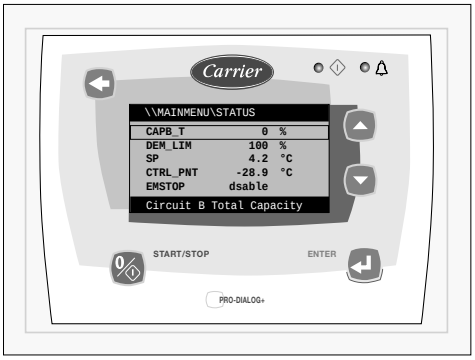
Carrier

United Technologies

PRO-DIALOG

CONTROLS MANUAL



Pro-Dialog+ Control

30RB/30RQ 008-040

AQUASNAP™

Original instructions

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1 - SAFETY CONSIDERATIONS

1.1 - General

Installation, start-up and servicing of equipment can be hazardous if certain factors particular to the installation are not considered: operating pressures, presence of electrical components and voltages and the installation site (elevated plinths and built-up up structures). Only properly qualified installation engineers and highly qualified installers and technicians, fully trained for the product, are authorised to install and start-up the equipment safely. During all servicing operations all instructions and recommendations which appear in the installation and service instructions for the product, as well as on tags and labels fixed to the equipment and components and accompanying parts supplied separately, must be read, understood and followed.

- Apply all standard safety codes and practices.
- Wear safety glasses and gloves.
- Use the proper tools to move heavy objects. Move units carefully and set them down gently.

1.2 - Avoid electrocution

Only personnel qualified in accordance with IEC (International Electrotechnical Commission) recommendations may be permitted access to electrical components. It is particularly recommended that all sources of electricity to the unit be shut off before any work is begun. Shut off the main power supply at the main circuit breaker or isolator.

IMPORTANT: This equipment conforms to all applicable codes regarding electromagnetic compatibility.

2 - GENERAL DESCRIPTION

2.1 - General

Pro-Dialog is an electronic control system to regulate units of the following types:

- 30RB air-cooled liquid chillers
- 30RQ reversible heat pumps.

These units have one or two refrigerant circuits.

Pro-Dialog controls:

- compressor start-up to control the water loop
- the fans to optimise operation of each refrigerant circuit
- the defrost cycles to ensure the operation of the refrigerant circuits (30RQ only).

As standard Pro-Dialog offers three on/off commands:

- Local - on/off command using the keyboard
- Remote - wired on/off command using volt-free contacts
- Network - Carrier Comfort Network (CCN) on/off command.

The command type is selected in advance by keyboard.

2.2 - Abbreviations used

In this manual, the refrigerant circuits are called circuit A and circuit B. The compressors in circuit A are labelled A1, A2 and A3. Those in circuit B are B1 and B2.

The following abbreviations are used frequently:

CCN	Carrier Comfort Network
LED	Light Emitting Diode
LEN	Internal communication bus linking the main board to the slave boards
SCT	Saturated condensing temperature
SST	Saturated suction temperature
EXV	Electronic expansion valve
PD-AUX	Auxiliary input/output board

3 - HARDWARE DESCRIPTION

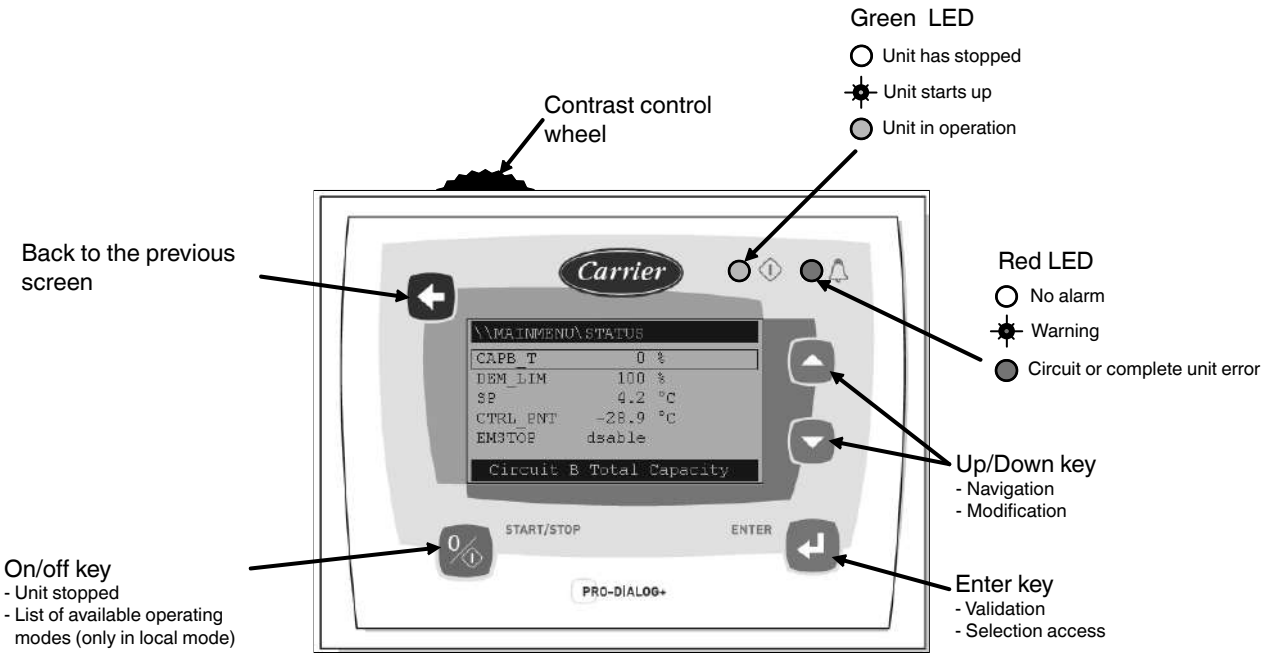
3.1 - General

The control system consists of an NRCP2-BASE board for single-circuit units (up to two compressors) and two NRCP2-BASE boards (one master and one slave board) for units with three or four compressors. The heat pump units that are equipped with the additional electric heater stage option uses an additional PD-AUX board.

All boards communicate via an internal LEN bus. The NRCP2-BASE boards continuously manage the information received from the various pressure and temperature probes. The NRCP2-BASE master board contains the program that controls the unit.

The user interface includes an alphanumeric eight-line display, two LEDs with five navigation keys as well as a contrast control wheel.

Figure 1 - Control board



3.2 - Electrical supply to boards

All boards are supplied from a common 24 V a.c. supply referred to earth.

CAUTION: Maintain the correct polarity of the power supply connection of the boards, to ensure that they are not damaged.

In the event of a power supply interrupt, the unit restarts automatically without the need for an external command. However, any faults active when the supply is interrupted are saved and may in certain cases prevent a circuit or unit from restarting.

3.3 - Light emitting diodes on boards

All boards continuously check and indicate the proper operation of their electronic circuits. A light emitting diode (LED) lights on each board when it is operating properly.

- The red LED that flashes for a two-second period - one second on, one second off - indicates correct operation. A different rate indicates a board or a software failure.
- The green LED flashes continuously on all boards to show that the board is communicating correctly over its internal bus. If the LED is not flashing, this indicates a LEN bus wiring problem.
- The orange LED of the master board flashes during any communication via the CCN bus.

3.4 - The sensors

Pressure sensors
Two types of electronic (high and low-pressure) sensors are used to measure the suction and discharge pressure in each circuit.

Thermistors
The heat exchanger water sensors are installed in the entering and leaving side. The outdoor temperature sensor is mounted under a metal plate. An optional water system temperature sensor can be used for master/slave assembly control (in the case of leaving water control).

In heat pump units a sensor placed on an air heat exchanger pipe ensures defrost operation.

3.5 - The controls

Water circulation pump
The controller can regulate one or two water heat exchanger pumps and takes care of automatic change-over between pumps.

Heaters
They protect the heat exchanger (and the piping for units without pump) against frost, if the unit has stopped and is left energised.

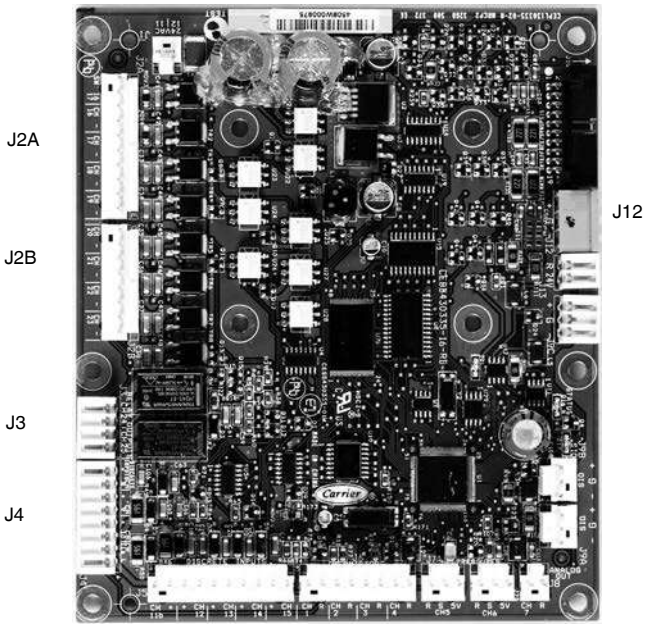
Boiler
This output authorises start/stop of a boiler.

3.6 - Connections at the user terminal block

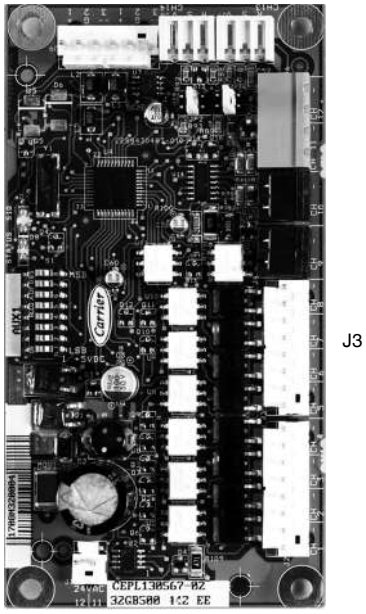
3.6.1 - General description

The contacts below are available at the user terminal block on the NRCP2-BASE boards. Some contacts can only be used if the unit operates in remote operating type (Remote).

NRCP2-BASE control board



Optional PD-AUX board



The following table summarises the connections at the user terminal block.

Description	Connector/ channel	Terminal	Board	Remarks
Contact 1: Start/stop	J4/CH 8	32-33	NRCP2-BASE	Used with the remote operating mode (Remote).
Contact 2: Heating/cooling selection	J4/CH 9	63-64	NRCP2-BASE	Used with the remote operating mode (Remote) in accordance with the boiler or heat pump configuration
Contact 3: Demand limit selection 1	J4/CH 10	73-74	NRCP2-BASE	
Customer safety loop input	J4/CH 11A	34-35	NRCP2-BASE	
Contact 3 bis: Demand limit selection 2	J5/CH 12		NRCP2-BASE	Unit without NRCP2-SLAVE board.
Setpoint selection	J5/CH 13		NRCP2-BASE	Used with the remote operating mode (Remote), unit without NRCP2-SLAVE board.
Desuperheater contact	J5/CH14		NRCP2-BASE	Used on units with desuperheater
Heat exchanger heater command	J2B/CH 21		NRCP2-BASE	Frost protection, when the unit is stopped.
Command, water pump 1	J2B/CH 22		NRCP2-BASE	
Command, water pump 2	J2B/CH 23		NRCP2-BASE	The change-over between the two pumps is configurable
Alarm relay output	J3/CH 24	30A-31A	NRCP2-BASE	
Unit operation relay output	J3/CH 25	37-38	NRCP2-BASE	
CCN network connection	J12		NRCP2-BASE	RS-485 series connection - Pin 1: signal + - Pin 2: ground - Pin 3: signal -
Setpoint selection	J4/CH 8	65-66	NRCP2-SLAVE	Used with the remote operating mode (Remote), unit with NRCP2-SLAVE board.
Contact 3 bis: Demand limit selection 2	J4/CH 10	75-76	NRCP2-SLAVE	Used with the remote operating mode (Remote), use of NRCP2-SLAVE board, depending on the size
Relay output for boiler command	J3/CH 25		NRCP2-SLAVE	Use of NRCP2-SLAVE board, depending on the size
Triac output for boiler command	J2B/CH 20		NRCP2-BASE	Cooling only unit without NRCP2-SLAVE board
Triac output for boiler command	J3/CH 5		PD-AUX	Heat pump unit without NRCP2-SLAVE board

3.6.2 - Volt-free contact on/off/cooling/heating

If the unit works in the remote operating mode (Remote) and the automatic heating/cooling changeover function is not selected and if the user configuration allows this (heat pump and Pro-Dialog interface selection) the operation of the on/off contacts and the heating/cooling contacts is as follows:

Without multiplexing

	Off	On cooling	On heating
On/off contact	Open	Closed	Closed
Heaing/cooling contact	-	Open	Closed

With multiplexing

	Off	On cooling	On heating	On auto
On/off contact	Open	Closed	Closed	Open
Heaing/cooling contact	Open	Open	Closed	Closed

NOTE: The automatic changeover function (on auto) selects the cooling or heating mode based on the outdoor temperature (see chapter 5.2).

3.6.3 - Volt-free setpoint selection contact

	Cooling		Heating	
	csp 1	**csp 2**	**hsp 1**	**hsp 2**
Set point selection contact	Open	Closed	Open	Closed

3.6.4 - Volt-free demand limit selection contact

	100%	Limit 1	Limit 2	Limit 3
Demand limit 1	Open	Closed	Open	Closed
Demand limit 2	Open	Open	Closed	Closed

4. SETTING UP PRO-DIALOG+ CONTROL

4.1 - General features

The interface includes different screens that are listed below:

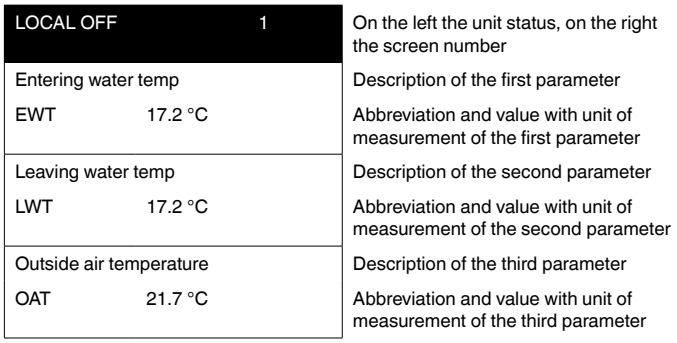
- Default screens with direct display of the main parameters,
- Menu screens for navigation,
- Data/configuration screens listing the parameters by type,
- Operating mode selection screen,
- Password entry screen,
- Parameter modification screen.

NOTE: If the interface is not used for a long period, it will go black. The control is always active, the operating mode remains unchanged. The interface screen is re-animated, when the user presses a key. Pressing the key once illuminates the screen, pressing the key a second time leads to a screen that is related to the context and the key symbol.

4.2 - Default screen characteristics

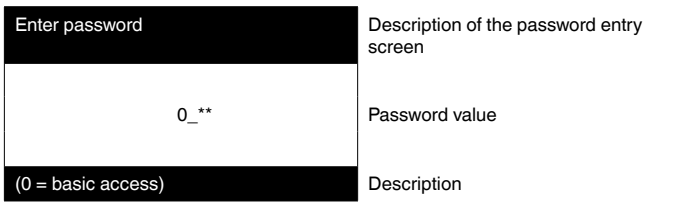
There are four default screens. Each screen shows:

- The unit status, its screen number,
- Three displayed parameters.

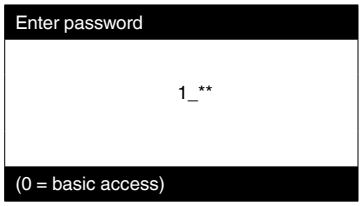


Pressing the Up or Down key changes one default screen to another default screen. The screen number is updated.

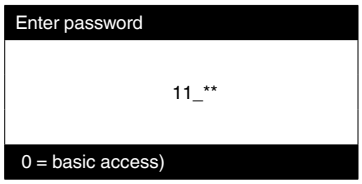
4.3 - Password screens



The password is entered digit by digit. The cursor is shown at the current digit that flashes. The arrow keys modify the digit value. The digit modification is validated with the Enter key and the cursor is moved to the next digit.



The first digit is 1, the cursor is positioned on the second digit

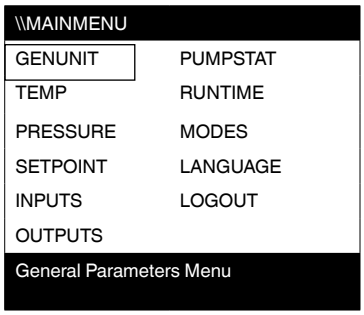


Pressing the Enter key at a digit without value validates the overall selection of the password. The screen is refreshed by the menu list, and the items displayed depend on the level of the activated password.

The entry of an incorrect password keeps the password entry screen.

Password selection 0 (zero) can simply be made by pressing the Enter key twice in succession.

4.4 - Menu screen characteristics



Current path in the menu structure

Selection cursor to the left of the first column

Menu list

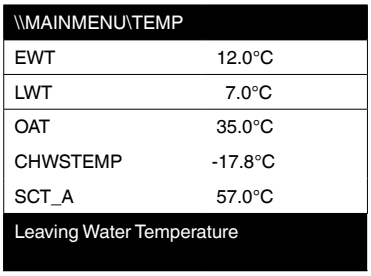
Description of the menu framed by the selection cursor

Each menu item defines the access to categorised data. The Up and Down arrows position the cursor at the current item. The Enter key activates the display of the selected sub-menu.

The item LOGOUT permits exiting from the menu screen and protects access by a user password. The “Previous” key permits exiting from the current screen without deactivating the password-protected access.

4.5 - Data screen or configurable parameter characteristics

The data screens display information parameters such as temperatures or pressures. The configuration screens display unit control parameters such as the water temperature setpoints.



Current path in the menu structure

List of items

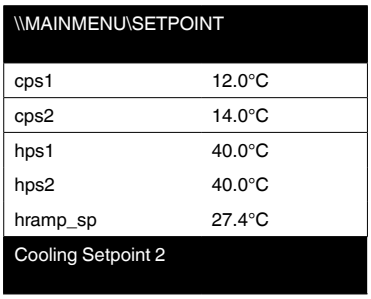
Cursor position

Description of the item framed by the selection cursor

The Up and Down arrow keys position the cursor on the current menu item. The Enter key activates the parameter modification (if possible). Any non-pertinent modification attempt is blocked by a refusal screen.

4.6 - Parameter modification

A configuration parameter can be modified by positioning the cursor and then pressing the Enter key.



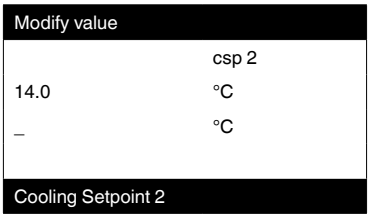
Current path in the menu structure

List of items

Cursor position

Description of the item framed by the selection cursor

The following screen allows modification of a parameter.



Screen description

Current value

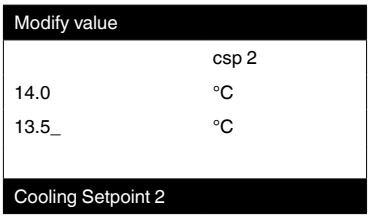
Cursor position

Item description

The Up and Down arrow keys permit the selection of the first digit. Pressing the Up key successively scrolls up to the following symbols:
0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ., -.

The Down key follows the reverse order of the Up key in scrolling down the digit list above. Each digit is validated with the Enter key.

The - sign is only accessible for the first selected character.



Description of the screen

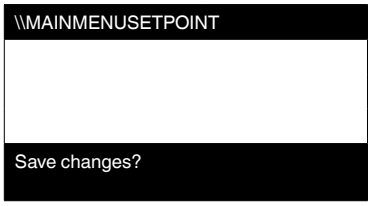
Current value

New value before validation

Item description

The value is validated with the Enter key. At any time the return key cancels the current modification.

ATTENTION: If the user exits from the current data screen, the value is saved. A saving confirmation is displayed. The Enter key validates the parameter modification(s). The Return to the Previous Screen key cancels the current modification(s).

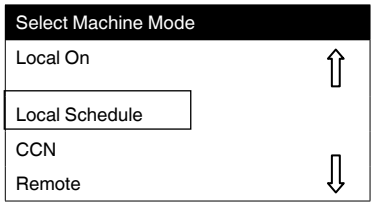


Current path in the menu structure

Confirmation that the modification is saved

4.7 - Operating mode screen

The unit is in Local Off mode, pressing the on/off (0/1) key once activates the display of the operating mode screen.



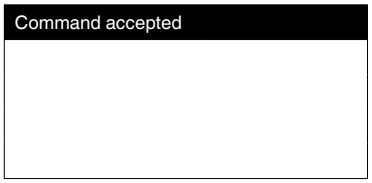
Description of the screen

List of the machine operating modes

Cursor

The Up and Down keys position the cursor on the selected operating mode. Four modes are immediately displayed on the screen. To access operating modes that are not visible, please use the Up and Down keys.

When the operating mode has been selected, the new operating mode can be validated with the Enter key.

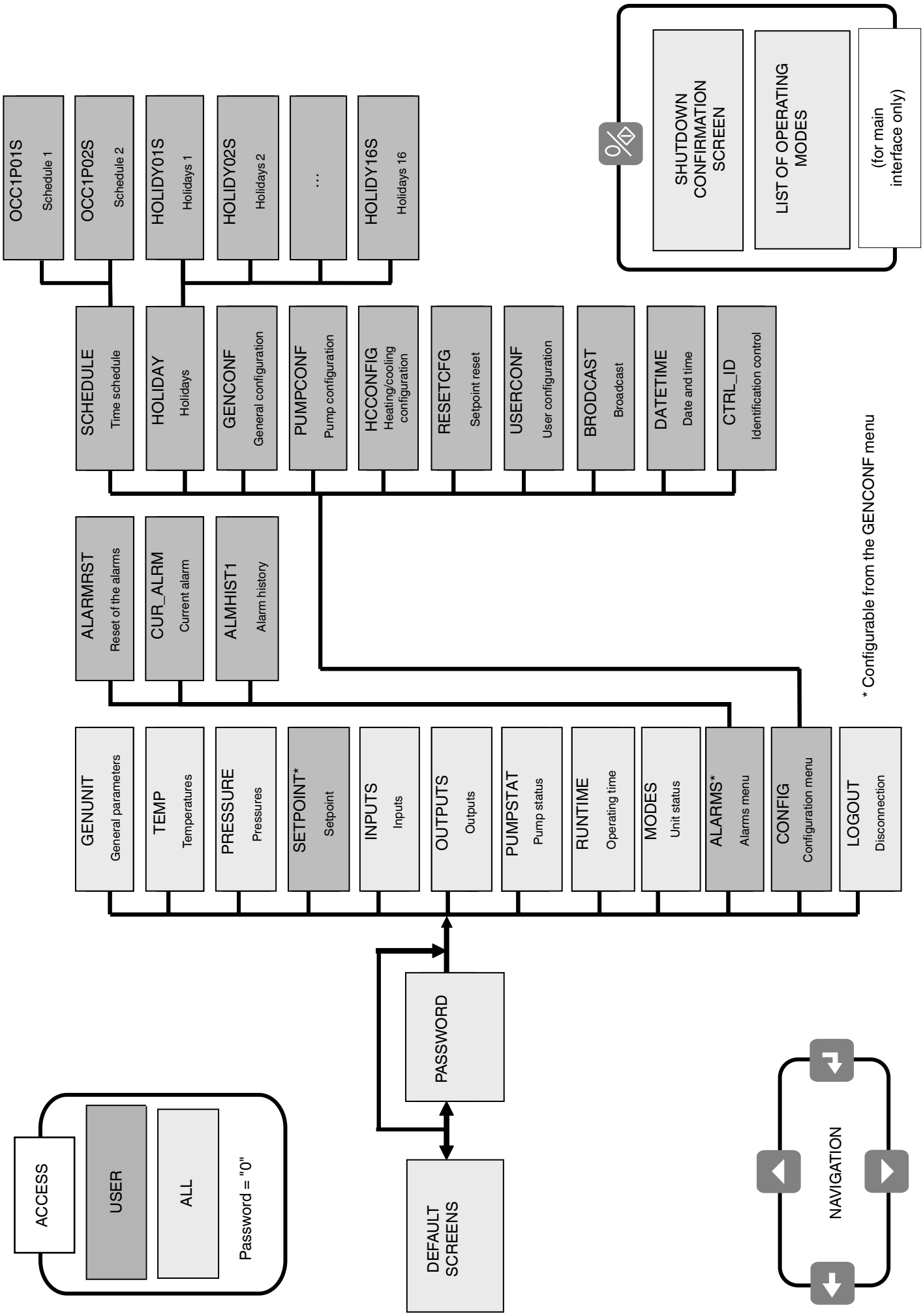


Operating mode validation screen

When the unit is in an operating mode and the On/off key is pressed, the unit will stop. A confirmation screen protects the unit against inadvertent shutdowns.

Machine shutdown confirmation screen

4.8 - Menu tree structure



4.9 - Detailed menu description

ATTENTION: Depending on the unit characteristics, certain menu items are not used.

4.9.1 - GENUNIT menu

NAME	FORMAT	UNIT	DESCRIPTION
ctrl_typ	0/1/2	-	Local = 0. CCN = 1. Remote = 2
STATUS	Running/Off/Stopping/ Delay	-	Operating status
ALM	Normal/Partial/Shutdown	-	Alarm status
min_left	0-15	min	Start-up delay
HEATCOOL	Heat/Cool/Standby/Both	-	Heating/cooling status
LOCAL_HC	0/1/2	-	Heating/cooling selection via the main interface
HC_SEL	0/1/2	-	Heating/cooling selection via the CCN network 0 = cooling, 1 = heating, 2 = auto
LSP_SEL	0/1/2	-	Setpoint selection via the main interface
SP_SEL	0/1/2	-	Setpoint selection via the CCN network 0 = Auto 1 = Spt1 2 = Spt2
SP_OCC	Yes/No	-	Occupied setpoint active
CHIL_S_S	Enable/Disable	-	Unit start/stop via the CCN network
CHIL_OCC	Yes/No	-	Unit time schedule via the CCN network
CAP_T	nnn	%	Total unit capacity
CAPA_T	nnn	%	Capacity circuit A
CAPB_T	nnn	%	Capacity circuit B
DEM_LIM	nnn	%	Demand limit value
SP	±nnn.n	°C	Current setpoint
CTRL_PNT	±nnn.n	°C	Control point
EMSTOP	Enable/Emstop	-	CCN emergency stop

4.9.2 - TEMP menu

NAME	FORMAT	UNIT	DESCRIPTION
EWT	±nnn.n	°C	Heat exchanger entering water temperature
LWT	±nnn.n	°C	Heat exchanger leaving water temperature
OAT	±nnn.n	°C	Outside air temperature
CHWSTEMP	±nnn.n	°C	Common master/slave temperature
SCT_A	±nnn.n	°C	Saturated condensing temperature A
SST_A	±nnn.n	°C	Saturated suction temperature A
SCT_B	±nnn.n	°C	Saturated condensing temperature B
SST_B	±nnn.n	°C	Saturated suction temperature B
DEFRT_A	±nnn.n	°C	Defrost temperature A
DEFRT_2	±nnn.n	°C	Defrost temperature B or second coil
sgtc1	±nnn.n	°C	Suction gas temperature, coil 1, unit with three compressors
sgtc2	±nnn.n	°C	Suction gas temperature, coil 2, unit with three compressors

4.9.3 - PRESSURE menu

NAME	FORMAT	UNIT	DESCRIPTION
DP_A	±nnn.n	kPa	Discharge pressure A
SP_A	±nnn.n	kPa	Suction pressure A
DP_B	±nnn.n	kPa	Discharge pressure B
SP_B	±nnn.n	kPa	Suction pressure B

4.9.4 - SETPOINT menu

NAME	FORMAT	VALUE	UNIT	DESCRIPTION
csp1	- 29.7 to 20	12.0	°C	Cooling setpoint 1
csp2	- 29.7 to 20	12.0	°C	Cooling setpoint 2
hsp1	20 to 55	40.0	°C	Heating setpoint 1
hsp2	20 to 55	40.0	°C	Heating setpoint 2
hramp_sp	0.1 to 1.1	0.60	^C	Ramp loading
cauto_sp	3.9 to 50	24.0	°C	Cooling change-over setpoint
hauto_sp	0 to 46.1	18.0	°C	Heating change-over setpoint
lim_sp1	0 to 100	100	%	Limit setpoint 1
lim_sp2	0 to 100	100	%	Limit setpoint 2
lim_sp3	0 to 100	100	%	Limit setpoint 3
min_sct	26.7 to 55*	40	°C	Condensing setpoint for desuperheater option

* 50, if the unit includes a variable-speed fan

4.9.5 - INPUTS menu

NAME	FORMAT	UNIT	DESCRIPTION
ONOFF_SW	Open/Close	-	Remote start/stop contact
HC_SW	Open/Close	-	Remote heating/cooling contact
on_ctrl	Off, On Cool, On Heat, On Auto	-	Current control
SETP_SW	Open/Close	-	Remote setpoint contact
LIM_SW1	Open/Close	-	Remote demand limit contact 1
LIM_SW2	Open/Close	-	Remote demand limit contact 2
FLOW_SW	Open/Close	-	Water flow rate/customer safety loop contact
leak_1_v	nn.n	Volt	Leak detector value 1
leak_2_v	nn.n	Volt	Leak detector value 2
DSHTR_SW	Open/Close	-	Desuperheater user contact

4.9.6 - OUTPUTS menu

NAME	FORMAT	UNIT	DESCRIPTION
CP_A1	On/Off	-	Compressor output A1
CP_A2	On/Off	-	Compressor output A2
CP_A3	On/Off	-	Compressor output A3
fan_a1	0-2	-	Fan output A1
fan_a2	0-2	-	Fan output A2
exv_a	0-100	%	EXV position circuit A
HD_POS_A	0-100	%	Position variable fan speed controller A
RV_A	On/Off	-	Four-way refrigerant valve
CP_B1	On/Off	-	Compressor output B1
CP_B2	On/Off	-	Compressor output B2
fan_b1	0-2	-	Fan output B1
exv_a	0-100	%	EXV position circuit B
HD_POS_B	0-100	%	Position variable fan speed controller B
RV_B	On/Off	-	Four-way refrigerant valve
C_HEATER	On/Off	-	Heat exchanger and lower coil heater
BOILER	On/Off	-	Boiler output
EHS_STEP	0-4	-	Electric heater stages
ALARM	On/Off	-	Alarm relay
RUNNING	On/Off	-	Unit on relay

4.9.7 - PUMPSTAT menu

NAME	FORMAT	UNIT	DESCRIPTION
CPUMP_1	On/Off	-	Command pump 1
CPUMP_2	On/Off	-	Command pump 2
ROT_PUMP	Yes/No	-	Pump rotation
WATPRES1	±nnn.n	kPa	Water pressure sensor 1
WATPRES2	±nnn.n	kPa	Water pressure sensor 2
WP_CALIB	Yes/No	-	Water pressure sensor calibration? Following a water pressure sensor error, WP_OFFST is deconfigured (-99 kPa) to inform of the need to calibrate the water loop. This calibration must be made while there is no water flow in the machine
WP_OFFST	±nnn.n	kPa	Water pressure sensor calibration value
DP_FILTR	nnn.n	kPa	Filter pressure drop
WP_MIN	nnn.n	kPa	Minimum water pressure
WAT_FLOW	±nnn.n	g/s	Water flow rate
CAPPOWER	±nnn.n	kW	Unit capacity
w_dt_spt	nn.n	^C	Setpoint delta T
w_dp_spt	nn.n	kPa	Setpoint delta P
drvp_pwr	+nnn.n	kW	Pump capacity
drvp_i	+nnn.n	A	Pump current
drvp_ver	xxxxxxxx	-	Variable pump speed controller version

4.9.8 - RUNTIME menu

NAME	FORMAT	UNIT	DESCRIPTION
HR_MACH	nnnnn	hours	Unit operating hours
st_mach	nnnnn	-	Number of start-ups, unit
HR_CP_A1	nnnnn	hours	Operating hours compressor A1
st_cp_a1	nnnnn	-	Number of start-ups compressor A1
HR_CP_A2	nnnnn	hours	Operating hours compressor A2
st_cp_a2	nnnnn	-	Number of start-ups compressor A2
HR_CP_A3	nnnnn	hours	Operating hours compressor A3
st_cp_a3	nnnnn	-	Number of start-ups compressor A3
HR_CP_B1	nnnnn	hours	Operating hours compressor B1
st_cp_b1	nnnnn	-	Number of start-ups compressor B1
HR_CP_B2	nnnnn	hours	Operating hours compressor B2
st_cp_b2	nnnnn	-	Number of start-ups compressor B2
hr_fana1	nnnnn	hours	Operating hours fan A1
hr_fana2	nnnnn	hours	Operating hours fan A2
hr_fanb1	nnnnn	hours	Operating hours fan B1
st_fa_a1	nnnnn	-	Number of start-ups fan A1
st_fa_a2	nnnnn	-	Number of start-ups fan A2
st_fa_b1	nnnnn	-	Number of start-ups fan B1
hr_cpum1	nnnnn	hours	Operating hours pump 1
hr_cpum2	nnnnn	hours	Operating hours pump 2
nb_def_a	nnnnn	-	Number of defrost cycles circuit B
nb_def_b	nnnnn	-	Number of defrost cycles circuit A

4.9.9 - MODES menu

NAME	FORMAT	UNIT	DESCRIPTION
m_limit	Yes/No	-	Demand limit active
m_ramp	Yes/No	-	Ramp loading active
m_cooler	Yes/No	-	Heat exchanger heater active
m_night	Yes/No	-	Low-noise level night mode
m_SM	Yes/No	-	Aquasmart active
m_leadla	Yes/No	-	Master/slave active
m_auto	Yes/No	-	Change-over active
m_heater	Yes/No	-	Electric heater stages active
m_lo_ewt	Yes/No	-	Lock heating mode and entering water too cold
m_boiler	Yes/No	-	Boiler active
m_defr_a	Yes/No	-	Defrost circuit A active
m_defr_b	Yes/No	-	Defrost circuit B active
m_sst_a	Yes/No	-	Low suction temperature circuit A
m_sst_b	Yes/No	-	Low suction temperature circuit B
m_dgt_a	Yes/No	-	High discharge gas temperature circuit A
m_dgt_b	Yes/No	-	High discharge gas temperature circuit B
m_hp_a	Yes/No	-	High pressure circuit A
m_hp_b	Yes/No	-	High pressure circuit B
m_sh_a	Yes/No	-	Low superheat circuit A
m_sh_b	Yes/No	-	Low superheat circuit B

4.9.10 - ALARMS menu

NAME	DESCRIPTION
ALARMRST	Alarm reset
CUR_ALRM	Current alarms
ALMHIST1	Alarm history

4.9.11 - CONFIG menu

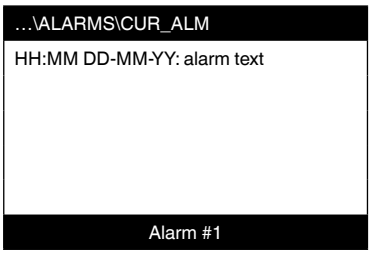
NAME	DESCRIPTION
GEN_CONF	General configuration menu
PUMPCONF	Water pump configuration menu
HC_CONFIG	Heating/cooling configuration menu
RESETCFG	Reset configuration menu
USERCONFIG	User configuration menu
SCHEDULE	Time schedule
HOLIDAY	Holiday calendar
BRODCAST	Broadcast menu
DATETIME	Date and time menu
DISPLAY	Display configuration menu
CTRL_ID	Identification control

4.9.12 - ALARMRST menu

NAME	FORMAT	UNIT	DESCRIPTION
RESET_AL	Normal	-	Alarm reset
ALM	Normal	-	Alarm status
alarm_1c	nnnnn	-	Current alarm 1
alarm_2c	nnnnn	-	Current alarm 2
alarm_3c	nnnnn	-	Current alarm 3
alarm_4c	nnnnn	-	Current alarm 4
alarm_5c	nnnnn	-	Current alarm 5
alarm_1	nnnnn	-	Current JBus alarm 1
alarm_2	nnnnn	-	Current JBus alarm 2
alarm_3	nnnnn	-	Current JBus alarm 3
alarm_4	nnnnn	-	Current JBus alarm 4
alarm_5	nnnnn	-	Current JBus alarm 5

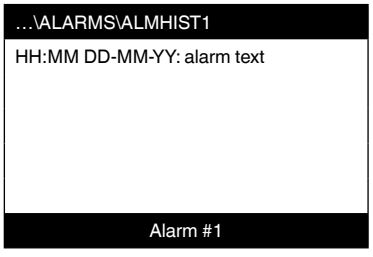
4.9.13 - CUR_ALRM menu

This menu lists up to ten a active alarms. For each alarm the display shows the time and date the alarm was generated as well as the alarm description. Each screen shows one alarm.



4.9.14 - ALMHIST1 menu

This menu lists up to twenty alarms that have occurred at the unit. For each alarm the display shows the time and date the alarm was generated as well as the alarm description. Each screen shows one alarm.



4.9.15 - SCHEDULE menu

NAME	DESCRIPTION
OCC1P01S	Unit on/off time schedule
OCC1P02S	Unit setpoint selection time schedule

4.9.16 - HOLIDAY menu

NAME	DESCRIPTION
HOLDY_01	Holiday period 1
HOLDY_02	Holiday period 2
HOLDY_03	Holiday period 3
HOLDY_04	Holiday period 4
HOLDY_05	Holiday period 5
HOLDY_06	Holiday period 6
HOLDY_07	Holiday period 7
HOLDY_08	Holiday period 8
HOLDY_09	Holiday period 9
HOLDY_10	Holiday period 10
HOLDY_11	Holiday period 11
HOLDY_12	Holiday period 12
HOLDY_13	Holiday period 13
HOLDY_14	Holiday period 14
HOLDY_15	Holiday period 15
HOLDY_16	Holiday period 16

4.9.17 - BRODCAST menu

NAME	FORMAT	DEFAULT	UNIT	DESCRIPTION
ccnbroad	0/1/2	2	-	Activates the broadcast 0 = deactivated, 1= broadast during holidays at the network, 2 = broadcast during holidays, machine only
oatbusnm	0 to 239	0	-	Broadcast of the outside temperature Bus number of the machine with the outside temperature
oatlocad	0 to 239	0	-	Element number of the machine with the outside temperature
dayl_sel	Disable/Enable	Disable	-	Activation summer time, winter time
Summer time				
startmon	1 to 12	3	-	Month
startdow	1 to 7	7	-	Day of the week (1 = Monday)
startwom	1 to 5	5	-	Week of the month
Winter time				
stopmon	1 to 12	10	-	Month
stoptdow	1 to 7	7	-	Day of the week (1 = Monday)
stopwom	1 to 5	5	-	Week of the month

4.9.18 - GENCONF menu

NAME	FORMAT	DEFAULT	UNIT	DESCRIPTION
lead_cir	0/1/2	0	-	Circuit loading sequence 0 = auto, 1 = A first, 2 = B first
seq_typ	No/Yes	No	-	Loading sequence by circuit
ramp_sel	No/Yes	No	-	Ramp loading sequence
off_on_d	1 to 15	1	min	Start-up delay
nh_limit	0 to 100	100	%	Capacity limitation in night mode
nh_start	00:00 to 24:00	00:00	-	Night mode start hour
nh_end	00:00 to 24:00	00:00	-	Night mode stop hour
bas_menu	0 to 3	0	-	Basic menu configuration 0 = total access 1 = access to the alarm menu by password 2 = access to the setpoint menu by password 3 = combination of 1 and 2
synoptic	No/Yes	No	-	Synoptic diagram displayed

4.9.19 - PUMPCONF menu

NAME	FORMAT	DEFAULT	UNIT	DESCRIPTION
pump_seq	0/1/2/3/4	0	-	Heat exchanger pump sequence 0 = no pump 1 = one pump 2 = two pumps auto 3 = pump 1 manual 4 = pump 2 manual
pump_del	24 to 3000	48	hours	Rotation time between pumps
pump_per	No/Yes	No	-	Pump seizure protection
pump_sby	No/Yes	No	-	Pump shutdown when the unit is in standby
pump_loc	No/Yes	Yes	-	Flow rate verification when the pump has shut down

4.9.20 - HCCONFIG menu

NOM	FORMAT	DEFAULT	UNIT	DESCRIPTION
auto_sel	No/Yes	No	-	Automatic change-over selection
cr_sel	0 to 2	0	-	Cooling reset selection
hr_sel	0 to 2	0	-	Heating reset selection 1 = outside temp., 0 = none, 2 = delta T
heat_th	-20 to 0	-15	°C	Outside temperature threshold cooling mode
boil_th	-15 to 15	-10	°C	Outside temperature threshold for the boiler
ehs_th	-5 to 21.2	5	°C	Outside temperature threshold for electric heater stages
both_sel	No/Yes	No	-	Heating or cooling command selection for HSM
ehs_back	No/Yes	No	-	1 backup electric heater stage
ehs_pull	0 to 60	0	minutes	Delay before start-up of the first electric heater stage
ehs_defr	No/Yes	No	-	Quick electric heat stages for defrost

4.9.21 - RESETCFG menu

NAME	FORMAT	DEFAULT	UNIT	DESCRIPTION
COOLING RESET				
oatcr_no	-10 to 51.7	-10	°C	Outside temperature for no reset
oatcr_fu	-10 to 51.7	-10	°C	Outside temperature for maximum reset
dt_cr_no	0 to 13.9	0	^C	Delta T for no reset
dt_cr_fu	0 to 13.9	0	^C	Delta T for maximum reset
cr_deg	-16.7 to 16.7	0	^C	Cooling reset value
HEATING RESET				
oathr_no	-10 to 51.7	-10	°C	Outside temperature for no reset
oathr_fu	-10 to 51.7	-10	°C	Outside temperature for maximum reset
dt_hr_no	0 to 13.9	0	^C	Delta T for no reset
dt_hr_fu	0 to 13.9	0	^C	Delta T for maximum reset
hr_deg	-16.7 to 16.7	0	^C	Heating reset value

4.9.22 - USERCONF menu

NAME	FORMAT	DEFAULT	UNIT	DESCRIPTION
language	0 to 4	0	-	Language selection English = 0, Spanish = 1, French = 2, Portuguese = 3, Italian = 4, Translation = 5
use_pass	1 to 9999	11	-	User password

4.9.23 - DATETIME menu

NAME	FORMAT	DEFAULT	UNIT	DESCRIPTION
hour	0 to 24		hours	Hour
minutes	0 to 59		minutes	Minutes
dow	1 to 7			Day of the week
tom_hol	No/Yes	No	-	Holiday tomorrow?
tod_hol	No/Yes	No	-	Holiday today
dlig_off	No/Yes		-	Winter time change-over active?
dlig_on	No/Yes		-	Summer time change-over active?
d_of_m	1 to 31			Day of the month
month	1 to 12			Month
year	0 to 99			Year

4.9.24 - Menu CTRL_ID

NAME	FORMAT	DEFAULT	UNIT	DESCRIPTION
elemt_nb	1 to 239	1	-	Element number
bus_nb	0 to 239	0	-	Bus number
baudrate	9600 to 38400	9600	-	Communication speed
		PRO-DIALOG + 30RBS/RQS		Description
		CSA-SR-20H430NN		Software version
		-		Serial number

4.9.25 - OCC1PSX menu

The control provides two timer programs: schedule 1 and schedule 2 that can be activated.

The first timer program (schedule 1) provides a means to automatically switch the unit from an occupied mode to an unoccupied mode: the unit is started during occupied periods.

The second timer program (schedule 2) provides a means to automatically switch the active setpoint from an occupied setpoint to an unoccupied setpoint: cooling setpoint 1 is used during occupied periods, cooling or heating setpoint 2 during unoccupied periods.

Each schedule consists of eight time periods set by the operator. These time periods can be flagged to be in effect or not in effect on each day of the week plus a holiday period. The day begins at 00.00 hours and ends at 23.59 hours.

Program is in unoccupied mode unless a schedule time period is in effect. If two periods overlap and are both active on the same day, the occupied mode takes priority over the unoccupied period.

Each of the eight periods can be displayed and changed with the aid of a sub-sub-menu. The table on page 17 shows how to access the period configuration. Method is the same for the time schedule 1 or the time schedule 2.

Time schedule type:

Time	MON	TUE	WES	THU	FRI	SAT	SUN	HOL
0	P1							
1	P1							
2	P1							
3								
4								
5								
6								
7	P2	P2	P3	P4	P4	P5		
8	P2	P2	P3	P4	P4	P5		
9	P2	P2	P3	P4	P4	P5		
10	P2	P2	P3	P4	P4	P5		
11	P2	P2	P3	P4	P4	P5		
12	P2	P2	P3	P4	P4			
13	P2	P2	P3	P4	P4			
14	P2	P2	P3	P4	P4			
15	P2	P2	P3	P4	P4			
16	P2	P2	P3	P4	P4			
17	P2	P2	P3					
18			P3					
19			P3					
20			P3					P6
21								
22								
23								

MON: Monday
TUE: Tuesday
WED: Wednesday
THU: Thursday
FRI: Friday
SAT: Saturday
SUN: Sunday
HOL: Holiday

Occupied
Unoccupied

	Starts at	Stops at	Active on
P1: period 1,	0h00,	3h00,	Monday
P2: period 2,	7h00,	18h00,	Monday + Tuesday
P3: period 3,	7h00,	21h00,	Wednesday
P4: period 4,	7h00,	17h00,	Thursday + Friday
P5: period 5,	7h00,	12h00,	Saturday
P6: period 6,	20h00,	21h00,	Holidays
P7: period 7,	Not used in this example		
P8: period 8,	Not used in this example		

NAME	FORMAT	DEFAULT	UNIT	DESCRIPTION
OVR_EXT	0-4	0	hours	Occupied schedule override
DOW1	0/1	11111111	-	Period 1 day of the week MTWTFSSH Monday Tuesday Wednesday Thursday Friday Saturday Sunday Holiday
OCCTOD1	0:00-24:00	00:00	-	Occupied from
UNOCTOD1	0:00-24:00	24:00:00	-	Occupied until
DOW2	0/1	0	-	Period 2 days of the week MTWTFSSH Monday Tuesday Wednesday Thursday Friday Saturday Sunday Holiday
OCCTOD2	0:00-24:00	00:00	-	Occupied from
UNOCTOD2	0:00-24:00	00:00	-	Occupied until
DOW3	0/1	0	-	Period 3 days of the week MTWTFSSH Monday Tuesday Wednesday Thursday Friday Saturday Sunday Holiday
OCCTOD3	0:00-24:00	00:00	-	Occupied from
UNOCTOD3	0:00-24:00	00:00	-	Occupied until
DOW4	0/1	0	-	Period 4 days of the week MTWTFSSH Monday Tuesday Wednesday Thursday Friday Saturday Sunday Holiday
OCCTOD4	0:00-24:00	00:00	-	Occupied from
UNOCTOD4	0:00-24:00	00:00	-	Occupied until
DOW5	0/1	0	-	Period 5 days of the week MTWTFSSH Monday Tuesday Wednesday Thursday Friday Saturday Sunday Holiday
OCCTOD5	0:00-24:00	00:00	-	Occupied from
UNOCTOD5	0:00-24:00	00:00	-	Occupied until
DOW6	0/1	0	-	Period 6 days of the week MTWTFSSH Monday Tuesday Wednesday Thursday Friday Saturday Sunday Holiday
OCCTOD6	0:00-24:00	00:00	-	Occupied from
UNOCTOD6	0:00-24:00	00:00	-	Occupied until
DOW7	0/1	0	-	Period 7 days of the week MTWTFSSH Monday Tuesday Wednesday Thursday Friday Saturday Sunday Holiday
OCCTOD7	0:00-24:00	00:00	-	Occupied from
UNOCTOD7	0:00-24:00	00:00	-	Occupied until
DOW8	0/1	0	-	Period 8 days of the week MTWTFSSH Monday Tuesday Wednesday Thursday Friday Saturday Sunday Holiday
OCCTOD8	0:00-24:00	00:00	-	Occupied from
UNOCTOD8	0:00-24:00	00:00	-	Occupied until

4.9.26 - HOLIDY0XS menu

This function is used to define 16 public holiday periods. Each period is defined with the aid of three parameters: the month, starting day and duration of the public holiday period. During these public holidays the controller will be in occupied or unoccupied mode, depending on the programmed periods validated for public holidays.

Each of these public holiday periods can be displayed and changed with the aid of a sub-menu.

ATTENTION: The broadcast function must be activated to utilise the holiday schedule, even if the unit is running in stand-alone mode (not connected to CCN).

NAME	FORMAT	DEFAULT	UNIT	DESCRIPTION
HOL_MON	0-12	0	-	Holiday month
HOL_DAY	0-31	0	-	Holiday day
HOL_LEN	0-99	0	-	Holiday duration

5 - PRO-DIALOG PLUS CONTROL OPERATION

5.1 - Start/stop control

The table below summarises the unit control type and stop or go status with regard to the following parameters.

- Operating type: this is selected using the start/stop button on the front of the user interface.
  LOFF: local off, L-C: local on, L-SC: local schedule, REM: remote, CCN: network, MAST: Master
- Remote start/stop contacts: these contacts are used when the unit is in remote operating type (Remote). See sections 3.6.2 and 3.6.3.
- CHIL_S_S: this network command relates to the unit start/stop when the unit is in network mode (CCN).
- Command set to Stop: the unit is halted.
- Command set to Start: the unit runs in accordance with schedule 1.
- Start/Stop schedule: occupied or unoccupied status of the unit as determined by the chiller start/stop program (Schedule 1).
- Master control type. This parameter is used when the unit is the master unit in a two chiller lead/lag arrangement. The master control type determines whether the unit is to be controlled locally, remotely or through CCN (this parameter is a Service configuration).
- CCN emergency shutdown: if this CCN command is activated, it shuts the unit down whatever the active operating type.
- General alarm: the unit is totally stopped due to failure.

ACTIVE OPERATING TYPE							STATUS OF PARAMETERS					CONTROL TYPE	UNIT MODE
LOFF	L-ON	L-SC	rEM	CCN	MASt	CHIL_S_S	REMOTE START/STOP CONTACT	MASTER CONTROL TYPE	START/STOP SCHEDULE MODE	CCN EMERGENCY SHUTDOWN	GENERAL ALARM		
-	-	-	-	-	-	-	-	-	-	Enable	-	-	Off
-	-	-	-	-	-	-	-	-	-	-	Yes	-	Off
Active	-	-	-	-	-	-	-	-	-	-	-	Local	Off
-	-	Active	-	-	-	-	-	-	Unoccupied	-	-	Local	Off
-	-	-	Active	-	-	-	Off	-	-	-	-	Remote	Off
-	-	-	Active	-	-	-	-	-	Unoccupied	-	-	Remote	Off
-	-	-	-	Active	-	Disable	-	-	-	-	-	CCN	Off
-	-	-	-	Active	-	-	-	-	Unoccupied	-	-	CCN	Off
-	-	-	-	-	Active	-	-	Local	Unoccupied	-	-	Local	Off
-	-	-	-	-	Active	-	Off	Remote	-	-	-	Remote	Off
-	-	-	-	-	Active	-	-	Remote	Unoccupied	-	-	Remote	Off
-	-	-	-	-	Active	Disable	-	CCN	-	-	-	CCN	Off
-	-	-	-	-	Active	-	-	CCN	Unoccupied	-	-	CCN	Off
-	Active	-	-	-	-	-	-	-	-	Disable	No	Local	On
-	-	Active	-	-	-	-	-	-	Occupied	Disable	No	Local	On
-	-	-	Active	-	-	-	On cooling	-	Occupied	Disable	No	Remote	On
-	-	-	Active	-	-	-	On heating	-	Occupied	Disable	No	Remote	On
-	-	-	Active	-	-	-	On auto	-	Occupied	Disable	No	Remote	On
-	-	-	-	Active	-	Enable	-	-	Occupied	Disable	No	CCN	On
-	-	-	-	-	Active	-	-	Local	Occupied	Disable	No	Local	On
-	-	-	-	-	Active	-	On cooling	Remote	Occupied	Disable	No	Remote	On
-	-	-	-	-	Active	-	On heating	Remote	Occupied	Disable	No	Remote	On
-	-	-	-	-	Active	-	On auto	Remote	Occupied	Disable	No	Remote	On
-	-	-	-	-	Active	Enable	-	CCN	Occupied	Disable	No	CCN	On

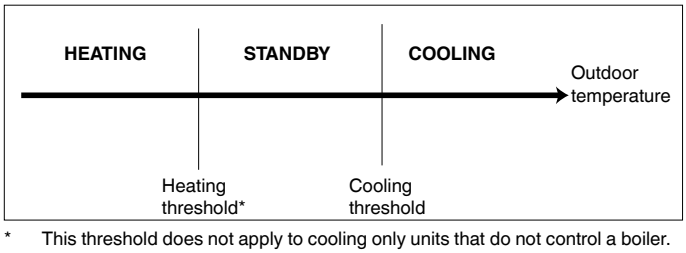
5.2 - Heating/cooling/standby operation

5.2.1 - General

The heating/cooling/standby selection applies to all units. But only 30RB (liquid chillers) units, controlling a boiler can change over to heating mode. Heating/cooling control can be automatic or manual.

In automatic mode the outdoor temperature determines the heating/cooling/standby changeover based on the two threshold values configured by the user (see RESETCFG menu for cooling and heating mode changeover thresholds).

If the unit is in standby it does not cool or heat, and no compressor can be activated. The diagram below summarises the operating principle in automatic mode.



* This threshold does not apply to cooling only units that do not control a boiler.

5.2.2 - Heating/cooling/auto selection

The table below summarises the unit heating/cooling operation, based on the following parameters:

- Control type: indicates whether the unit operates in local, remote or CCN mode. See section 5.1.
- Unit on/off status: indicates whether the unit is shut down (not authorised to start) or in operation (or authorised to start).
- Heating/cooling/auto selection in local mode: operating mode selected via the user interface. See GENUNIT menu.
- Remote heating/cooling contacts: these contacts are only active if the unit is under remote control.
- HC_SEL: this network command permits heating/cooling/auto control, if the unit is in CCN operating mode.
- Outside temperature: determines the operation, if the unit is in automatic heating/cooling/standby changeover mode.

PARAMETER STATUS						
ON/OFF STATUS	**CONTROL TYPE**	**HEATING/COOLING SELECTION IN LOCAL MODE**	**REMOTE HEATING/ COOLING CONTACTS**	**HC_SEL**	**OUTDOOR TEMPERATURE**	**OPERATING MODE**
Off	-	-	-	-	-	Cooling
On	Local	Cooling	-	-	-	Cooling
On	Local	Heating	-	-	-	Heating
On	Local	Auto	-	-	> Cooling threshold	Cooling
On	Local	Auto	-	-	< Heating threshold	Heating*
On	Local	Auto	-	-	Between cooling and heating thresholds	Standby
On	Remote	-	Cooling mode	-	-	Cooling
On	Remote	-	Heating mode	-	-	Heating
On	Remote	-	Auto mode	-	> Cooling threshold	Cooling
On	Remote	-	Auto mode	-	< Heating threshold	Heating*
On	Remote	-	Auto mode	-	Between cooling and heating thresholds	Standby
On	CCN	-	-	Cooling	-	Cooling
On	CCN	-	-	Heating	-	Heating
On	CCN	-	-	Auto	> Cooling threshold	Cooling
On	CCN	-	-	Auto	< Heating threshold	Heating*
On	CCN	-	-	Auto	Between cooling and heating thresholds	Standby

* Does not apply to cooling only units that do not control a boiler.

5.3 - Heat exchanger water pump control

The unit can control one or two heat exchanger water pumps. The pump is turned on when this option is configured (see PUMPCONFIG) and when the unit is in one of the on modes described above or in delay mode. Since the minimum value for the delay at start-up is 1 minute (configurable between 1 and 15 minutes), the pump will run for at least one minute before the first compressor starts.

The pump is kept running for 20 seconds after the unit goes to stop mode. The pump keeps working when the unit switches from heating to cooling mode or vice-versa. It is turned off if the unit is shut down due to an alarm unless the fault is a frost protection error. The pump can be started in particular operating conditions when the heat exchanger heater is active (see chapter 5.5). See chapter 5.14 for the particular heat exchanger pump control for the follower unit (master/slave assembly).

If two pumps are controlled and the reversing function has been selected (see PUMPCONF configuration), the control tries to limit the pump run time delta to the configured pump change-over delay. If this delay has elapsed, the pump reversing function is activated, when the unit is running. During the reversing function both pumps run together for two seconds. If the pumps are of the variable flow rate type pump reversal will take place at the next machine start-up.

If a pump has failed and a secondary pump is available, the unit is stopped and started again with this pump.

The control provides a means to automatically start the pump each day at 14.00 hours for 2 seconds when the unit is off. If the unit is fitted with two pumps, the first pump is started on odd days and the second pump is started on even days. Starting the pump periodically for few seconds increases the life-time of the pump bearings and the tightness of the pump seal.

5.4 - Control interlock contact

This contact checks the status of a loop (water flow switch and customer safety loop, see chapter 3.6). It prevents the unit from starting if it is open when the delay at start-up has expired. This open contact leads to an alarm shut-down, if the unit is running.

5.5 - Heat exchanger frost protection

The heater for the heat exchanger and the water pump (for units with a pump) can be energised to protect the heat exchanger, if it may be damaged by frost, when the unit is shut down for a long time at low outdoor temperature.

NOTE: Heat exchanger heater control parameters can be modified, using the Service configuration.

5.6 - Control point

The control point represents the water temperature that the unit must produce. The heat exchanger entering water temperature is controlled by default, but the heat exchanger leaving water temperature can also be controlled (requires a Service configuration modification).

Control point = active setpoint + reset

5.6.1 - Active setpoint

Two setpoints can be selected as active in cooling mode and two in heating mode. Usually, the second setpoint is used for unoccupied periods.

Depending on the current operating type, the active setpoint can be selected:

- by choosing the item in the GENUNIT menu,
- via the user's volt-free contacts,
- via network commands
- via the setpoint timer program (schedule 2).

The following tables summarise the possible selections depending on the control types (local, remote or network) and the following parameters:

- Setpoint select in local control: item LSP_SEL in the GENUNIT menu permits selection of the active set-point, if the unit is in local operating type.
- Heating/cooling operating mode.
- Setpoint selection contacts: setpoint selection contact status.
- Schedule 2 status: schedule for setpoint selection.

LOCAL OPERATING MODE

PARAMETER STATUS			
Heating/cooling operating mode	**Local setpoint selection**	**Time schedule 2 status**	**Active setpoint**
Cooling	sp 1	-	Cooling setpoint 1
Cooling	sp 2	-	Cooling setpoint 2
Cooling	auto	occupied	Cooling setpoint 1
Cooling	auto	unoccupied	Cooling setpoint 2
Heating	sp1	-	Heating setpoint 1
Heating	sp 2	-	Heating setpoint 2
Heating	auto	occupied	Heating setpoint 1
Heating	auto	unoccupied	Heating setpoint 2

REMOTE OPERATING MODE

PARAMETER STATUS		
Heating/cooling operating mode	**Setpoint selection contact**	**Active setpoint**
Cooling	sp 1 (open)	Cooling setpoint 1
Cooling	sp 2 (closed)	Cooling setpoint 2
Heating	sp 1 (open)	Heating setpoint 1
Heating	sp 2 (closed)	Heating setpoint 2

5.6.2 - Reset

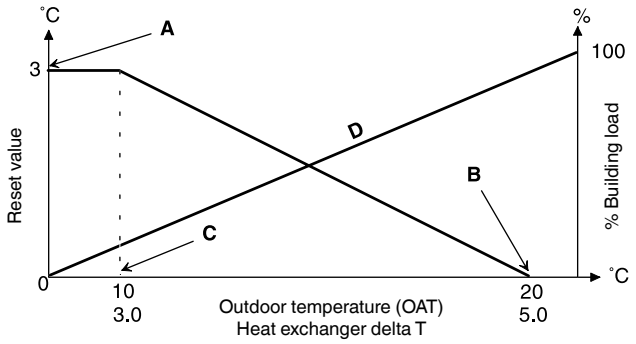
Reset means that the active setpoint is modified so that less machine capacity is required (in cooling mode, the setpoint is increased, in heating mode it is decreased). This modification is in general a reaction to a drop in the load. For the Pro-Dialog control system, the source of the reset can be configured in the HCCONFIG configuration: it can be provided either by the outdoor temperature (that gives a measure of the load trends for the building) or by the return water temperature (heat exchanger delta T, gives an average building load).

In response to a drop in the outdoor temperature or to a drop in delta T, the cooling setpoint is normally reset upwards in order to optimise unit performance:

In both cases the reset parameters, i.e. slope, source and maximum value, are configurable in the RESETCFG menu (see section 4.3.8). Reset is a linear function based on three parameters.

- A reference at which reset is zero (outdoor temperature or delta T - no reset value).
- A reference at which reset is maximum (outdoor temperature or delta T - full reset value).
- The maximum reset value.

Reset example in cooling mode based on the outside temperature



Legend

A Maximum reset value
B OAT or delta T for no reset
C OAT or delta T for full reset
D Building Load

5.7 - Demand limit

The demand limit is used to restrict the unit power consumption. The Pro-Dialog control system allows limitation of the unit capacity, using user-controlled volt-free contacts.

The unit capacity can never exceed the limit setpoint activated by these contacts. The limit setpoints can be modified in the SETPOINT menu.

5.8 - Night mode

The night period is defined (see GENUNIT configuration) by a start time and an end time that are the same for each day of the week. During the night period, the number of fans operating can be reduced, and the unit capacity may be limited.

5.9 - Capacity control

This function adjusts the number of active compressors to keep the heat exchanger water temperature at its setpoint. The precision with which this is achieved depends on the capacity of the water loop, the flow rate, the load, and the number of stages available on the unit. The control system continuously takes account of the temperature error with respect to the setpoint, as well as the rate of change in this error and the difference between entering and leaving water temperatures, in order to determine the optimum moment at which to add or withdraw a capacity stage.

If the same compressor undergoes too many starts (per hour) or runs below one minute each time it is started this automatically brings about reduction of compressor starts, which makes leaving water temperature control less precise.

The high pressure, low pressure or defrost unloading functions can also affect temperature control accuracy. Compressors are started and stopped in a sequence designed to equalise the number of start-ups (value weighted by their operating time).

5.10 - Head pressure control

The head pressure is independently controlled for each circuit, based on the saturated condensing temperature value.

5.11 - Defrost function

This function only applies to heat pumps. Defrost is activated, when the unit is in heating mode to reduce frost build-up on the air heat exchanger. The defrost cycle can only be applied to one circuit at a time. During the defrost cycle the fans of that circuit are stopped, and the four-way refrigerant valve is reversed, forcing the circuit to cooling mode. The fan can temporarily be restarted during the defrost cycle. The defrost cycle is fully automatic and does not require any setting.

5.12 - Desuperheater option

In units with desuperheater it is possible to reclaim the hot water. To optimise this option, the condensing setpoint should be increased (chapter 4.9.4 setpoint menu, sct_min) while the desuperheater heat exchanger is used. Optimising desuperheater condensation is activated via dry contact DSHTR_SW (see chapter 3.6.1).

5.13 - Additional electric heater stage control

The heat pump units can control up to four additional electric heating stages (accessory).

The electric heating stages are activated to complement the heating capacity when the following conditions are satisfied:

- The unit uses 100% of the available heating capacity, or the unit is limited in its operation by a protection mode (low suction temperature, hot gas or defrost sequence in progress protection), and in all cases cannot satisfy the heating load.
- The outdoor temperature is below a configured threshold (see HCCONFIG configuration).
- The unit demand limit is not active.

The user may configure the last available electric heating stages as a safety stage. In this case, the safety stage is only activated in addition to the other stages if there is a machine fault, preventing the use of the heating capacity. The other electric heating stages will continue to operate as described above.

5.14 - Control of a boiler

NOTE: The control of the electric heating stages or of a boiler is not authorised for slave units.

The unit can control the start-up of a boiler, if it is in heating mode. When the boiler is operating, the unit water pump is stopped.

A heat pump unit and a boiler cannot operate together. In this case the boiler output is activated in the following conditions:

- The unit is in heating mode, but a fault prevents the use of the heat pump capacity.
- The unit is in heating mode, but works at a very low outdoor temperature, making the heat pump capacity insufficient. The outdoor air temperature threshold for use of the boiler is fixed at -10°C, but this value can be adjusted in the HCCONFIG menu.

5.15 - Master/slave assembly

Two Pro-Dialog+ units can be linked to produce a master/slave assembly. The two machines are interconnected over the CCN bus. All parameters required for the master/slave function must be configured through the Service configuration menu.

Master/slave operation requires the connection of a temperature probe at the common manifold on each machine, if the heat exchanger leaving water temperature is controlled. It is not required, if the entering water temperature is controlled.

The master/slave assembly can operate with constant or variable flow. In the case of variable flow each machine must control its own water pump and automatically shut down the pump, if the cooling capacity is zero.

For constant flow operation the pumps for each unit are continuously operating, if the system is operating. The master unit can control a common pump that will be activated, when the system is started. In this case the slave unit pump is not used.

All control commands to the master/slave assembly (start/stop, setpoint, heating/cooling operation, load shedding, etc.) are handled by the unit which is configured as the master, and must therefore only be applied to the master unit. They will be transmitted automatically to the slave unit.

The master unit can be controlled locally, remotely or by CCN com-mands. Therefore to start up the assembly, simply validate the Master operating type (Master) on the master unit. If the Master has been configured for remote control then use the remote volt-free contacts for unit start/stop.

The slave unit must stay in CCN operating type continuously. To stop the master/slave assembly, select Local Off on the master unit or use the remote volt-free contacts if the unit has been configured for remote control.

One of the functions of the master unit (depending on its configuration) may be the designation, whether the master or slave is to be the lead machine or the follower. The roles of lead machine and follower will be reversed when the difference in running hours between the two units exceeds a configurable value, ensuring that the running times of the two units are automatically equalised.

The changeover between lead machine and follower may take place when the assembly is started up, or even whilst running. The running time balancing function is not active if it has not been configured: in this case the lead machine is always the master unit.

The lead machine will always be started first. When the lead machine is at its full available capacity, start-up delay (configurable) is initialised on the follower. When this delay has expired, and if the error on the control point is greater than 1.7°C, the follower unit is authorised to start and the pump is activated. The follower will automatically use the master unit active setpoint. The lead machine will be held at its full available capacity for as long as the active capacity on the follower is not zero. When the follower unit receives a command to stop, its evaporator water pump is turned off with 20 seconds delay.

In the event of a communication fault between the two units, each shall return to an autonomous operating mode until the fault is cleared. If the master unit is halted due to an alarm, the slave unit is authorised to start without prior conditions.

ATTENTION: For heat pumps operating in master/slave mode and using an NRCP2 board or equipped with electric heater stages control must be on the entering water temperature.

6 - DIAGNOSTICS - TROUBLESHOOTING

6.1 - General

The Pro-Dialog+ control system has many fault tracing aid functions. The local interface and its various menus give access to all unit operating conditions. If an operating fault is detected, an alarm is activated and an alarm code is stored in the Alarms menu, sub-menus CUR_ALRM and ALARMRST.

6.2 - Displaying alarms

The alarm LED on the interface (see chapter 4.1) allows the quick display of the unit status.

- A flashing LED shows that the circuit is operating but there is an alert.
- A steady LED shows that the circuit has been shut down due to a fault.

The ALARMRST menu on the main interface displays up to five fault codes that are active on the unit.

6.3 - Resetting alarms

When the cause of the alarm has been corrected the alarm can be reset, depending on the type, either automatically on return to normal, or manually when action has been taken on the unit. Alarms can be reset even if the unit is running.

This means that an alarm can be reset without stopping the machine. In the event of a power supply interrupt, the unit restarts automatically without the need for an external command. However, any faults active when the supply is interrupted are saved and may in certain cases prevent a circuit or a unit from restarting.

A manual reset must be run from the main interface via the ALARMRST menu, item RST_ALM. Depending on the configuration in the GENCONF menu, access to the item may be protected by a password.

6.4 - Alarm codes

Alarm No.	Alarm code	Alarm description	Reset type	Probable cause	Action taken by the control
Thermistor faults					
1	th-01	Sensor fault, fluid entering water heat exchanger	Automatic when the temperature measured by the sensor returns to normal	Defective thermistor	Unit is shut down
2	th-02	Sensor fault, fluid leaving water heat exchanger	As above	As above	As above
3	th-03	Defrost fault, circuit A	As above	As above	Circuit is shut down, if the unit is in heating mode
4	th-04	Defrost fault, circuit B or second default sensor fault, circuit B	As above	As above	As above
5	th-10	Outside temperature sensor fault	As above	As above	Unit is shut down
6	th-11	CHWS fluid sensor fault (master/ slave)	As above	As above	The master/slave mode is stopped
7	th-12	Suction sensor fault, circuit A	As above	As above	Circuit is shut down
8	th-13	Suction sensor fault, circuit B	As above	As above	As above
9	th-44	Suction sensor fault, coil 1	As above	As above	As above
10	th-45	Suction sensor fault, coil 2	As above	As above	As above
Pressure transducer faults					
11	Pr-01	Discharge pressure transducer fault, circuit A	Automatic when the voltage transmitted by the sensor returns to normal	Defective transducer or installation fault	Circuit is shut down
12	Pr-02	Discharge pressure transducer fault, circuit B	As above	As above	As above
13	Pr-04	Suction pressure transducer fault, circuit A	As above	As above	As above
14	Pr-05	Suction pressure transducer fault, circuit B	As above	As above	As above
51	Pr-24	Entering water pressure sensor fault	Automatic when the voltage transmitted by the sensor returns to normal	Defective transducer or installation fault	Circuit is shut down
52	Pr-25	Leaving water pressure sensor fault	As above	As above	As above
Communication with the slave boards					
15	CO-BB	Communication loss with the NRCP2 board	Automatic when communication is re-established	Installation bus fault or defective slave board	Depending on the configuration, compressor A3 is shut down or circuit B is shut down.
16	Co-ht	Communication loss with the additonal heating stage board	As above	As above	The additional heating stages are shut down
17	Co-e1	Communication loss with the EXV board	As above	As above	Unit is shut down
18	Co-o1	Communication loss with the PD-AUX 1 board	As above	As above	Unit with optional water pressure sensors, unit is shut down
19	Co-o2	Communication loss with the PD-AUX 2 board	As above	As above	None
Process faults					
20	P-01	Water heat exchanger frost protection	Automatic if the same alarm has not tripped during the last 24 hours, otherwise manual.	Water flow rate too low or defective thermistor	Unit is shut down
21	P-05	Low suction temperature, circuit A	Automatic when the temperature returns to normal, and if this alarm has not appeared during the last 24 hours, otherwise manual.	Pressure sensor defective, EXV blocked or low refrigerant charge	Circuit is shut down
22	P-06	Low suction temperature, circuit B	As above	As above	As above
23	P-08	High superheat, circuit A	As above	As above	As above
24	P-09	High superheat, circuit B	As above	As above	As above
25	P-11	Low superheat, circuit A	As above	As above	As above
26	P-12	Low superheat, circuit B	As above	As above	As above
27	P-14	Water flow control and customer interlock fault	Automatic if the unit is in manual shut-down status, otherwise manual.	Heat exchanger pump defect or water flow switch fault	Unit is shut down
28	P-16	Compressor A1 not started or no pressure increase registered	Manual	Connection problem	Compressor is shut down
29	P-17	Compressor A2 not started or no pressure increase registered	As above	As above	As above
30	P-18	Compressor A3 not started or no pressure increase registered	As above	As above	As above
31	P-20	Compressor B1 not started or no pressure increase registered	As above	As above	As above
32	P-21	Compressor B2 not started or no pressure increase registered	As above	As above	As above

6.4 - Alarm codes (cont.)

Alarm No.	Alarm code	Alarm description	Reset type	Probable cause	Action taken by the control
Process faults (cont.)					
33	P-29	Communication loss with the System Manager	Automatic when communication is re-established	CCN installation bus defective	Unit goes into autonomous mode
34	P-30	Communicaiton loss between master and slave	Automatic when communication is re-established	CCN installation bus defective	As above
35	MC-nn	Master chiller 1 configuration error	Automatic when the master configuration returns to normal or when the unit is no longer in master/slave mode	Master/slave configuration error	Master/slave mode is stopped
36	FC-n0	No factory configuration	Automatic when the configuration is entered	The unit size has not been configured	Unit is shut down
37	FC-01	Illegal factory configuration number	Manual	The unit size has been configured with the wrong value	As above
38	P-31	CCN emergency stop	Manual	Network command	As above
39	P-32	Fault water pump 1	Manual	Pump overheating or poor pump connection	Unit is completely stopped if there is no emergency pump
40	P-33	Fault water pump 2	Manual	As above	As above
41	P-37	Repeated high pressure unloading, circuit A	Automatic	Transducer defective or fan circuit fault	None
42	P-38	Repeated high pressure unloading, circuit B	Automatic	As above	As above
43	P-40	Repeated low suction temperature unloading in heating mode, circuit A	Manual	Pressure sensor defective or refrigerant charge too low	Circuit is shut down
44	P-41	Repeated low suction temperature unloading in heating mode, circuit B	Manual	As above	As above
45	P-43	Heat exchanger temperature too low, less than 10°C, prevents unit start-up	Automatic when the temperature detected returns to normal or when the mode returns to cooling	Operating compressor protection out of range or pressure sensor fault	The unit cannot start
46	P-97	Reversed entering/leaving water sensors	Manual	Sensor defective, sensors reversed	Unit is shut down
48	V0-xx	Fault, variable fan speed controller, circuit A	Manual or automatic	Speed controller fault or alert	Alert: The circuit continues to operate, the speed controller slows down the motor. Alarm: The circuit shuts down.
49	V1-xx	Fault, variable fan speed controller, circuit B	As above	As above	As above
50	V3-xx	Fault, variable water pump controller			
51	Sr-00	Maintenance service alert	Manual	The preventive maintenance date has passed	
53	P62-2	Water loop control fault, missing sensor calibration	Automatic if the calibration is valid	No calibration	
	P62-3	Water loop control fault, suction pressure too low	Automatic the first time, if the water system is supplied with water, the second time manual if it is the same day	Too little water in the system	Unit is shut down
	P62-4	Water loop control fault, water pump has not started			
	P62-5	Reserved			
	P62-6	Water loop control fault, water pump overload	Automatic	Missing pressure head at the water pump	Unit is shut down
	P62-7	Water loop control fault, water flow rate fault	Manual	Serious water leak, casse pompe	Unit is shut down
	P62-8	Water loop control fault, water pressure sensors mixed up	Automatic	Sensors mixed up	Unit is shut down
54	P-63	High pressure fault in circuit A	Manual	Fan fault	Circuit is shut down
55	P-64	High pressure fault in circuit B	As above	As above	As above
56	P-99	Refrigerant leak detected	Automatic	Refrigerant leak or solvent present in the machine atmosphere	No action

ISO9001·ISO14001

Quality and Environment Management Systems Approval

Order No. 13462-76, 10.2016. Supersedes order No.: 13462-76, 07.2015.
Manufacturer reserves the right to change any product specification without notice.

Manufactured by: Carrier SCS, Montluel, France.
Printed in the European Union.