

DAIKIN



CONTROL PANEL OPERATING MANUAL

WATER COOLED SCREW CHILLER
with software version 10.100 and later

Contents

This manual provides installation, setup and troubleshooting information for the control panel of the Chillers with Frame 4000 and 3200 screw compressor.

All operational descriptions contained in this manual refer to control software ver. 10.100 and subsequent revisions. Chiller operating characteristics and menu selections may be different from other versions of the control software. Contact Daikin Service for software update information.

Installation precautions

Warning

Electric shock hazard. Injury to personnel or damage to equipment may occur. This equipment must be properly grounded. Connections and service of the control panel must be performed only by personnel that are knowledgeable in the operation of the equipment being controlled.

Caution

Static sensitive components. A static discharge while handling electronic circuit boards can cause damage to the components. Discharge any static electrical charge by touching the bare metal inside the control panel before performing any service work. Never unplug any cables, circuit board terminal blocks, or power plugs while power is applied to the panel.

Temperature and humidity considerations

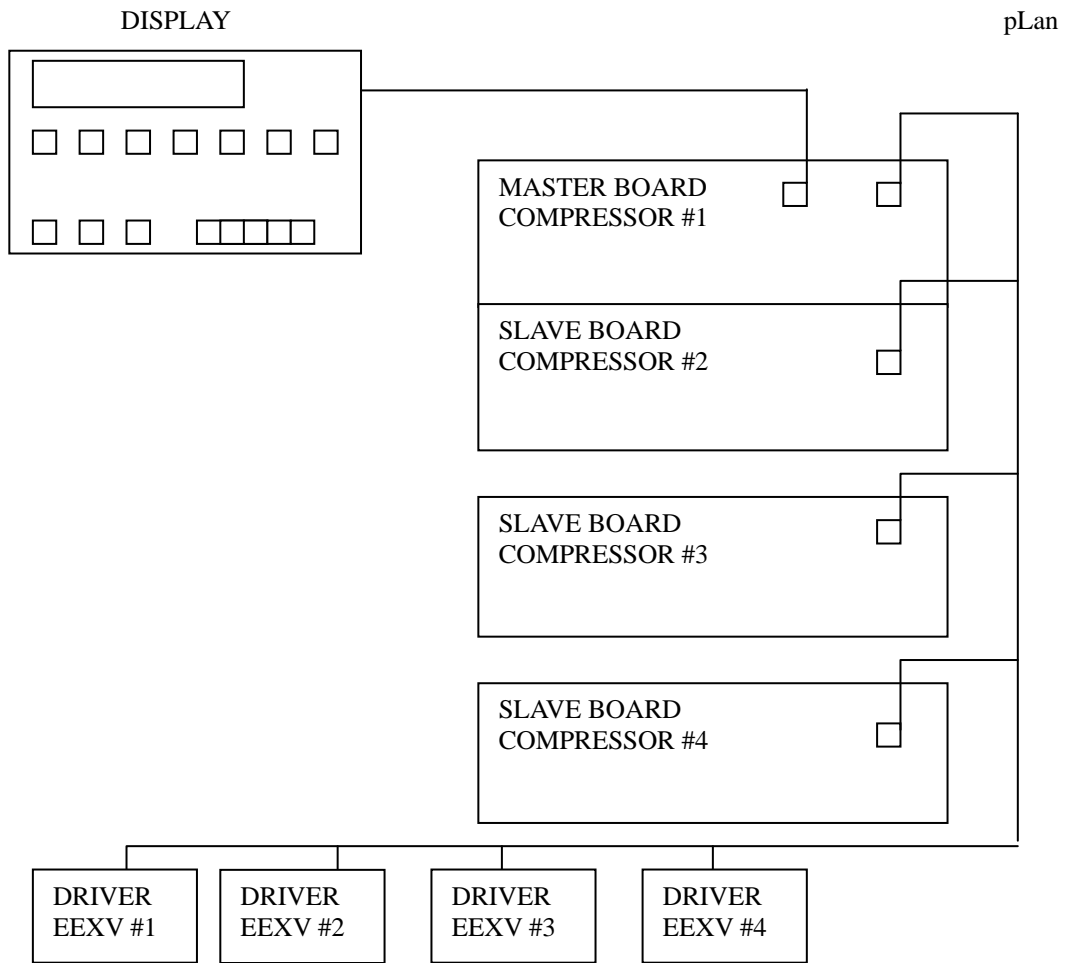
The controller is designed to operate within an ambient temperature range of -40°C to $+65^{\circ}\text{C}$ with a maximum relative humidity of 95% (non-condensing).

1. General description

The control panel contains a microprocessor based controller which provides all monitoring and control functions required for the safe, efficient operation of the Chiller. The operator can monitor all operating conditions by using the panel's built in 4-line by 20-character keypad/display or by using an IBM compatible computer running monitor software release 2.0 or later. In addition to providing all normal operating controls, the controller monitors all safety devices on the unit and takes corrective action if the chiller operates out of its normal design conditions. If a fault condition occurs, the controller will shut-down the system and activate an alarm output. The most important operating conditions at the time an alarm condition occurs are retained in the controller's memory to aid in troubleshooting and fault analysis.

The system is protected by a password scheme which only allows access by authorized personnel. A password must be entered into the panel keypad by the operator before any configuration can be altered.

LAN layout



MASTER BOARD COMPRESSOR #1	MASTER BOARD COMPRESSOR #1
SLAVE BOARD COMPRESSOR #1	SLAVE BOARD COMPRESSOR #1
DRIVER EEXV #1	DRIVER EEXV #1

2. Main features of control software

- Management of water-cooled chillers.
- Control of the outlet temperature of evaporator, condenser, or both.
- Control of leaving water within ± 0.1 °C (under stable load conditions).
- Management of sudden load drops of up to 50% with max 3°C controlled temperature oscillation.
- Readout of all the main operating parameters of the unit (temperatures, pressures, etc.).
- Automatic control of primary evaporator and condenser pumps.
- Control of up to 4 steps of cooling tower plus regulation bypass valve with a proportional 0-10 Vdc signal.
- Dual setpoint through local or remote change-over switch. This function allows switching of the local setpoint between two preset values.
- Setpoint override using an external (4-20 mA) signal –either outside ambient temperature or evaporator return temperature.
- Adjustable Max Pull-Down rate reduces under-shoot during low demand in the control loop.
- Hot-water start feature allows the unit to start smoothly even under high temperature condition of evaporator water.
- SoftLoad feature reduces electrical consumption and peak demand charges during loop low demand.
- Power-limiting feature reduces the electrical consumption of the unit by limiting either current (current limit) or capacity demand (demand limit).
- Fan Quiet Mode feature helps reduce noise by limiting the speed of the fans in accordance with a time schedule
- Panel-mounted 15-key keypad for quick interfacing. The operator can log the chiller operating conditions on the 4-line by 20-column backlit display.
- Four levels of security protection against unauthorized changes.
- Compressor diagnostic system that includes logging of the last ten alarms and information on date, time and current operating conditions at the time the alarm was activated.
- Weekly and yearly start-stop time schedule.
- Ambient Lockout feature allows the unit shutdown based on outside ambient temperature.
- Easy integration into building automation systems via separate 4-20 mA signals for chilled water temperature setpoint and limitation of demand.
- Communication capabilities for remote monitoring, changing of setpoint, trend logging, alarm and event detection, via compatible IBM-PC running monitoring software 2.0 or later.
- BMS communication capability via Modbus, LonWork, Johnson Metasys.
- Remote communication capabilities via modem (up to 8 chillers with Gateway Modem).
- Remote communication capabilities via GSM Modem.

3. Components description

3.1 Control Panel

The Control Panel consists of a 4-line by 20-character backlit display and a 15-key keypad whose functions are described below.

Figure 1. Control panel - front view

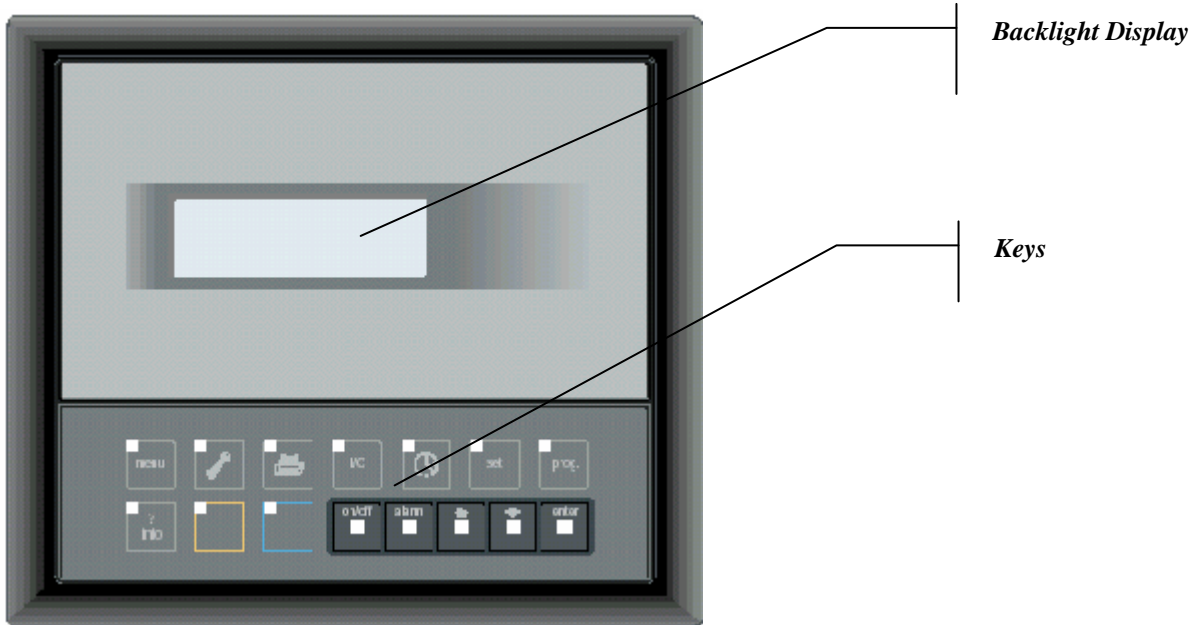
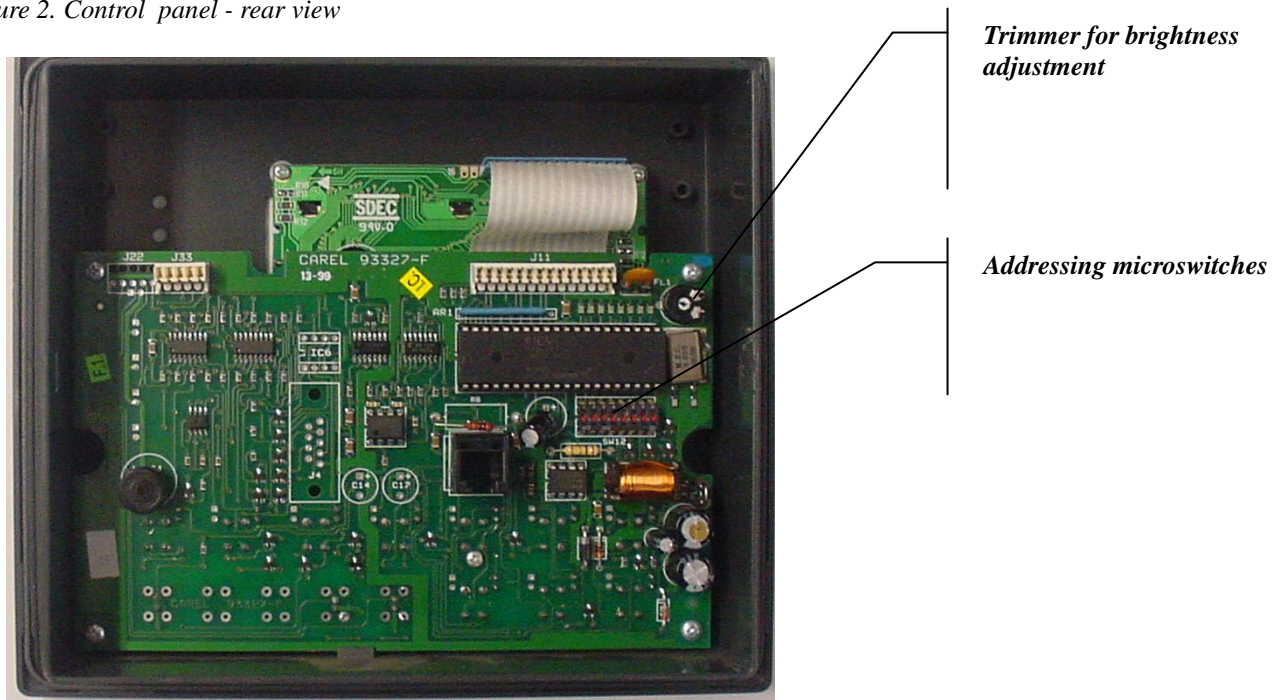


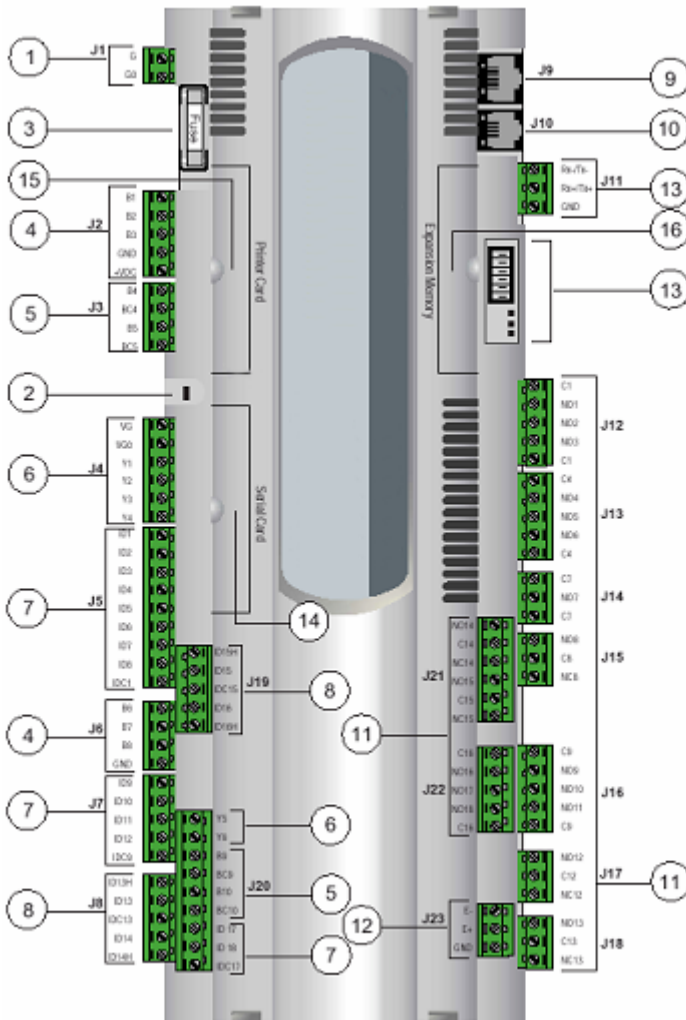
Figure 2. Control panel - rear view



3.2 Main board

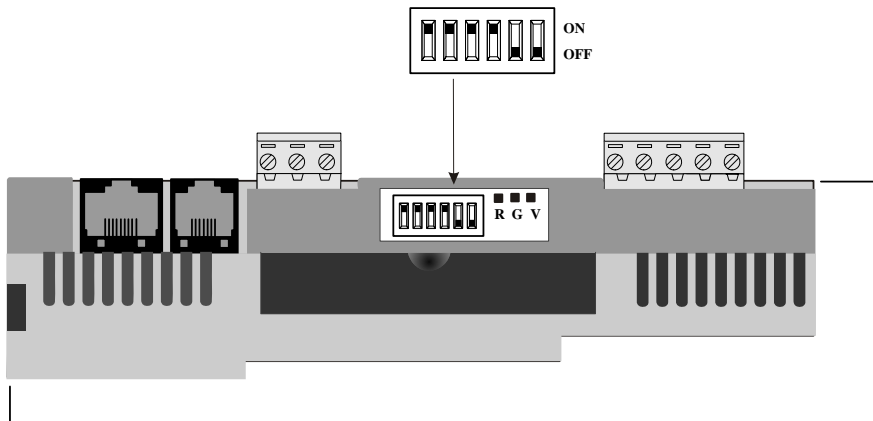
The control board contains the hardware and the software necessary to monitor and to control the unit.

Figure 3. Main board



1. Power supply G (+), G0 (-)
2. Status LED
3. Fuse 250Vac
4. Universal analogue inputs (NTC, 0/1V, 0/10V, 0/20mA, 4/20mA)
5. Passive analogue inputs (NTC, PT1000, On-Off)
6. Analogue outputs 0/10V
7. 24Vac/Vdc digital input
8. 230Vac or 24Vac/Vdc digital inputs
9. Synoptic terminal connection
10. Standard terminal (and program download) connector
11. Digital Outputs (relays)
12. Expansion board connection
13. pLAN connection and microswitches
14. Serial card connection
15. Printer card connection
16. Memory expansion connection

Figure 4. pLAN addressing microswitches



3.3 EEXV valve driver

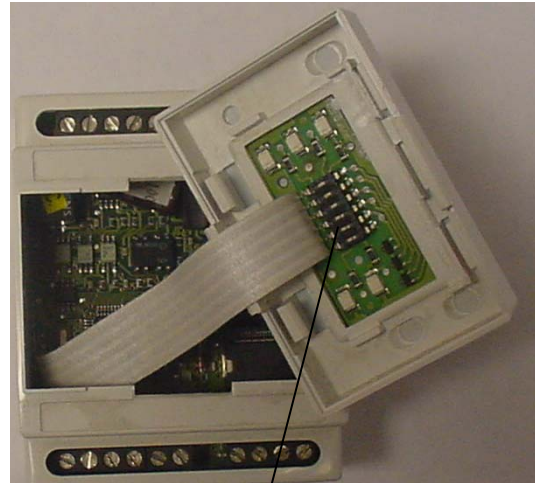
The valve drivers contain the software for the control of the electronic expansion valve and are connected to the battery group which provides power to close valve in case of power failure.

Figure 5. Driver



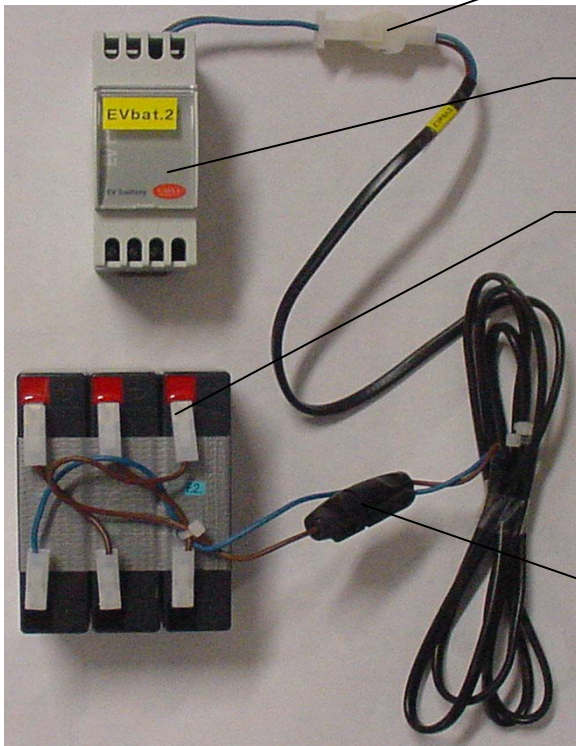
Status Led

Figure 6. Inside of driver



Addressing microswitches

Figure 7. Battery assembly



Plug In

Battery charger

Chargeable battery

10 Amp fuse

3.4 Meaning of the EEXV Driver status LEDs

Under normal conditions, five (5) LEDs indicate:

- POWER: (yellow) remains On in presence of supply. Remains Off in case of battery operation
- OPEN: (green) Flashing during the valve opening. On when valve is fully open.
- CLOSE: (green) Flashing during the valve opening. On when valve is fully close.
- Alarm: (red) On or flashing in case of hardware alarm
- pLAN: (green) On during the normal working of pLAN.

In the event of a critical alarm, the nature of the alarm can be identified by observing the status of the LEDs as shown below. Highest priority is level 7. When more than one alarm occur, only the one with the highest priority level is shown.

Alarms that will shutdown the system	PRIORITY	LED "OPEN"	LED "CLOSE"	LED "POWER"	LED "ALARM"
Eprom reading error	7	Off	Off	<i>On</i>	<i>Flashing</i>
Valve remains open on power failure	6	Flashing	Flashing	<i>On</i>	<i>Flashing</i>
At start up, wait for battery loading (parameter.....)	5	Off	On	<i>Flashing</i>	<i>Flashing</i>
Other alarms	PRIORITY	LED "OPEN"	LED "CLOSE"	LED "POWER"	LED "ALARM"
Motor connection failure	4	Flashing	Flashing	<i>On</i>	<i>On</i>
Sensor/input error	3	Off	Flashing	<i>On</i>	<i>On</i>
Eeprom writing error	2	-	-	<i>On</i>	<i>On</i>
Battery error	1	-	-	<i>Flashing</i>	<i>On</i>
pLAN		LED pLAN			
Connection OK		On			
Driver connection or address error = 0		Off			
The Pco Master doesn't answer		Flashing			

3.5 Addressing of pLAN

To get the correct functionality of the pLAN net system, it is necessary to address correctly all the installed components. Each component has a number of microswitches that must be set as specified in the following table.

pLAN component	Microswitches					
	1	2	3	4	5	6
Local DISPLAY	OFF	OFF	OFF	OFF	ON	OFF
Remote DISPLAY (if available)	ON	OFF	OFF	OFF	ON	OFF
COMP. BOARD #1	ON	OFF	OFF	OFF	OFF	OFF
COMP. BOARD #2	OFF	ON	OFF	OFF	OFF	OFF
COMP. BOARD #3	ON	ON	OFF	OFF	OFF	OFF
COMP. BOARD #4	OFF	OFF	ON	OFF	OFF	OFF
DRIVER EXV #1	ON	OFF	ON	OFF	OFF	OFF
DRIVER EXV #2	ON	ON	ON	OFF	OFF	OFF
DRIVER EXV #3	ON	OFF	OFF	ON	OFF	OFF
DRIVER EXV #4	ON	ON	OFF	ON	OFF	OFF

4. Controller Input/Output

The software refers to the configuration of the input and output channels of the controller as shown below.

4.1 Air-cooled chillers (Unit config. 00)

Digital inputs

N	COMPRESSOR 1	COMPRESSOR 2	COMPRESSOR 3	COMPRESSOR 4
1	Compressor On/Off	Compressor On/Off	Compressor On/Off	Compressor On/Off
2	Evaporator flow switch			
3	Unit On/Off			
4	High discharge temperature	High discharge temperature	High discharge temperature	High discharge temperature
5	Low pressure switch	Low pressure switch	Low pressure switch	Low pressure switch
6	External alarm			
7	Phase monitor (unit or comp. #1)	Comp. #2 phase monitor	Comp. #3 phase monitor	Comp. #4 phase monitor
8	Enable double setpoint			
9				
10	Failed transition start	Failed transition start	Failed transition start	Failed transition start
11	High pressure switch	High pressure switch	High pressure switch	High pressure switch
12	Compressor overload	Compressor overload	Compressor overload	Compressor overload

Analogue inputs

N	COMPRESSOR 1	COMPRESSOR 2	COMPRESSOR 3	COMPRESSOR 4
1	Evaporator inlet water temperature			
2	Evaporator water outlet temperature (or common evap outlet temp for units with 2 evaporators)	Evaporator 1 water outlet temperature		Evaporator 2 water outlet temperature (for units with 2 evaporators)
3	Setpoint change	Demand limit		
4	Compressor discharge temperature	Compressor discharge temperature	Compressor discharge temperature	Compressor discharge temperature
5	Outside ambient temperature			
6	Compressor load	Compressor load	Compressor load	Compressor load
7	Condensation pressure	Condensation pressure	Condensation pressure	Condensation pressure
8	Oil pressure	Oil pressure	Oil pressure	Oil pressure

Digital outputs

N	COMPRESSOR 1	COMPRESSOR 2	COMPRESSOR 3	COMPRESSOR 4
1	Evaporator pump			
2	Compressor start	Compressor start	Compressor start	Compressor start
3	Fourth step fan	Fourth step fan	Fourth step fan	Fourth step fan
4	Fifth step fan	Fifth step fan	Fifth step fan	Fifth step fan
5	Liquid line	Liquid line	Liquid line	Liquid line
6	Compressor load	Compressor load	Compressor load	Compressor load
7	<i>Compressor unload</i>	<i>Compressor unload</i>	<i>Compressor unload</i>	<i>Compressor unload</i>
8	Third step fan	Third step fan	Third step fan	Third step fan
9	<i>Liquid injection</i>	<i>Liquid injection</i>	<i>Liquid injection</i>	<i>Liquid injection</i>
10	Antifreeze heater			
11	Compressor #1 and Unit alarm	Compressor #2 alarm	Compressor #3 alarm	Compressor #4 alarm
12	First step fan	First step fan	First step fan	First step fan
13	Second step fan	Second step fan	Second step fan	Second step fan

Analogue outputs

N	COMPRESSOR 1	COMPRESSOR 2	COMPRESSOR 3	COMPRESSOR 4
1	Fan speed control output	Fan speed control output	Fan speed control output	Fan speed control output
2	2 nd Fan speed control output	2 nd Fan speed control output	2 nd Fan speed control output	2 nd Fan speed control output

4.2 Water-cooled heat pump or pursuit (Unit config. 01 or 02)

Digital inputs

N	COMPRESSOR 1	COMPRESSOR 2	COMPRESSOR 3	COMPRESSOR 4
1	Local On/Off	Local On/Off	Local On/Off	Local On/Off
2	Evaporator flow switch			
3	Remote On/Off			
4	High discharge temperature	High discharge temperature	High discharge temperature	High discharge temperature
5	Low pressure switch	Low pressure switch	Low pressure switch	Low pressure switch
6	External alarm			
7	Phase monitor (unit or comp. #1)	Comp. #2 phase monitor	Comp. #3 phase monitor	Comp. #4 phase monitor
8	Enable double setpoint			
9	Cooling/heating switch			
10	Failed transition start	Failed transition start	Failed transition start	Failed transition start
11	High pressure switch	High pressure switch	High pressure switch	High pressure switch
12	Compressor overload	Compressor overload	Compressor overload	Compressor overload

Analogue inputs

N	COMPRESSOR 1	COMPRESSOR 2	COMPRESSOR 3	COMPRESSOR 4
1	Evaporator inlet water temperature			
2	Evaporator water outlet temperature (or common evap outlet temp for units with 2 evaporators)	Evaporator 1 water outlet temperature		Evaporator 2 water outlet temperature (for units with 2 evaporators)
3	Setpoint change	Limitation of unit load		
4	Compressor discharge temperature	Compressor discharge temperature	Compressor discharge temperature	Compressor discharge temperature
5	Cooling return water temperature			
6	Compressor load	Compressor load	Compressor load	Compressor load
7	Condensation pressure	Condensation pressure	Condensation pressure	Condensation pressure
8	Oil pressure	Oil pressure	Oil pressure	Oil pressure

Digital outputs

N	COMPRESSOR 1	COMPRESSOR 2	COMPRESSOR 3	COMPRESSOR 4
1	Evaporator pump			
2	Compressor start	Compressor start	Compressor start	Compressor start
3	4th Cooling tower step	4th Cooling tower step	4th Cooling tower step	4th Cooling tower step
4	Condenser pump			
5	Liquid line	Liquid line	Liquid line	Liquid line
6	Compressor load	Compressor load	Compressor load	Compressor load
7	Compressor unload	Compressor unload	Compressor unload	Compressor unload
8	3rd Cooling tower step	3rd Cooling tower step	3rd Cooling tower step	3rd Cooling tower step
9	Liquid injection	Liquid injection	Liquid injection	Liquid injection
10	Antifreeze heater			
11	Compressor #1 and Unit alarm	Compressor #2 Unit alarm	Compressor #3 Unit alarm	Compressor #4 Unit alarm
12	1st Cooling tower step	1st Cooling tower step	1st Cooling tower step	1st Cooling tower step
13	2nd Cooling tower step	2nd Cooling tower step	2nd Cooling tower step	2nd Cooling tower step

Analogue outputs

N	COMPRESSOR 1	COMPRESSOR 2	COMPRESSOR 3	COMPRESSOR 4
1	Tower inverter output	Tower inverter output	Tower inverter output	Tower inverter output
2	Tower second inverter output	Tower second inverter output	Tower second inverter output	Tower second inverter output

4.3 Water-cooled chillers (Unit config. 03)

Digital inputs

N	COMPRESSOR 1	COMPRESSOR 2	COMPRESSOR 3	COMPRESSOR 4
1	Compressor On/Off	Compressor On/Off	Compressor On/Off	Compressor On/Off
2	Evaporator flow switch			
3	Unit On/Off			
4	High discharge temperature	High discharge temperature	High discharge temperature	High discharge temperature
5	Low pressure switch	Low pressure switch	Low pressure switch	Low pressure switch
6	External alarm			
7	Phase monitor (unit or comp. #1)	Comp. #2 phase monitor	Comp. #3 phase monitor	Comp. #4 phase monitor
8	Enable double setpoint			
9				
10	Comp. start failure	Comp. start failure	Comp. start failure	Comp. start failure
11	High pressure switch	High pressure switch	High pressure switch	High pressure switch
12	Compressor overload	Compressor overload	Compressor overload	Compressor overload

Analogue inputs

N	COMPRESSOR 1	COMPRESSOR 2	COMPRESSOR 3	COMPRESSOR 4
1	Evaporator inlet water temperature			
2	Evaporator water outlet temperature (or common evap outlet temp for units with 2 evaporators)	Evaporator outlet water temperature		
3	Setpoint change	Unit Limitation		
4	Compr. discharge temperature	Compr. discharge temperature	Compr. discharge temperature	Compr. discharge temperature
5	Condenser return water temperature			
6	Compressor load	Compressor load	Compressor load	Compressor load
7	Condensation pressure	Condensation pressure	Condensation pressure	Condensation pressure
8	Oil pressure	Oil pressure	Oil pressure	Oil pressure

Digital/analogue outputs

N	COMPRESSOR 1	COMPRESSOR 2	COMPRESSOR 3	COMPRESSOR 4
1	Evaporator pump			
2	Compressor start	Compressor start	Compressor start	Compressor start
3	Fourth step tower	Fourth step tower	Fourth step tower	Fourth step tower
4	Condenser pump			
5	Liquid solenoid valve	Liquid solenoid valve	Liquid solenoid valve	Liquid solenoid valve
6	Compressor load	Compressor load	Compressor load	Compressor load
7	Compressor unload	Compressor unload	Compressor unload	Compressor unload
8	Third tower step	Third tower step	Third tower step	Third tower step
9	Liquid injection	Liquid injection	Liquid injection	Liquid injection
10	Antifreeze heater			
11	Compressor #1 and Unit alarm	Compressor #2 alarm	Compressor #3 alarm	Compressor #4 alarm
12	First tower step	First tower step	First tower step	First tower step
13	Second tower step	Second tower step	Second tower step	Second tower step

Analogue outputs

N	COMPRESSOR 1	COMPRESSOR 2	COMPRESSOR 3	COMPRESSOR 4
1	Cooling tower inverter output	Cooling tower inverter output	Cooling tower inverter output	Cooling tower inverter output
2	Second cooling tower inverter output	Second cooling tower inverter output	Second cooling tower inverter output	Second cooling tower inverter output

5. Display and keypad

The display and the keypad are the main interfacing elements between operator and unit. Any operational conditions, alarms and setpoints can be monitored on the display, and any setpoint value can be modified through the keypad.

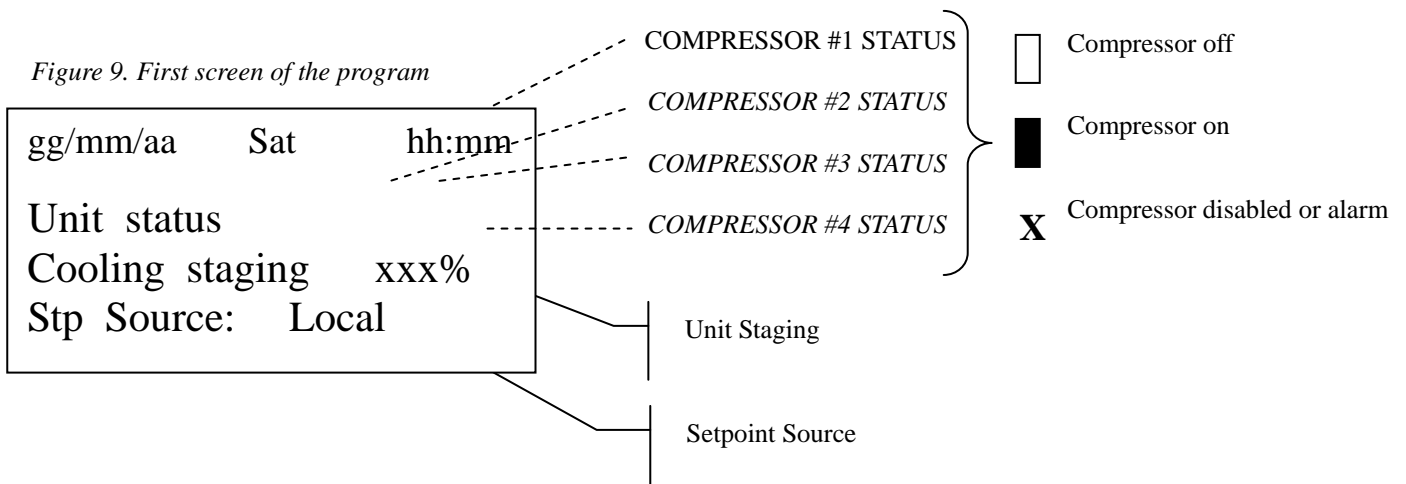
5.1 General description

The keypad has 15 keys for access to the operational conditions of the unit and to the functions of the program. The requested information is shown on the 4-line by 20-column backlit display.

Figure 8. Control panel

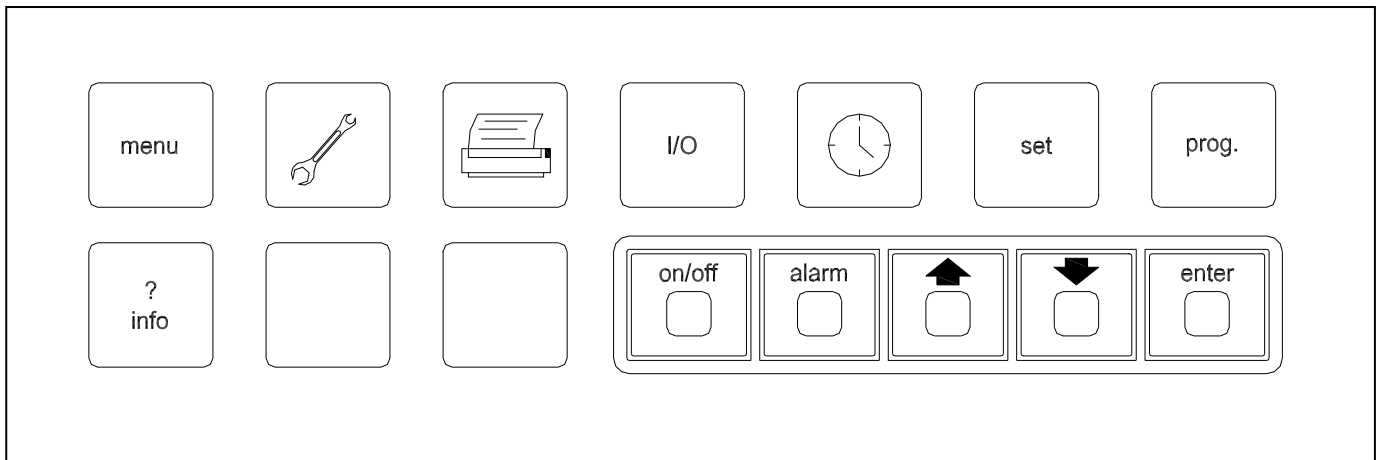


Figure 9. First screen of the program




5.2 Keypad keys and their functions


Figure 9. Keypad








- **prog:** by entering the user password, it is possible to set the following parameters:
 - Setpoint limits
 - Setpoint change parameters
 - Enable double setpoint
 - Regulation parameters
 - Start-up and shutdown parameters
 - SoftLoad parameters
 - Hot water start parameters
 - Ambient lockout parameters
 - Unit Limitation
 - Fan Quiet Mode parameters
 - Main pump timing
 - Enabling of digital and supervisory inputs
 - Time scheduling
- **set:** it allows to modify the setpoint value within the limits previously set up in the program

-  Date and time setting

- **I/O:** Input/output display and corresponding circuit functions

-  (=print): print (not available)

-  (=maint): by entering a password, it is possible to access the maintenance functions
- **menu**: it allows to view the main menu
- **info**: it allows to go from one board to another (showing the parameters of the corresponding compressor)
-  It allows to change over from chiller to heat pump (only if enabled)
-  It allows to change over from heat pump to chiller (only if enabled)
- **on/off**: unit On/Off key.
- **alarm**: It indicates the presence of possible malfunctions and their causes
-  (=up): It is used to return to previous screen
-  (=down) : It is used to shift to next screen
- **enter**: It confirms the set values

It is possible to access the different sections of program through the keypad. There are actually 9 screen categories as summarized in the table below, which includes the access keys for each screen along with a description of the category.

CATEGORY	DESCRIPTION	KEYS	PASSWORD
Main	Unit operational parameters (view only)	menu	NO
User	User parameters setting	prog	YES
Setting	Setpoint setting	set	NO
Input/Output	Compressors operational parameters (view only)	I/O	NO
Manufacturer	Manufacturer parameters setup	Menu+prog	YES
Maintenance	Access to maintenance parameters	maint	NO/YES
Maint auxiliary	Setting of auxiliary maintenance parameters	menu+maint	YES
Alarm	Alarms view	alarm	NO
Alarm buffer	10 recorded previous alarms	menu+ alarm	NO

The password remains valid for 10 minutes after last access.

5.3 Main menu

This section shows only the output parameters through subsequent screens (it is possible to shift from one screen to the next by using the arrow key):

- Current date, time and weekday, setpoint origin and unit load percentage, including the following information:
 - **Off Alarm**: unit shut down due to alarm condition
 - **Off Rem Comm**: unit switched off remotely (supervisor or BMS)
 - **Off Time Schedule** : unit off as per current time schedule
 - **Off Loc/Remote Sw**: unit off through switch
 - **Off Keypad**: unit switched off through the keypad on/off key
 - **Off Amb. LockOut**: unit Off on low ambient temperature (or tower return temperature)
 - **Waiting flow**: unit On waiting for evaporator water flow
 - **Waiting load**: unit On, but compressors not running because of low load requirements.
 - **No comps available**: unit On with no compressors available for automatic management (compressors switched OFF or in alarm condition or in manual mode)
- Unit limiting status (if enabled)

- Evaporator water inlet/outlet temperature (or common temperature for units with two evaporators)
- First and second evaporator outlet temperature (units with two evaporators)
- Condenser water outlet temperature (only water-cooled units in heat pump or pursuit mode)
- Load percentage status of the compressor, including following information:
 - **Off Alarm:** compressor shut down due to alarm condition
 - **Off Switch:** compressor switched off through the local switch
 - **Off Ready:** compressor off, ready to start
 - **Oil Heating:** compressor waiting for oil to warm up
 - **Manual Off:** compressor disabled through the keypad
 - **Recycle time:** compressor waiting for timing
 - **Starting:** compressor starting
 - **Pre-purge:** compressor unloading during start sequence
 - **Auto xx%:** automatic control of compressor and load percentage
 - **Manual xx%:** manual control of compressor and load percentage
 - **Downl.:** compressor download before stop
 - **Pumping down:** compressor pump down
- Suction and discharge pressure and saturated temperature.
- Suction temperature, suction and discharge superheat, expansion valve position
- Compressor status: off, standby, load or unload.

5.3 User menu

The user can define parameters in this section by entering a password and accessing the followings forms:

Item description	Default	U.m.
Cooling Temperature Setpoint Limits	4.0-10.0	°C
Heating Temperature Setpoint Limits (only water-cooled units in heat pump or pursuit mode)	40.0-50.0	°C
Setpoint change	NONE	
Cooling setpoint 4-20 mA override (if enabled) limits for evaporator leaving water	4.0-10.0	°C
Cooling setpoint 4-20 mA override limits (if enabled) for condenser outlet water (only water-cooled units in heat pump or pursuit mode)	40.0-50.0	°C
Setpoint override value (if enabled) when based on Outside Ambient Temperature		
Max Reset	3.0	°C
OAT for max override	27.0	°C
OAT for no override	35.0	°C
Setpoint override value (if enabled) based on evaporator water outlet temperature		
Evaporator DT for no override	3.0	°C
Max Setpoint diff.	3.0	°C
		°C
Enable double setpoint	N	
Regulation Band	3.0	°C
Dead band	0.2	°C
Max temp. reduction rate	1.2	°C/min
Start-up DT	2.6	°C
Shut-down DT	1.7	°C
SoftLoad enable	N	
Max Unit Load	50	%
Max Time	20	min
Limits for hot-water start		
Evaporator outlet temperature	25	°C
Max Unit Load	70	%
Outside ambient temperature lockout	N	
Ambient temperature setpoint	5.0	°C
Ambient temperature differential	1.0	°C
Unit Limitation	NONE	
Current limit (if enabled)		
Min current	0	A
Max current	400	A
Current limit	300	A
Delay time between main pump and compressor start	30	Sec
Delay for main pump switch off	180	Sec
Remote digital input on/off	Y	
Remote Supervisory On/Off:	N	
Enable Auto re-start after power failure	Y	
Switch off unit on external alarm	N	
Time scheduling		
Working time from Monday to Friday		
Working time for Saturday		

Working time for Sunday		
18 days for forced off		
Enter new password		

5.5 Setting Menu

In this section, it is possible to set and display the setpoint values:

- Cooling Setpoint (°C)
- Active setpoint (if the function “DOUBLE SETPOINT” or “RESET SETPOINT” or “AMBIENT COMPENSATION” is enabled)

5.6 Input/Output Menu (I/O Menu)

This section shows the following parameters:

- Software type, release
- Digital Input and Output status (C, O)
- Analogue Output value (Vdc)
- Inlet and outlet water temperature, ambient temperature
- Compressor discharge temperature and load
- Condensation and oil pressure
- Modem Status
- Controller Bios and Boot version and date
- SoftLoad Status
- EXV Firmware version

5.7 Manufacturer menu

This section allows setting all manufacturer data. A password is required for the operation. The parameters may only be modified by qualified persons.

Warning !

Incorrect setpoint or value can cause erratic chiller operation and damage to the chiller. Please use caution whenever setpoints or parameters are changed.

Unit Configuration	00 = Air-cooled Chiller 01 = Water/Water Heat Pump 02 = Water/Water Pursuit Chiller 03 = Water-cooled Chiller
Enable sensor (Master Board)	B1, B2, B4, B6, B7, B8
Enable sensor (Slave Board)	B4, B6, B7, B8
Discharge sensor type (B4)	PT1000
Phase monitor type	UNIT
PID parameter	
Integral time	200s
Derivative time	060s
Sampling time	030s
Compressor configuration	N. OF COMPRESSOR
Max number of pulses to load compressor	60
Max number of pulses to unload compressor	60
Min. time interval before a compressor is allowed to re-start	600 s
Min. time interval before any other compressor is allowed to start	120 s
Min running time for compressors	120 s
Min stop time for compressors	180 s
Interstage Timer	210 s
Double load/unload pulse for compressor load under	35%
Compressor unloading pulse time	<i>PULSE TIME</i> = 0.3 s <i>MIN. PULSE PERIOD</i> = 1 s

		<i>MAX. PULSE PERIOD = 10 s</i>
Compressor loading pulse time		<i>PULSE TIME = 0.3 s</i>
		<i>MIN. PULSE PERIOD = 20 s</i>
		<i>MAX. PULSE PERIOD = 90 s</i>
Pumpdown configuration		<i>ENABLE: YES</i>
		<i>MAX. TIME = 60 s</i>
		<i>MIN. PRESSURE = 0.5 bar</i>
High pressure stage hold		17.5 bar
High pressure stage down		18.5 bar
Low pressure stage hold		1.7 bar
Low pressure stage down		1.2 bar
Antifreeze prevention		
Setpoint		3,5°C
Diff.		1,0°C
Enable oil temperature control		Y
Enable evaporator flow alarm		YES (MASTER); NO (SLAVES)
Enable condenser flow alarm		YES (MASTER); NO (SLAVES)
<i>Evaporator flow alarm delay (if enabled)</i>		<i>START-UP DELAY = 20 s</i>
		<i>OPERATING DELAY = 5 s</i>
High discharge temperature setpoint		SETPOINT = 120 °C
		DIFFERENTIAL = 5 °C
High pressure alarm setpoint		SETPOINT = 20.5 bar
		DIFFERENTIAL = 05.0 bar
Low pressure alarm setpoint		SETPOINT = 01.0 bar
		DIFFERENTIAL = 00.5 bar
Low pressure alarm delay		START-UP DELAY = 120 s
		OPERATING DELAY = 60 s
Pressure ratio alarm setpoint	Min Load	1,4
	Pressure ratio alarm setpoint	Max Load
Pressure ratio alarm delay		START-UP DELAY = 180 s
		OPERATING DELAY = 90 s
Low oil pressure alarm delay		START-UP DELAY = 300 s
		OPERATING DELAY = 90 s
<i>High oil differential pressure delay</i>		20 sec
Max differential oil pressure		2.5 bar
Freeze protection		SETPOINT = 02.0 °C
		DIFFERENTIAL = 01.0 °C
Liquid injection		SETPOINT = 85,0 °C
		DIFFERENTIAL = 10,0 °C
Evaporator heater		SETPOINT = 3,0 °C
		DIFFERENTIAL = 1,0 °C
Supervisor configuration		PROTOCOL = CAREL
		COMMUNICATION SPEED = 19200
		IDENTIFICATION NUMBER = 001
Default parameter?		NO
<i>Modem connection password</i>		0152
<i>Password for driver configuration</i>		Reserved area

5.8 Maintenance menu

In this section, it is possible to set the maintenance parameters by accessing the following forms:

- Running time of evaporator pump/condenser pump
- Running time and number of compressor starts
- PID control status (only master)
- Correction of pressure and temperature sensors
- Correction of compressor running hours
- Correction of compressor starts
- Correction of compressor load sensor

By entering the maintenance password, it is possible to access the forms for maintenance parameters input.

5.9 Service Menu

Service parameters can be defined in this section by entering a password and accessing the followings forms:

- Compressor control (OFF/AUTO/MANUAL) and compressor load in manual mode
- Alarms reset
- SoftLoad reset
- Oil heating reset

5.10 Alarms Menu

When an alarm condition occurs, the display BUZZER sounds. By pressing the **alarm** key, the current fault is displayed. By pressing the **alarm** key twice, the buzzer is stopped, and by pressing it three times the alarm is cleared.

REMARK: Sometimes, after an alarm has occurred, it is possible that also a spurious alarm of star/delta transition failed occurs; in this case fix the earlier alarm first and, only if the spurious one occurs again, check the electrical connections. If the alarm is not cleared after pressing again the **alarm** key, it means that the fault conditions persists.

5.11 Buffer Alarm Menu

The last ten alarms of every chiller circuit are stored in this section.

Each form displays the date, the time and the description of the alarm. By pressing the **enter** key when an alarm description is displayed, the operating conditions at the time the alarm occurred (temperatures, pressures, expansion valve status and compressor load) are shown.

5.12 Alarm List

In the following table, the list of the possible alarms with the identifier number, the cause and the reset type (A = auto, M = manual) is shown

Alarm	Alarm cause	Reset
001	Phase monitor	M
002	Freeze alarm	M
005	Evaporator Flow alarm	M
006	Low pressure alarm	M
007	High discharge temperature switch	M
008	Fault transition	M
009	Low oil pressure	M
010	Low pressure switch	
011	High oil pressure difference	M
012	High pressure switch	M
016	Compressor overload	M
023	High pressure alarm	M
030	B1 sensor /input faulty or not connected	M
031	B2 sensor /input faulty or not connected	M
032	B3 sensor /input faulty or not connected	M
033	B4 sensor /input faulty or not connected	M
034	B5 sensor /input faulty or not connected	M
035	B6 sensor /input faulty or not connected	M
036	B7 sensor /input faulty or not connected	M
037	B8 sensor /input faulty or not connected	M
039	Evaporator pump maintenance	M

040	Condenser pump maintenance	Request of condenser pump maintenance	M
041	Compressor maintenance	Request of compressor maintenance	M
050	Unit 1 offline		A
051	Unit 2 offline		A
052	Unit 3 offline		A
053	Unit 4 offline		A
055	32K Clock Board Fault	Low charge, internal battery	A
D01	EXV Driver sensor /input fault		A
D02	EXV step motor error		A
D03	EXV Driver Eeprom error		M
D04	EXV Driver battery error		A
D08	EXV not closed during power off		M

6. Description of the compressor capacity control

Each screw compressor of the Frame 4 series, installs a sensor for the measurement of the compressor slide position. Such position data is sent to the controller through a 4-20 mA proportional signal. The controller uses this signal to control the logic of the refrigerated water system and the starting of the compressors. The minimum signal corresponds to 25% of the volume capacity of the compressor while the maximum signal corresponds to 100%.

This type of sensor guarantees a linear response of the signal according to the position of the capacitive pole and has no reset capabilities (see Figure a). To reset the slide position signal, it is necessary to access the software through the keypad.

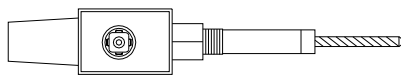


Figure (a)

6.1 Setting of the capacity transducer

Under the “**Service**” menu (protected by password) of the relevant compressor, once the request “adjustable sensor?” appears on the display, just select “N”.

After this, the request to introduce the type of the installed compressor appears. Verify the compressor model on the nameplate and input the information.

Once the compressor model information has been entered, the correction of the minimum and maximum values must be made. Unload the compressor completely as previously described and verify, by means of the I/O key, that the measured reference signal is 25%. If different from 25%, make the necessary adjustment of the measured value under the service menu password (the screen next to the compressors setup). The same procedure must be carried out once the compressor is loaded to 100%.

7. Water temperature Setpoint Reset

Among the controller’s options, there are also many possibilities to regulate the unit with particular logics or external signals.

One of the functions that engineers and technicians find most useful, is the possibility to modify the local control setpoint of the refrigerated water in accordance with the following logics:

1. **Dual setpoint:** Through an external contact (by customer), it is possible to change over the local setpoint of control between two well defined values. Such option results advantageously applicable in case of installation with ice bank. Such application normally requires a positive setpoint (e.g. 7°C) to be used in the daytime and a second negative setpoint (e.g. -5°C) for the night time. Obviously, in the case that the water temperature at the evaporator outlet is lower than 4°C, the correct amount of antifreeze must be added to the water system.
2. **From external signal:** By using an external 4-20mA signal, it is possible to modify the value of the local setpoint within predetermined minimum and maximum limits.
3. **From outside ambient temperature:** This function, which can be enabled under the "User" password, allows to modify the setpoint according to a defined external temperature range. A reduction of the external temperature causes an increase of the control setpoint. Such system allows to economise energy when the outside temperature drops under the design value.

4. **From evaporator water Delta T:** A reduction in the evaporator water Delta T -adjustable under "User" password- corresponds to an increase in the setpoint for refrigerated water temperature control. Such control logic allows electric energy savings when the unit works at partial load.

8. Unit Limitation

This function is useful in all those situations where a reduction in the electric consumption of the unit is necessary during certain hours of the day.

It is possible to limit the power consumption of the unit by using any of the two options available under "User" password.

The first way, called "Demand limit" requires a 4-20mA external signal; the unit max load decreases from 100% to 0% as the input increase from 4mA to 20mA. Inputs lower than 4mA have no effect on the unit.

The second way, called "Current limit" requires a direct measurement of the current absorbed by the unit and the setting of the maximum current to be absorbed (optional).

9. Soft load

This function, which can be accessed through the keypad under "User" password, limits unit load to a preset value for a pre-determined period of time after unit start-up. This function is applicable in situations where the water temperature is high at the start-up but thermal load is not consistently high. This logic allows to save energy during the load reduction period by preventing the compressors from unnecessarily increasing and then decreasing their capacity.

10. Start-up with high evaporator water temperature

This function limits the load of each compressor to a set value (default 70%), until the water outlet temperature is over the set value (default 25°C). Such logic helps start the group of chillers when the water temperature is initially very high (35-40°C).

This feature prevents from dangerous superheating of the motor and undesirable triggering of the high pressure protection. The values of maximum compressor load and water temperature limit are modifiable under "User" password.

11. Start-up inhibition

The controller can manage the start-up and the shut down of the unit in accordance with manifold logics in function of the requested application.

Local On/Off: unit shutdown through controller (On/Off key). If the switch is enabled, "Off Keypad" will appear on the status display of the unit

Remote On/Off: unit shutdown through digital contact.

If the panel switch is in the "0" position the unit is off by local switch and on the display will appear "Off Loc/Rem Sw". If the switch is in "Loc" position the unit is on (unless other shutdown conditions prevail).

When the switch in "Rem" position, the digital contact control allows the start-up and the shutdown of the unit from a remote location. When the unit is stopped remotely, "Off Loc/Rem Sw" will appear on the status display of the unit

On/Off Network: this function allows the start-up and the shutdown of the unit through a supervisory system. If the function is enabled, "Off Rem" will appear on the status display of the unit Comm."

Ambient On/Off: this function, if enabled, allows the start-up and the shutdown of the unit through external temperature. Enable the function under "User" password by entering the temperature value that will turn off the unit, along with the differential temperature for re-start. In the case the function is enabled, "Off Amb. Lockout" will appear on the status display of the unit.

On/Off Time Schedule: This function, if enabled, allows the start-up and the shutdown of the unit in accordance with a user defined time schedule. Enable the function under "User" password by entering the start-up and shutdown time for different weekdays and defining the holidays (forced-off days). In the case the function is enabled, "Off Time Schedule" will appear on the status display of the unit.

Appendix 1: Software upload to the controller

It is possible to upload the software into the controller using two different ways: using the direct download form a personal computer or using the Carel programming key.

Direct upload from a PC

To upload the program, it is necessary to:

- Install the program Winload in the PC. It can be requested from Daikin.
- Connect the PC, via a RS232 serial cable, to the RS232/RS485 converter (cod. 129150083)
- Connect the RS485 converter port to the controller terminal port (J10) using a 6-wire phone cable (terminal cable) (cod. 129150041).
- Disconnect the controller from pLAN and set the net address to 0.

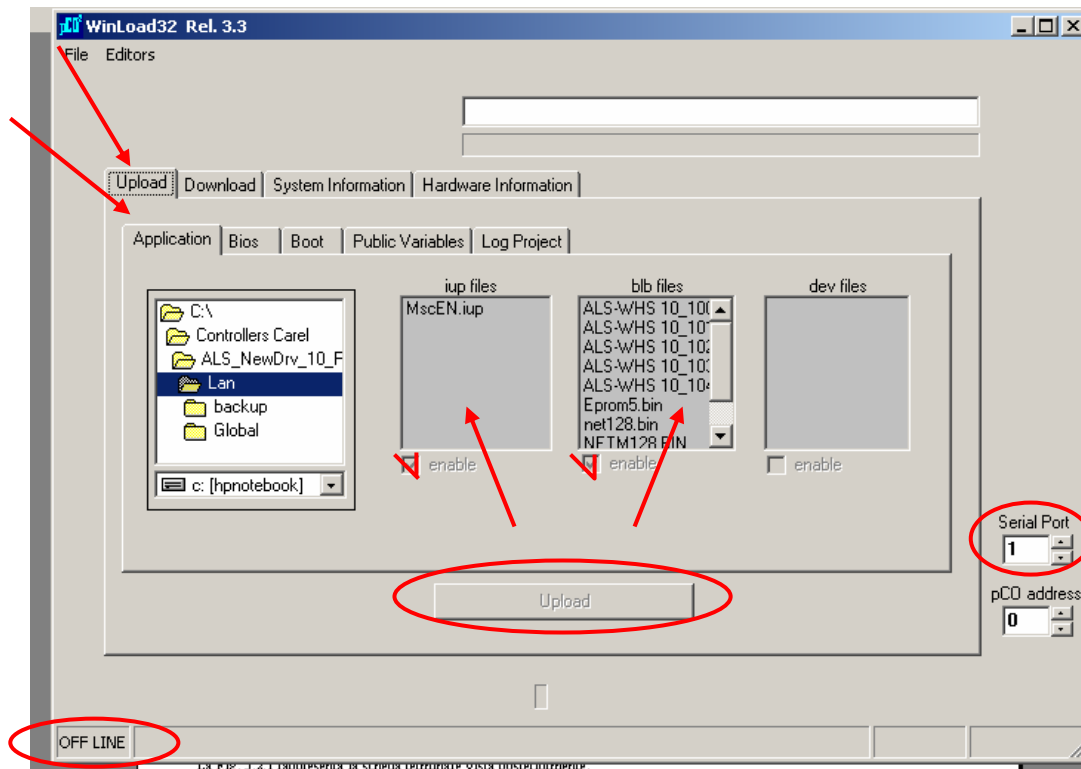
Switch on the controller and run Winload, select the correct serial port number you are using and wait (a few tenths of a second) for the “ON LINE” status (this means that the program is connected to the controller).

Then select the “Upload” folder and the “Application” section and select all program files supplied by Daikin (one file in the “blb files” box and one or more files in the “iup files” box).

Then press the “Upload” button and wait until the transfer is completed; the program shows the progress of the transfer phase in a window and when the process is completed the “UPLOAD COMPLETED” message will appear.

Finally turn off the controller, disconnect it from the PC, reconnect the pLAN and set the right net address.

This procedure has to be applied to all controllers on the unit.



Upload from programming key

To upload the program using the programming key (cod. 129150106), it is necessary to first upload the program to the key and then to upload it into one or more controllers. The same procedure has to be used for both operations, just selecting the correct position of the key switch:

Switch position	Transfer type
1 (green light)	Key programming from controller
2 (red light)	Controller programming from key

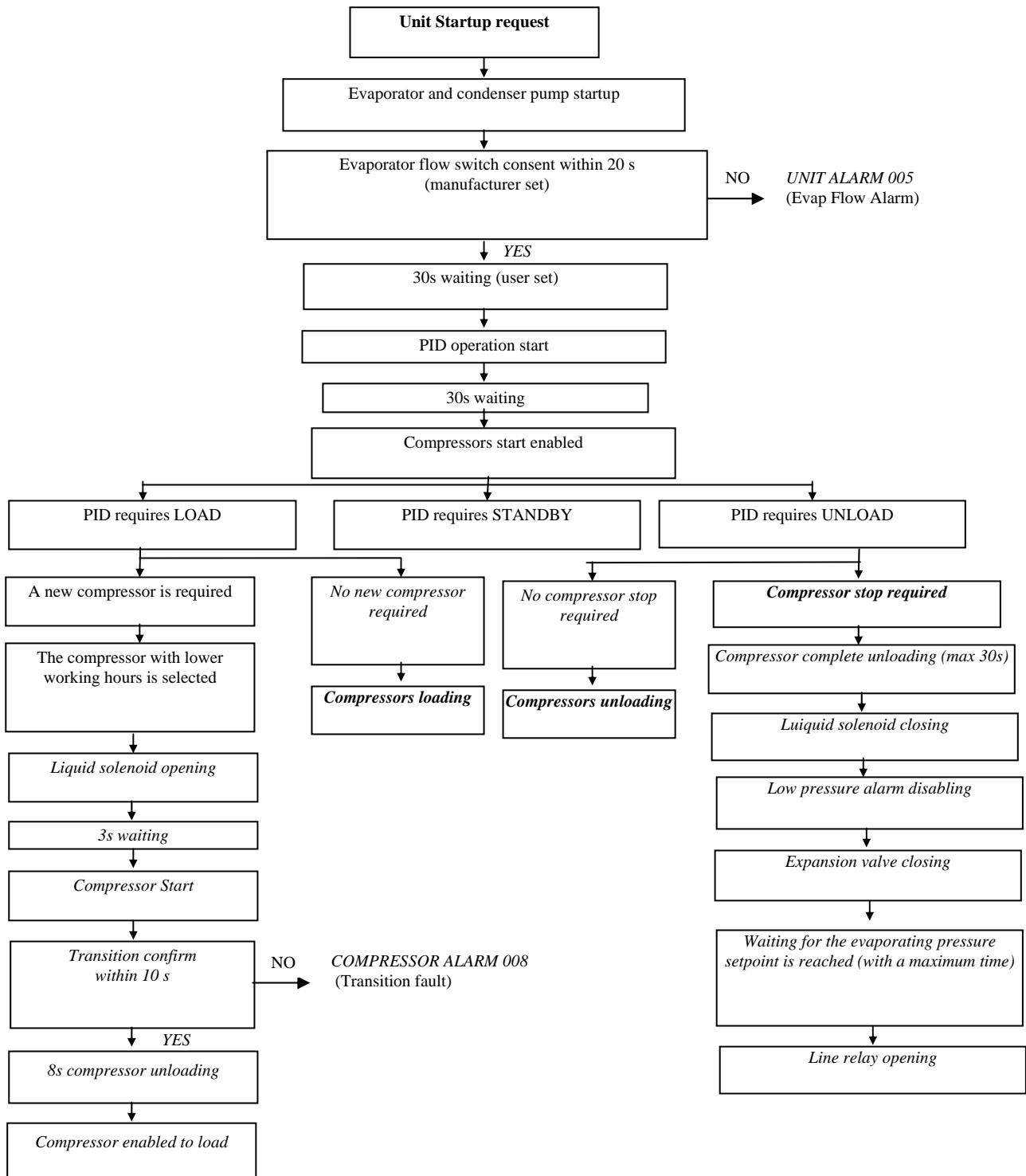
The procedure is described as follows.

- disconnect the controller from pLAN and set the net address to 0.
- select the right key switch position
- insert the key in the “expansion memory” connection (remove the cover if necessary)
- press “up” and “down” keys at the same time and switch on the controller
- press “enter” key to confirm the operation
- wait until the controller boots up
- turn off the controller
- remove the key

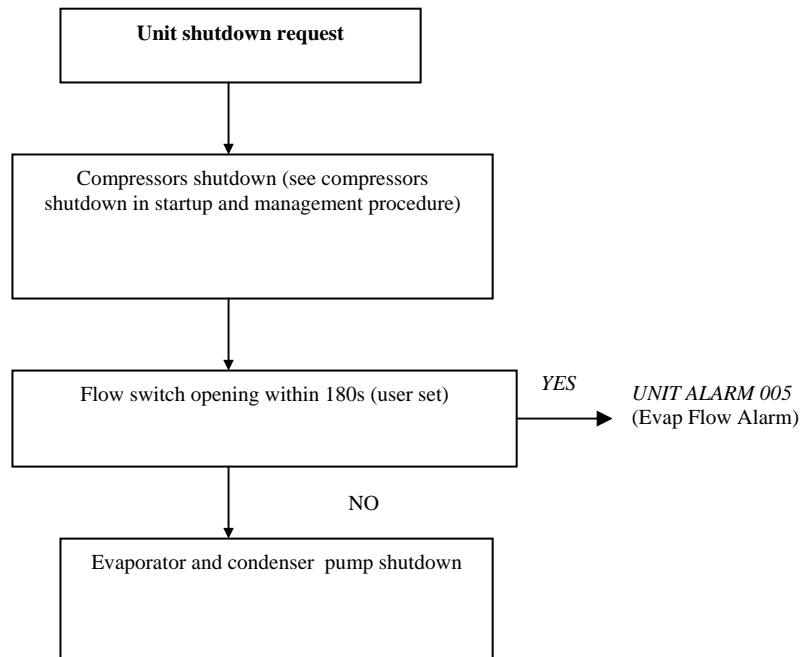
In case no controller with an installed programme is available, the key may be programmed using the same procedure described for the direct upload from a PC. In this case, with the key inserted in the controller and the key switch in position 2 (red light), the program will be written on the key instead of on the controller.

Appendix 2: Unit start-up sequence

In the following paragraphs, the unit start-up, management and shutdown procedures are shown. In addition to this, the compressors loading and unloading strategy is shown.



Unit startup and compressors management



Unit Shutdown

Compressors start-up and loading management (4 compressors)

Step n.	Leader Comp.	Lag 1 Comp.	Lag 2 Comp.	Lag 3 Comp.
0	Off	Off	Off	Off
1	If $(T - \text{SetP}) < \text{Start-up DT}$ & Cooling or $(\text{SetP} - T) < \text{Start-up DT}$ & Heating Waiting			
2	Start	Off	Off	Off
3	Load up to 75%	Off	Off	Off
4	If T in Regulation Band Wait inter-stage time			
5	If T is approaching SetP – Waiting			
6a (T in reg band)	Unload up to 50%	Start	Off	Off
6b (T out of reg band)	Fixed at 75%	Start	Off	Off
6	Fixed at 75% or 50%	Load up to 50%	Off	Off
7 (if leader at 50%)	Load up to 75%	Fixed at 50%	Off	Off
8	Fixed at 75%	Load up to 75%	Off	Off
9	If T in Regulation Band Wait inter-stage time			
10	If T is approaching SetP – Waiting			
10a (T in reg band)	Fixed at 75%	Unload up to 50%	Start	Off
10b (T out of reg band)	Fixed at 75%	Fixed at 75%	Start	Off
11	Fixed at 75%	Fixed at 75% or 50%	Load up to 50%	Off
12 (if lag1 at 50%)	Fixed at 75%	Load up to 75%	Fixed at 50%	Off
13	Fixed at 75%	Fixed at 75%	Load up to 75%	Off
14	If T in Regulation Band Wait inter-stage time			
15	If T is approaching SetP – Waiting			
16a (T in reg band)	Fixed at 75%	Fixed at 75%	Unload up to 50%	Start
16b (T out of reg band)	Fixed at 75%	Fixed at 75%	Fixed at 75%	Start
17	Fixed at 75%	Fixed at 75%	Fixed at 75% or 50%	Load up to 50%
18 (if lag2 at 50%)	Fixed at 75%	Fixed at 75%	Load up to 75%	Fixed at 50%
19	Fixed at 75%	Fixed at 75%	Fixed at 75%	Load up to 75%
20	Load up to 100%	Fixed at 75%	Fixed at 75%	Fixed at 75%
21	Fixed at 100%	Load up to 100%	Fixed at 75%	Fixed at 75%
22	Fixed at 100%	Fixed at 100%	Load up to 100%	Fixed at 75%
23	Fixed at 100%	Fixed at 100%	Fixed at 100%	Load up to 100%
24	Fixed at 100%	Fixed at 100%	Fixed at 100%	Fixed at 100%

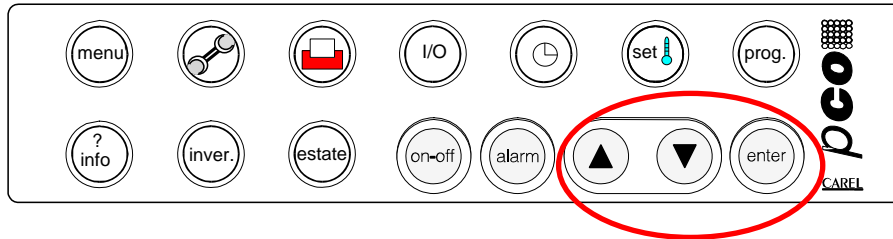
Compressors unload and shutdown management (4 compressors)

Step n.	Leader Comp.	Lag 1 Comp.	Lag 2 Comp.	Lag 3 Comp.
0	100%	100%	100%	100%
1	Fixed at 100%	Fixed at 100%	Fixed at 100%	Unload up to 75%
2	Fixed at 100%	Fixed at 100%	Unload up to 75%	Fixed at 75%
3	Fixed at 100%	Unload up to 75%	Fixed at 75%	Fixed at 75%
4	Unload up to 75%	Fixed at 75%	Fixed at 75%	Fixed at 75%
5	Fixed at 75%	Fixed at 75%	Fixed at 75%	Unload up to 50%
6	Fixed at 75%	Fixed at 75%	Unload up to 50%	Fixed at 50%
7	Fixed at 75%	Fixed at 75%	Fixed at 50%	Unload up to 25%
8	If T is approaching SetP – Waiting			
8a (T in reg band)	Fixed at 75%	Fixed at 75%	Load up to 75%	Stop
8b (T no in reg band)	Fixed at 75%	Fixed at 75%	Fixed at 75%	Stop
9(if lag2 at 75%)	Fixed at 75%	Fixed at 75%	Fixed at 75%	Off
10	Fixed at 75%	Unload up to 50%	Fixed at 50%	Off
11	Fixed at 75%	Fixed at 50%	Fixed at 25%	Off
12	If T is approaching SetP – Wait			
13a (T in reg band)	Fixed at 75%	Load up to 75%	Stop	Off
13b (T out of reg band)	Fixed at 75%	Fixed at 50%	Stop	Off
14(lag1 at 75%)	Fixed at 75%	Unload up to 50%	Off	Off
15	Unload up to 50%	Fixed at 50%	Off	Off
16	Fixed at 50%	Unload up to 25%	Off	Off
17	If T is approaching SetP – Waiting			
18a (T in reg band)	Load up to 75%	Stop	Off	Off
18b (T out of reg band)	Fixed at 50%	Stop	Off	Off
19	Unload up to 25%	Off	Off	Off
20	If T is approaching SetP – Waiting			
21	If (SetP - T) < Shutdown DT & Cooling or (T - SetP) < Shutdown DT & Heating Wait			
22	Stop	Off	Off	Off
23	Off	Off	Off	Off

Appendix 3: pLAN settings

This operation must be performed if a terminal is added to the pLAN or if settings are changed.

1. Keep the keys “Up”, “Down” and “Enter” pressed for at least 10 seconds



2. A screen will appear showing the terminal and board address.

```
Terminal Adr: 16
I/O Board Adr: n
```

3. Using the “Up” and “Down” keys, it is possible to choose the different board (1, 2, 3, 4 for the compressors and 5, 7, 9, 11 for the electronic valve drivers)
4. Select 1 for “I/O Board Adr” (Board with address 1) and push “Enter”. In about two seconds the following screen will appear:

```
Terminal Config

Press ENTER
To continue
```

5. Press “Enter” again; the following screen will appear:

```
P:01  Adr      Priv/Shared
Trm1  16       Sh
Trm2  None     --
Trm3  None     -- Ok? No
```

6. If you had to add a second terminal (remote terminal), change the line “Trm2 None –“ with the line “Tmr2 17 sh”. To enable the new configuration, put the pointer on “No” (using the key “Enter”) and with “Up” and “Down” change it to “Yes” and push “Enter”.

The operations 1 through 6 must be repeated for all the compressor boards (“I/O Board” from 1 to 4)
At the end of operations turn off and restart the system.

Remark:

It is possible, after restart, that the terminal is stuck on a unit. This is due to the fact that the memory of the Drivers remains fed by the buffer battery and retains the data of the preceding configuration. In this case, with the system power supply off, it is sufficient to disconnect batteries from all the drivers and then connect them again.

CE Daikin units comply with the European regulations that guarantee the safety of the product.



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