at Celsius (see Table 7 on page 11).
°F	The temperature unit is set at Fahrenheit (see Table 7 on page 11).

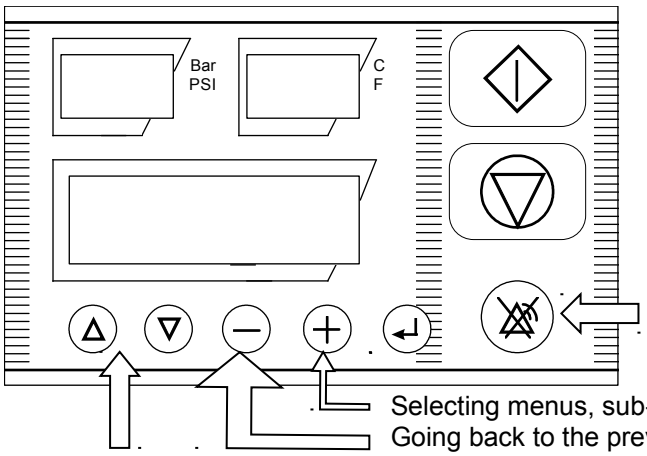
Table 3

3 Basic software menus and functions

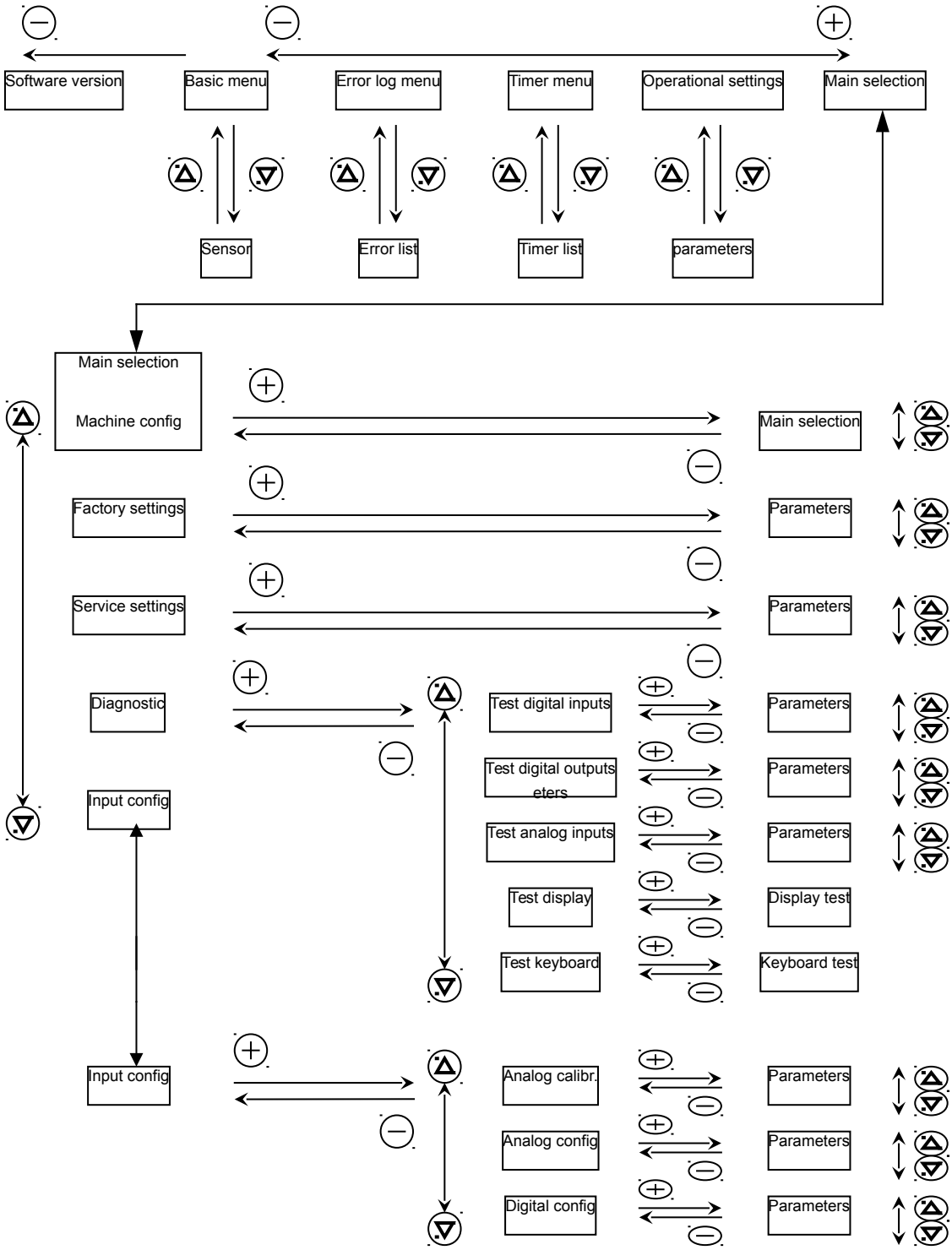
3.1 Menu code entry / parameter modification

This paragraph explains how to select a menu and how to scroll through the different parameters.

3.1.1 Entering menus



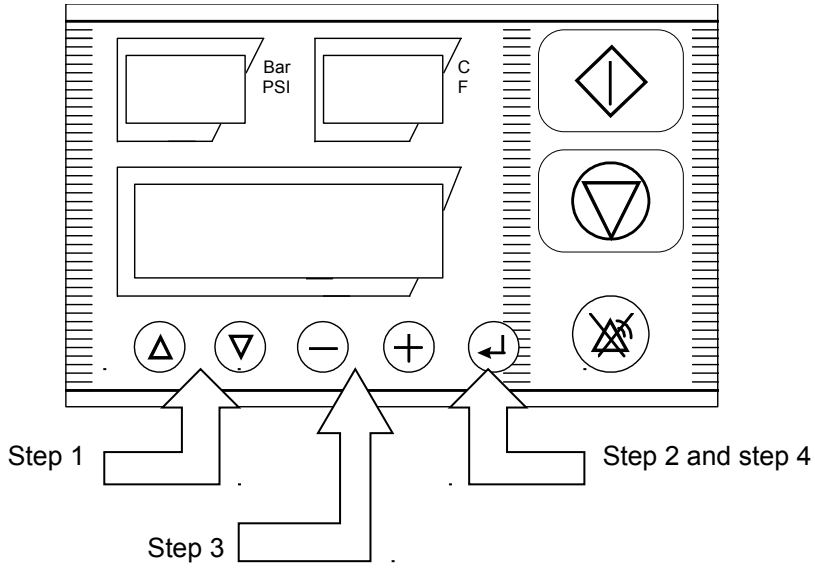
How the different menus and sub-menus can be entered, is shown below:



Parameter modification

a) Parameter modification without password protection

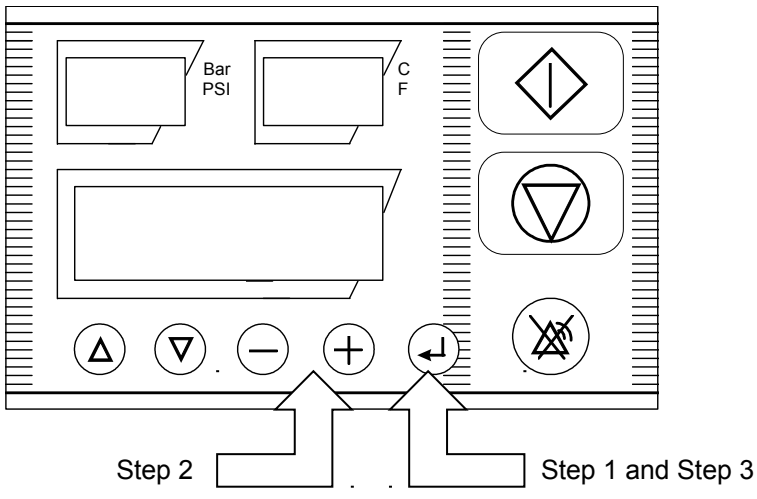
- Within the entered menu, select the parameter to be changed by scrolling through the menu with the up and down arrow-button (step 1)
- Push the enter-button and the parameter value will start blinking (step 2)
- Change the blinking value with the “+” or “-“ button (step 3)
- Confirm with the enter-button (step 4)



b) Parameter modification with password protection

The parameters of several menus are protected by a password. With the following procedure those parameter values can be changed.

- Within the entered menu, select the parameter to be changed by scrolling through the menu with the up and down arrow-button (step 1)
- Push the enter-button and “CODE” will appear on the display at the same time “000” starts blinking
- Set with the “+” and “-“ minus-push button the appropriate code for the selected menu (step 2)
- Confirm the selected code by pushing the enter-button again (step 3)



Entry codes

- Machine configuration: 11
- Factory settings : ---
- Service settings : 12
- Diagnostics : 13
- Input configuration : ---

3.2 Menus and changeable features

3.2.1 Status menu

The status menu can be considered as the default menu. It is shown at start-up of the controller and the Aircon L1 will revert to this menu after one minute when the keyboard activity stops while displaying a different menu. The following messages are displayed :

- Machine status (e.g. standby, blowing down, on load, off load, etc.)
- Time and day
- Errors - active faults are blinking (e.g. air. Temp ----, Oil pressure, etc.)
- See also appendix column 3.2.1

3.2.2 Error log menu

The Aircon L1 saves the 10 most recent occurred faults. By using the up and down arrow-button all the messages can de displayed. Below an example is given:

Display message	Meaning
Fault log nr. 1 High pressure fault	Occurred fault number 1 is being displayed.
Fault log nr. 2 Emergency stop	Occurred fault number 2 is being displayed.
Fault log nr. 3 Air temperature	Occurred fault number 3 is being displayed.
Fault log nr. 4 Temperature probe fault	Occurred fault number 4 is being displayed. (See Table 1 on page 5)
Etc.	

Table 4

After a fault has been selected and the enter-button is pushed continuously, the date and time is displayed when the fault occurred.

3.2.3 Timer menu

In the timer menu the following timers can be checked:

Parameter	Meaning
Running hours	Total running hours is being displayed.
Loaded hours	Total loaded hours is being displayed.
Air filter time	Remaining hours to air filter service is being displayed.
Oil filter time	Remaining hours to oil filter service is being displayed.
Inner time	Remaining hours service is being displayed.
Oil change time	Remaining hours to oil change is being displayed.

Table 5

Note: Setting and resetting the displayed values can be done in the service setting menu (see Table 10 on page 14)

3.2.4 Operational setting menu

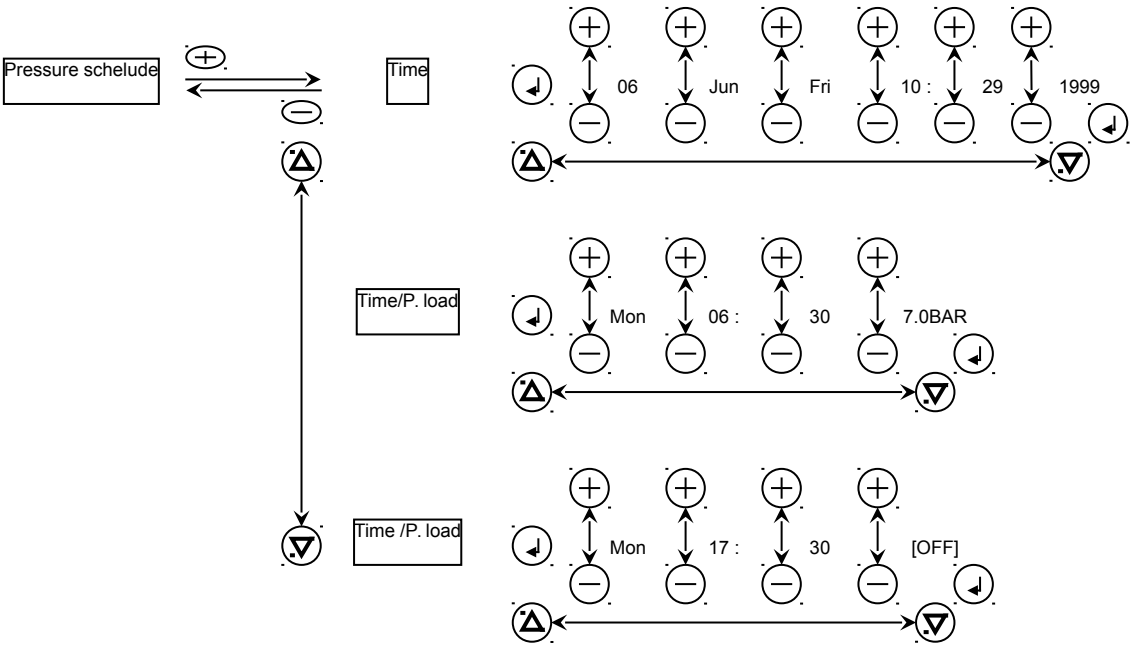
In this menu, the operator can make some modifications according to his requirements. The following parameters can be accessed and changed by the operator:

Parameter	Function	Default	Min.	Max.
Pressure control CNT AUT	• Continuous : the compressor motor runs continuously from the start command until the stop command. The inlet valve will be powered in function of the measured pressure and the programmed load & unload level. • Automatic : this operation mode is essentially the same as continuous control but with an additional feature: if the compressor remains unloaded for a certain (programmable) time, the compressor motor is stopped (see item “run on timer” in this table). After stopping the motor, the pressure remains monitored by the controller. The machine restarts automatically when the pressure decreases below the programmable load-level.	CNT		
Pressure unload level	From this level the machine starts working offload (for max. value see also factory settings)	40 bar	Load level	P mc max
Pressure load level	From this level the machine starts working load	38 bar	2 bar	Unload level
Run on timer	The amount of time that the motor keeps on running idle before it stops	10 min	0min	20min
Press. schedule	Enabling or disabling the pressure schedule	OFF	OFF	ON
Press. schedule	The current time can be set as well as the configuration of the pressure schedule throughout the week (see Pressure schedule on page 11)			
Drain spit time	Opening time of the drain to release the moisture of the after cooling process	5sec	1sec	20sec
Drain dwell time	Opening interval of the drain	30sec	10sec	120sec

Table 6

3.2.4.1 Pressure schedule

In the pressure schedule menu, the date and time can be set. It is also possible to program a week schedule containing 32 different pressure settings that are linked to a specified time. Below it is explained how to modify the parameters in this menu. (See also clock settings in Table 9 on page 13)



3.2.5 Machine configuration

In the machine configuration menu, the following application specific parameters can be set:

Parameter	Function	Default	Min.	Max.
Auto restart	Automatic restart of the machine after a power failure in case when the machine was running before the power failure.	OFF	AUT	OFF
Start control	Selection between local start / stop control or remote start / stop control through a digital input. (see Table 20 on page 23 and note)	LOC	LOC	REM
Pressure control	Selection between local load / unload control or remote load / unload control through a digital input. (see Table 20 on page 23 and note below)	LOC	LOC	REM
Machine number	Address of the controller in an RS485 network..	1	1	254
P unit	Selection of the pressure unit.	BAR	BAR	PSI
T unit	Selection of the temperature unit.	°C	°C	°F
Language	Selection of the language in which the messages are displayed.	English		

Table 7

Important note: It is always possible to stop the machine locally when remote start / stop function is enabled.

3.2.6 .

3.2.7 Factory settings

In the factory menu, the following fundamental parameters are set :

Factory settings		
Start Y / D or soft start		
Pre-start :	0" (0 … 240)	
Service pressure :	41 bar (8,7 … 42)	
Overload pressure :	42 bar (8,7 … 42)	
Oil min. pressure :	1,5 bar (0 … 10)	
Oil pressure delay :	10" (0 … 120)	
Input min. pressure :	6 bar (6 … 11)	
Final max. Temp. :	50°C (0 … 100)	
1st max. Temp. :	225°C (0 … 240)	
2nd max. Temp. :	225°C (0 … 240)	
3rd max. Temp. :	180°C (0 … 240)	
Water max. Temp :	75°C (-2 … 80)	
H. cross. Max. Temp :	80°C (5 … 80)	
V. cross. Max. Temp :	80°C (5 … 80)	
Dryer delay :	1" (0 … 10)	
Start / hour max. :	4 (0 … 30)	
Y / D start delay :	6" (3 … 60)	
Y / D start return :	40ms (10 … 100)	
Purging delay :	2" (0 .. 10)	
Accelerating delay :	15" (2 … 60)	
Releaser min. delay :	2" (0 … 60)	
Stop delay :	3" (1 … 60)	
Water pump delay :	5' (1 … 60)	
Decelerating delay :	10" (2 … 60)	
On load time :	0	
Working time :	0	
Error log clear		
Re-programming		

Table 9

See also Appendix column 3.2.7

3.2.8 Service settings

In the service menu the following programmed service timers can be set and reset:

Parameter	Function	Default	Min	Max
Air filter time	Air filter time.	2000	0	4000
Oil filter time	Oil filter life time.	2000	0	4000
Inner time	Time to inner service.	2000	0	4000
Oil change time	Time to oil change.	4000	0	4000

Table 10

3.2.9 Diagnostics

The diagnostics menu contains various submenus that allows testing of the different inputs and outputs.

3.2.9.1 Test digital inputs

Parameter	Function	Default	Min	Max
Dig in 1	By changing the status of input 1, the input can be tested. – Emergency stop	Clsd	Open	Closed
Dig in 2	By changing the status of input 2, the input can be tested. – Water flow	Clsd	Open	Closed
Dig in 3	By changing the status of input 3, the input can be tested. – Load / Unload	Open	Open	Closed
Dig in 4	By changing the status of input 4, the input can be tested. – Fault delta	Open	Open	Closed
Dig in 5	By changing the status of input 5, the input can be tested. – Th Water Pump	Clsd	Open	Closed
Dig in 6	By changing the status of input 6, the input can be tested. – Accessories	Clsd	Open	Closed
Dig in 7	By changing the status of input 7, the input can be tested. – Dew point	Open	Open	Closed
Dig in 8	By changing the status of input 8, the input can be tested. – Th Motor	Clsd	Open	Closed

Table 11

Note: Clsd = closed

3.2.9.2 Test digital outputs

Warning: the relays are being powered for testing!

Parameter	Function	Default	Min	Max
Dig out 1	Relay 1 is powered. – Contactor L	OFF	On	Off
Dig out 2	Relay 2 is powered. – Contactor Y	OFF	On	Off
Dig out 3	Relay 3 is powered. – Contactor D	OFF	On	Off
Dig out 4	Relay 4 is powered. – Air valve	OFF	On	Off
Dig out 5	Relay 5 is powered. – OK	OFF	On	Off
Dig out 6	Open collector output 1 is activated. – Purging 1+2	OFF	On	Off
Dig out 7	Open collector output 2 is activated. – Purging 2	OFF	On	Off
Dig out 8	Open collector output 3 is activated. – Water pump	OFF	On	Off

Table 12

See also appendix column 3.2.9 / 2

3.2.9.3 Test analogue inputs

Parameter	Function
Anal inp 1	The applied voltage of the analogue input 1 is displayed. (some software versions show the A/D steps)
Anal inp 2	The applied voltage of the analogue input 2 is displayed. (some software versions show the A/D steps)
Anal inp 3	The applied voltage of the analogue input 3 is displayed. (some software versions show the A/D steps)
Anal inp 4	The applied voltage of the analogue input 4 is displayed. (some software versions show the A/D steps)
↓	
Anal inp 20	The applied voltage of the analogue input 20 is displayed. (some software versions show the A/D steps)

Table 13

See also appendix column 3.2.9 / 3

3.2.9.4 Test displays

Parameter	Function
Display test	All digits of all the displays and all LEDS are lit up at the same time for testing.

Table 14

3.2.9.5 Test keyboard

Parameter	Function
Test keyboard	When a push button is pushed, its function is shown on the alphanumeric display. By waiting 3 seconds after pushing all the buttons, this menu can be left.

Table 15

3.2.10 Input configuration

3.2.10.1 Analogue calibration

Parameter	Function	Default	Min	Max
P offset	Setting the offset of the pressure sensor. Sensor trimming must be done when the machine is completely depressurized. .	- - -	-100 AD steps	+100 AD steps
P range	Configuring the pressure sensor range.	13.8bar 200PSI	5Bar 72PSI	17,5Bar 254PSI
T out	Outlet temperature offset setting. (Trimming the sensor compared with the real measured temp.).	- - -	-10°C	+10°C
T air	Air temperature offset setting. (Trimming the sensor compared with the real measured temp.).	- - -	-10°C	+10°C
T oil	Oil temperature offset setting. (Trimming the sensor compared with the real measured temp.).	- - -	-10°C	+10°C

Table 16

3.2.10.2 Analogue configuration

Parameter	Function	Default	Selectable setting
Anal in 1	Selecting the input signal	4-20mA	0-20mA, 0-5V, 4-20mA, 1-5V, 1-6V, 5-55V
Anal in 2	Selecting the input signal	KTY10	The following measurement probes can be selected : KTY10, TD2A, LM135 and KTY83
Anal in 3	Selecting the input signal	Off (=disabled)	The following measurement probes can be selected : KTY10, TD2A, LM135 and KTY83
Anal in 4	Selecting the input signal	Off (=disabled)	The following measurement probes can be selected : KTY10, TD2A, LM135 and KTY83
↓			
Anal in 20	Selecting the input signal	Off (=disabled)	The following measurement probes can be selected : KTY10, TD2A, LM135 and KTY83

Table 17

Note: Apart from setting a software parameter in this menu, hardware jumpers have to be set as well according to the selected input signal. A detailed description regarding the jumper settings is given in paragraph 5.6 on page 24. See also appendix column 3.2.10 / 2

3.2.10.3 Digital configuration

Parameter	Function	Default	Min	Max
Dig input 1	Changing the configuration of input 1	NC	NC	NO
Dig input 2	Changing the configuration of input 2	NC	NC	NO
Dig input 3	Changing the configuration of input 3	NO	NC	NO
Dig input 4	Changing the configuration of input 4	NO	NC	NO
Dig input 5	Changing the configuration of input 5	NC	NC	NO
Dig input 6	Changing the configuration of input 6	NC	NC	NO
Dig input 7	Changing the configuration of input 7	NC	NC	NO
Dig input 8	Changing the configuration of input 8	NC	NC	NO

Table 18

Note: NO = Normal open, NC = Normal closed
See also appendix column 3.2.10 / 2

3.3 Additional software features

3.3.1 Micro interruption of the power supply

Function	Default setting
The Aircon L1 is standard equipped with a device that detects a micro interruption of the power supply. Every zero crossing of the 24VAC mains is detected. When 2 consecutive cycles or a power failure of 40ms is detected, the controller will automatically stop the machine. At the same time, all relays are released and 3 horizontal dashes are displayed on the LED display. By stopping the machine during a micro interruption of the power supply, sparks on the relay contacts are avoided which will extend the relay lifetime.	40ms

Table 19

3.4 Menu structure – quick reference

Basic menu	Date & time
	Ready to start
	Standby
	Starting
	OnLoad
	OFFloaded
	Stopping (soft stop)
	Blowing down
	Warning and alarms

Warning and alarms
High pressure
High temperature
Air filter blocked
Reversed phases
Motor overload
Motor over temperature
Fan motor overload
Power failure
etc.

Error log menu	Logged error Nr. 1: error type + date & time
	Logged error Nr. 2: error type + date & time
	Logged error Nr. 3: error type + date & time
	Logged error Nr. 4: error type + date & time
	Logged error Nr. 5: error type + date & time
	Logged error Nr. 6: error type + date & time
	Logged error Nr. 7: error type + date & time
	Logged error Nr. 8: error type + date & time
	Logged error Nr. 9: error type + date & time
	Logged error Nr. 10: error type + date & time

Timer menu	Loaded hours
	Running hours
	Remaining hours to air filter change
	Remaining hours to oil filter change
	Remaining hours to inner service
	Remaining hours to oil change

Operational settings	Pressure control : AUT/CNT
	Pressure unload level
	Pressure load level
	Run on timer
	Pressure schedule ON / OFF
	Pressure schedule ON / OFF
	Drain spit time : sec.
	Drain dwell time : sec.

Pressure schedule ON / OFF
Current time & date set-up
Pressure 1 + time & date 1
Pressure 2 + time & date 2
Pressure 3 + time & date 3
Pressure 4 + time & date 4
etc. (up to 32)

Main selection	**Machine configuration**	Entry code = 11
All password protected	Auto start OFF / ON.	

Start control LOCAL / REMOTE
Pressure control LOCAL / REMOTE
Machine number (for RS485)
Pressure in BAR or PSI
Temperature in C or F
Language

Service settings
Remaining hours to air filter change
Remaining hours to oil filter change
Remaining hours to inner service
Remaining hours to oil change

Entry code = 12

Diagnostics
Test digital inputs
Test digital outputs
Test analogue inputs
Display test
Keyboard test

Entry code = 13

Digital output test
Digital input test
Analogue input test

Input configuration
Analogue calibration
Analogue configuration
Digital configuration

4 Hardware

4.1 Analogue inputs

Each input is selectable for:

- Current: 4...20 mA; 10-bit resolution, mostly used for pressure reading.
- Resistance: KTY for temperature control: +/- 3 ° C
- 0 … 5 Volt
- 0 … 6 Volt

4.2 Direct digital inputs

8 digital inputs for voltage free contacts.

4.3 Digital outputs

5 Relays, contact 250 VAC, 8 A.

4.4 Analogue outputs

The PWM (pulse width modulation) outputs can also be used to activate 3 external relays.

- Voltage output: 20VDC +/-10%
- Current: 150mA
- Frequency range: 91.9 – 11600Hz
- Pulse width: 43µs

(See also item 6 Technical specifications on page 28)

4.5 Power supply

24 VAC via transformer, +/- 20 %.

4.6 User interface

- Two 3 digit LCD displays
- One alpha-numerical display with 2 lines of 16 characters
- 8 indication LED's mounted at pre-determined locations.
- Tactile keypad with 8 push buttons (can be custom made)

4.7 Housing

Compact size, stainless steel cabinet. (IP65 at front side, IP 54 at backside)

4.8 Connectors

Plugable and screwable PHOENIX compatible connectors.

4.9 Processor and memory

- 8 bit micro controller 80C552
- 64 kByte to 256 kByte program memory
- EEPROM: 256 byte or 2 kByte
- 32 kByte of RAM memory.

4.10 Data communications

One RS485 data communication line

5 Installation and connections

5.1 General installation prescriptions

5.1.1 Safety

The unit complies with "class I equipment" in which protection against electric shocks relies on accessible conductive parts that are connected to the protective earthing-conductor in the fixed wiring of the installation, in such a way that they can not become live in the event of a failure of the basic insulation.

If the Aircon L1 is not earthed and the Aircon L1 relays are used to switch circuits with voltage of 42.4V peak and more, electrocution of people could happen.

If one of the circuits connected with the Aircon L1 have voltages of 42.2V peak or more, the unit is classified as "class III equipment". Although in this situation safety earth is not needed, it is still necessary to earth the unit to fulfil the electromagnetic compatibility demands.

The housing must be earthed at all times

Designing the Aircon L1, regulated distances between live parts and accessible parts are taken into account. We only guarantee this safety regulation when the unit is assembled by a qualified employee of C.M.C..

C.M.C. disclaims any warranty in a case an unauthorized person has opened the module.

5.1.2 Electromagnetic compatibility

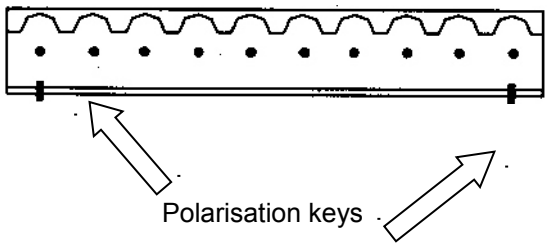
The housing is an important part of the protection of the electronics against electromagnetic interference. Also the radiation of the electromagnetic energy is shielded by the housing. Therefore it is necessary to earth the housing with a very short wire to the nearest earth metal part. C.M.C. advises a maximum length of 20cm.

Keep the earth-wire as short as possible and do not tie it with other wires.

The electromagnetic compatibility of the unit can not be guaranteed when the unit is opened.

5.1.3 Connectors

To be sure the cable connectors can not be plugged in twisted, the PCB connectors must be equipped with polarisation keys.



5.2 Power supply

The power supply connector is indicated on the back cover with X03.
The Aircon L1 requires a 24VAC / 25VA power supply.

Important note:
DO NOT GROUND THE 24VAC SECONDARY WINDING OF THE TRANSFORMER. DOING SO WILL CAUSE SEVERE DAMAGE !!! THE 24VAC SECONDARY WINDING DOES NOT NEED TO BE GROUNDED (See EN 60420-1 Safety of machinery part 1 general requirements – IEC 204-1:1992 modified.)

To make sure both the two-pins power supply connector X03 and the two-pins communication connector X06 can not be interchanged. The supply cable connector must be equipped with two polarization keys as shown below.

Polarization keys for Phoenix-like cable connectors

The interchanging of the supply and communication connectors will severely damage the unit. Therefore the use of polarization keys is compulsory

5.3 Fusing

2 fuses of 1.6A slow must be used for protection of the secondary winding of the transformer and they must be able to withstand 20A rms during at least 10ms.

The Aircon L1 is equipped with 2 fuses of 3A slow (3AT). In case of repair, use only original (similar) fuses.

5.4 Digital inputs

The connector of the digital inputs is indicated on the back cover with X01

Digital input	Pin	Function	Default	Fault action
	1	20VDC internal power supply for the digital inputs		
Input 1	2	Emergency stop	N.C.	Shutdown
Input 2	3	Water flow	N.C.	Shutdown
Input 3	4	External Load / Unload	N.O.	---
Input 4	5	Fault delta	N.O.	Shutdown
Input 5	6	Th water pump	N.C.	Shutdown
Input 6	7	Accessories	N.C.	Shutdown
Input 7	8	Dew point	N.C.	Shutdown
Input 8	9	Main motor winding temperature	N.C.	Shutdown

Table 20

The Aircon L1 can be put on and off load remotely through the RS485 communication port (e.g. trough ENERCON).

5.5 Analogue inputs

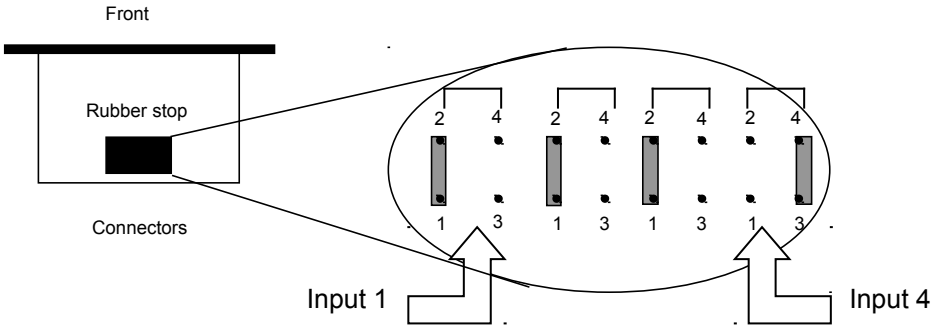
The connector of the analogue inputs is indicated on the back cover with X02

Analogue input	Pin	Function	Signal
	1	20VDC internal power supply for the 4-20mA inputs	
Input 1	2	System pressure measurement – 40 bar	4-20mA
Input 2	3	Oil pressure	4-20mA
Input 3	4	Suction pressure	4-20mA
Input 4	5	Outlet temperature measurement (KTY10)	Resistance
	6	Analogue ground	

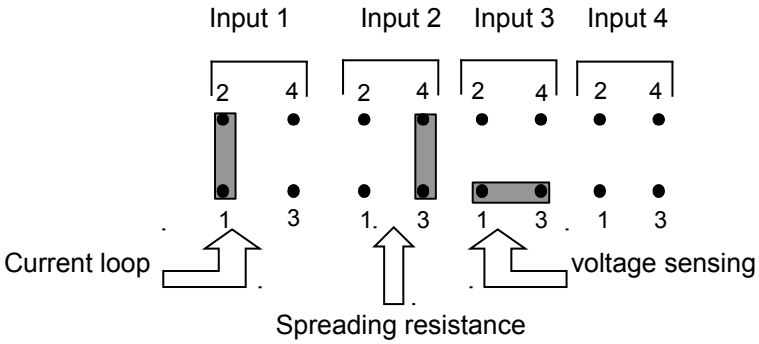
Table 21

Note: By changing the necessary software parameters (see Table 17 on page 16) and jumper setting (see below) the measurement probes can be modified. However enabling input 3 and 4 requires a software change by C.M.C as well as incorporating different measurement probes that are listed in Table 17 on 16 page. This must be especially requested.

For the standard Aircon L1 AFAP08 software the jumpers are placed as follows:



Jumper setting according to the selected input signal



Configuration is only allowed when no voltages are present on any connector. Otherwise the unit could be severely damaged.

The terminal beside the connector X02 of the analogue inputs can be used for connecting the shield of the sensor cable. Please note that it is not required to use a shielded cable for high quality sensors such as the C.M.C. pressure sensor (98CM08.00) and C.M.C.'s temperature sensors. Although using shielded cables is highly recommended for sensor that are not properly designed for industrial environments what makes them subjective to electromagnetic interference's.

Do not exceed the maximum voltage and current mentioned in the technical specification file.

5.6 Relay outputs

The connector of the relay outputs is indicated on the back cover with X08

Relay	Pin	Function
Relay 1	1-2	Line.
Relay 2	3-4	Star.
Relay 3	5-6	Delta.
Relay 4	7-8	Load / unload valve.
Relay 5	9-10	Alarm : the relay is not powered in case an error or fault occurs.
		Auxiliary circuit
Relay 6		EV 1+2
Relay 7		EV 2
Relay 8		Contactor water pump

Table 22

A VDR is placed parallel over the relay contact. So even with an open contact, the VDR is still able to let a small current flow. This current is too small to activate a load but it can harm people when the circuit is touched.

Do not exceed the maximum voltage and current mentioned in the technical specification file.

5.7 Electronic outputs

The connector of the electronic outputs is indicated on the back cover with X09

Output	Pin	Function	Signal
	1	20VDC internal power supply for the electronic outputs	
Open collector 1	2	Drain solenoid 1+2.	On-off
Open collector 2	3	Drain solenoid 2.	On-off
Open collector 3	4	Contactor water pump	On-off

Table 23

All electronic outputs have a clamping diode to protect the switching device from spikes generated by inductive loads. If the load is located at a greater distance (more that 50cm) the use of load with a build-in clamping diode is advised.

5.8 RS485 connection

The connector of the RS485 data communication is indicated on the back cover with X06

Com. line	Pin	Function
L1	1	Data communication line 1
L2	2	Data communication line 2

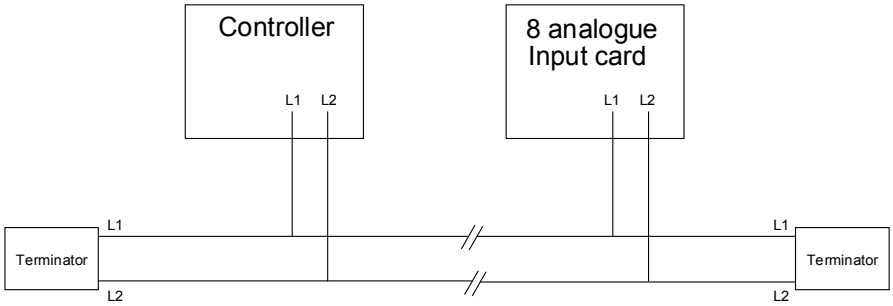
Table 24

See note on next page.

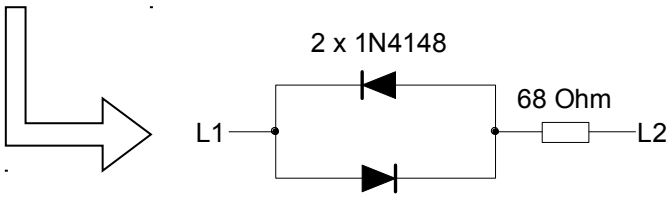
Note: do not forget to set the RS485 address (see item Machine configuration on page 11).

It is recommended to use a twisted pair shielded cable with a section of 0.5mm² for the RS485 network. Setting up the network is very simple by connecting all the devices in parallel. In an RS485 network it is very important to respect polarity. Please make sure that all the L1 and L2 terminals are connected in parallel. Do not make a cross connection: connecting an L1 terminal with a L2 terminal is not allowed!

The use of terminators is also recommended for a stable data communication especially for longer distances.



RS485 terminator



5.9 Extension

5.9.1 .

5.9.2 .

5.9.3 .

5.9.4 IIC / RS485 8 analogue input card

The 8 analogue input card is for those applications that require more analogue inputs than are provided by the controller itself. An IIC long line driver is plugged onto the back of the Aircon L1 to connect it to the first IIC extension board. All IIC extension boards are linked over a two-wire bus in a daisy chain loop. A total of 16 boards can be hooked up to the IIC bus system. If the IIC extension bus is already used for other purposes, a connection can be made between this card and the Aircon L1 by RS485.

By jumper placement on this card, the input signal can be determined:

- PT1000
- 4-20mA

The use of these external digital input cards greatly reduces the total wiring in the machine as the input cards can be mounted in the machine at remote locations.

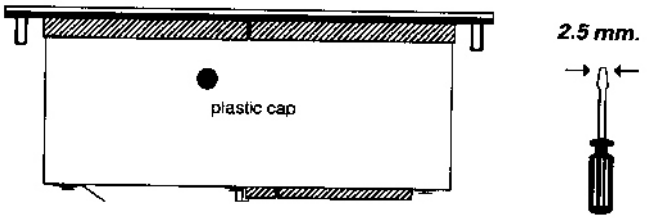
5.9.5 .

5.9.6 PWM to 3 relay conversion card

The 3-relay card is for those applications that require more relay outputs than are provided by the controller itself. By using this additional card the 3 PWM outputs are converted to 3 250V/8A relay contacts (for each relay 1 normal open and 1 normal closed contact).

5.10 Adjusting LCD contrast

The only possible adjustment is the view angle of the alphanumeric display. In the factory this angle is already adjusted to its best position. When another angle is wanted it can be changed by removing the black cap at the bottom of the unit. Just behind the aperture a 270 degrees potentiometer is located. Use a screwdriver with a 25mm blade or less to make the adjustment. Do not forget to replace the black cap.



5.11 Maintenance

The Aircon L1 does not need maintenance. When the front panel is dirty, it can be cleaned with a soft cloth drenched in soap water or methanol.

If the unit seems to be faulty, it can be repaired at C.M.C.. Before the unit is send back, check the cause of the failure by checking the wiring and even parameters.

If it is necessary to send the unit back, please note the following information on the rejection note:

- C.M.C. part number
- Serial number
- **Detailed fault description.**

This information is very helpful during the repair.

5.12 Wiring diagram

See addendum

6 Technical specifications

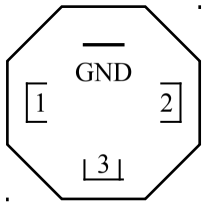
	According to	Min	Typical	Max
Power supply		18VAC	24VAC	29VAC
Internal power supply digital inputs		18VDC	20VDC	22VDC
Internal power supply analogue inputs		18VDC	20VDC	22VDC
Internal power supply electronic outputs		18VDC	20VDC	22VDC
			50mA**	150mA**
PWM outputs		18VDC	20VDC	22VDC
			50mA**	150mA**
Frequency		91.9Hz		11600Hz
Pulse width			43µs	
Internal power supply analogue inputs		0mA		20mA
		0V		6VDC
Relays				250V
				8A (cos phi =1)
Operating temperature	IEC 68-2-2B IEC 68-2-14 Na IEC 68-2-14 Nb IEC 68-2-3 Ca IEC 68-2-1 A	-10°C		+55°C
Storage temperature	IEC 68-2-1 A IEC 68-2-2 B	-25°C		+65°C
Rel. humidity at 40C at front side				95%
Rel. humidity at 40C at rear side				80%
Operating vibrations over 10 to 150Hz	IEC 68-2-6 IEC 68-2-29			2g
Transport vibrations over10 to 150Hz	IEC 68-2-6 IEC 68-2-29			10g
Bumps of 6ms				40g
Continuous electrostatic discharge	IEC 801-2 level 4			16kV
Electric field	IEC 801-3 level 3 Level 4*			10V/m 30V/m
Fast transients at supply	IEC 801-4 level 4			4kV
Surge at supply	IEC 801-5 level 5			3kV
Emission				CISPR 22class B

Table 25

*max. analogue deviation of 10%
**50mA in case 3 electronic outputs are used and 150mA in case only one electronic output is used

7 Appendix

3.2.1	3.2.2	3.2.3	3.2.4		3.2.5
Parameters display	**Defaults display**	**Counters display**	**operational param**	**Main menu**	**Machine config**
Oil pressure (Bar)	Default n°1	Working time (hours)	auto./cont. setting	Machine configuration	Starting auto./stop.
Suction pressure (Bar)	Default n°2	On load time (hours)	Set off load (40bar)	Factory parameters	Start control loc/ext rs485
1st stage Temp (°C)	Default n°3	Air filter (suction)	Set on load (39bar)	Maintenance param.	Press control loc/ext
2nd stage Temp (°C)	Default n°5	Oil filter	Off load delay (10')	Diagnose	Machine number (1,2,3,..)
3rd stage Temp (°C)	Default n°6	Segments	Timing for star/stop	Inputs configuration	Pressure unit (bar/psi)
Water temperature (°C)	Default n°6	Oil change	Time settings		Language FR N I D GB
Vertical cross T° (°C)	Default n°7		Electro-Valve purging 1&2: open (5'')		
Horizontal cross T° (°C)	Default n°8				
Ext. temperature (°C)	Default n°9		Electro-Valve purging 1&2: closed (30'')		
Ext. pressure (Bar)	Default n°10				



Temp 1 and 2

Y10 ⇒ 1630Ω at 0°C (e.g.: 1922Ω at 20°C)T1, T2, T3, TE, TC… PT1000 ⇒ 1000Ω at 0°C (e.g.: 1078Ω at 20°C)Pressure 1 and 3 … 4-20mA P air : 50 Bar and P oil : 10 Bar

3.2.7 Factory settings	3.2.8 Maintenance parameters	3,2,9 / 1 Input digital test (read)	3,2,9 / 2 Output digital test (read & set)
Start Y / D or soft start	Air filter (0...2000H)	Dig input 1 (X01 C1) Emerg stop	Dig output 1 (X08-1 1&2) Line
Pre-start 0" (0…240)	Oil filter (0...2000H)	Dig input 2 (X01 C2) Water flow	Dig output 2 (X08-2 3&4) Star
Service pressure 41 bar (8,7…42)	Segments (0...2000H)	Dig input 3 (X01 C3) Load / Unload	Dig output 3 (X08-3 5&6) Delta
Overload pressure 42 bar(8,7…42)	Oil change (0...2000H)	Dig input 4 (X01 C4) Delta return	Dig output 4 (X08-4 7&8) Reg EV
Oil min. pressure 1,5 bar (0…10)		Dig input 5 (X01 C5) Water pump	Dig output 3 (X08-4 9&10) OK
Oil pressure delay 10'' (0…120)		Dig input 6 (X01 C6) Device default	Dig output 6 (X02-P1) Purging 1&2
Input min. pressure 6 bar (6…11)		Dig input 7 (X01 C7) Dew point	Dig output 7 (X02-P2) Purging 2
Final max. Temp. 50°C (0…100)		Dig input 8 (X01 C8) Th motor	Dig output 8 (X02-P3) Water Pump
1st max. Temp. 225°C (0…240)			
2nd max. Temp. 225°C (0…240)			
3rd max. Temp. 180°C (0…240)			
Water max. Temp 75°C (-2…80)			
H. cross. Max. Temp 80°C (5…80)			
V. cross. Max. Temp 80°C (5…80)			
Dryer delay 1'' (0…10)			
Start / hour max. 4 (0…30)			
Y / D start delay 6" (3…60)	Water pump delay 5' (1…60)		
Y / D start return 40ms (10…100)	Decelerating delay 10" (2…60)		
Purging delay 2'' (0…10)	On load time : 0		
Accelerating delay 15'' (2…60)	Working time : 0		
Releaser min. delay 2'' (0…60)	Error log clear		
Stop delay 3" (1…60)	Re-programming		

3.2.9 / 3 Analog input test (read)	3.2.9 / 4 Display test	3.2.10 / 2 Analog configuration	3.2.10 / 3 Digital configuration (X02)
Input 1 (X02 A1) End pressure	Reading	Input 1 (X02 A1) 4…20 mA	Digital input C1 Emerg stop NC
Input 2 (X02 A2) Oil pressure		Input 2 (X02 A2) 4…20 mA	Digital input C2 Water flow NC
Input 3 (X02 A3) Suction press.	**3.2.9 / 5**	Input 3 (X02 A3) 4…20 mA (off)	Digital input C3 Load / unload NO
Input 4 (X02 A4) End temp.	**Keyboard test**	Input 4 (X02 A4) KTY10	Digital input C4 Delta return NO
Input 5 (X06 A1) 1st stage temp.		Input 5 (X06 A1) PT1000	Digital input C5 Pump default NC
Input 6 (X06 A2) 2nd stage temp	**3.2.10 / 1**	Input 6 (X06 A2) PT1000	Digital input C6 OK NC
Input 7 (X06 A3) 3rd stage temp	**Input configuration**	Input 7 (X06 A3) PT1000	Digital input C7 Dew point NC
Input 8 (X06 A4) Water temp.		Input 8 (X06 A4) PT1000	Digital input C8 Th motor NC
Input 9 (X05 A5) V cross temp.	Analog settings	Input 9 (X05 A5) PT1000	
Input 10 (X05 A6) H cross temp	Analog configuration	Input 10 (X05 A6) PT1000	
Input 11 (X05 A7) Spare temp.	Digital configuration	Input 11 (X05 A7) PT1000 (off)	
Input 12 (X05 A8) Spare press.		Input 12 (X05 A8) 4…20mA (off)	