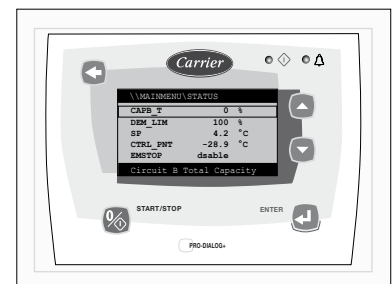




48UA/UH - 50UA/UH

Pro-Dialog+ Control for Rooftop Units

PRO-DIALOG



Installation, operation and maintenance 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 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:

- 48UA cooling only rooftop unit with gas heating
- 50UA cooling only rooftop unit
- 48UH reversible heat pump rooftop unit with gas heating
- 50UH reversible heat pump rooftop unit.

These units have one or two refrigerant circuits.

Pro-Dialog controls:

- compressor start-up to control the space temperature
- indoor fan operation
- the outdoor fans to optimise the operation of each refrigerant circuit
- the defrost cycles to ensure the operation of the refrigerant circuits (48/50UH only).

Safety devices are constantly monitored by Pro-Dialog to ensure unit protection. 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 refrigeration circuits are called circuit A and circuit B. The compressors in circuit A are labelled A1 and A2. Those in circuit B are labelled B1 and B2.

The following abbreviations are used frequently:

RTU	Rooftop unit
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
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 or additional heater stages.

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 seven-line display, two LEDs with five navigation keys as well as a contrast control wheel.

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.

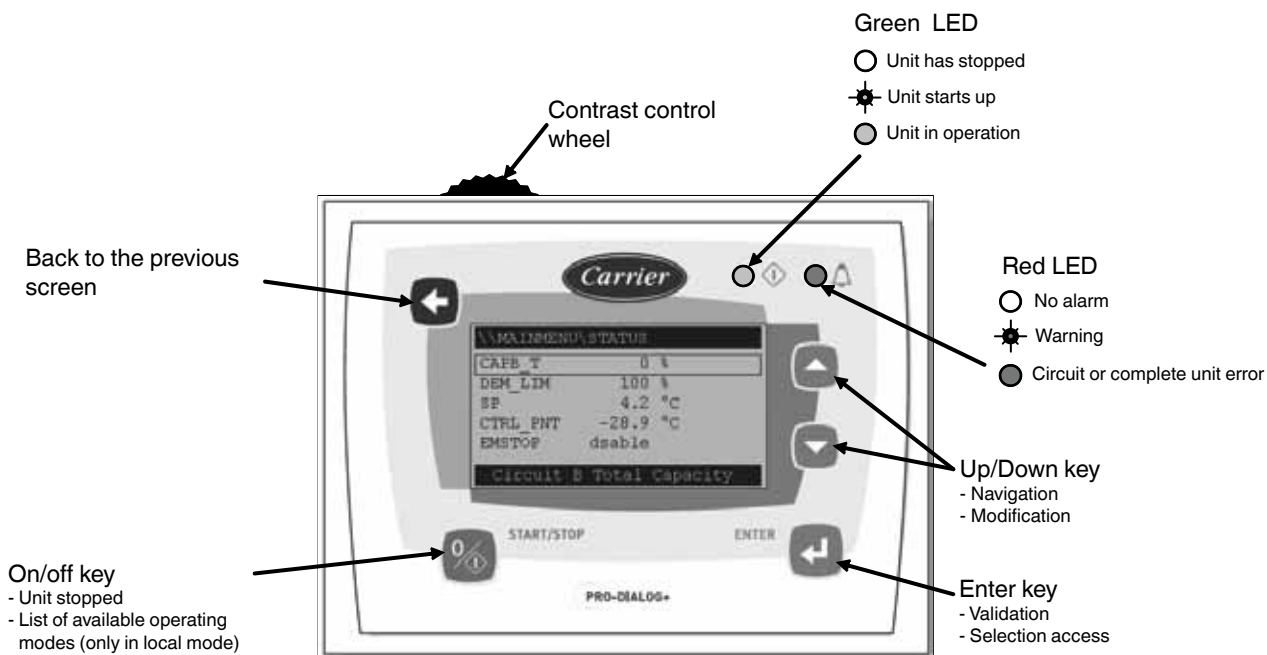
In the event of a power supply interrupt, the unit restarts automatically without the need for an external command. However, any faults active when the supply is interrupted are saved and may in certain cases prevent a circuit or unit from restarting.

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.

Figure 1 - Control board



3.4 - Sensors

Pressure sensors

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

Thermistors

Space temperature sensors

Up to two sensors may be used. They take into account either an average space temperature or minimum and maximum space temperatures, depending on the configuration.

- Sensor T-55: this is a 10 K sensor
- Optional sensor T-56: this 10 K sensor is fitted with:
 - an offset slider to adjust the temperature setpoint. Moving the slider to the left (cold) allows the temperature setpoint to be reduced by as much as 3 K; moving it to the right (warm) allows it to be increased by up to 3 K (in steps of ± 1 K). When the slider is in its central position there is no offset.
 - a button for extending the occupied period from one to four hours depending on the occupied period extension value entered in the configuration menu (see GENCONF menu).
- Optional sensor T-55: this 10 K sensor is fitted with a button for extending the occupied period.
- Optional Room-mate comfort controller (sensor T-59): this 10 K sensor is fitted with:
 - a customised liquid crystal display (LCD) that indicates space temperature and setpoint offset.
 - an on/off function to start and stop the unit using remote contacts.
 - temperature offset adjustment which allows the temperature setpoint to be reduced by as much as 3 K and to be increased by as much as 3 K.
 - a button to extend the occupied period from one to four hours depending on the occupied period extension value entered in the configuration menu (see GENCONF menu).

Supply air sensor

The control system uses this to maintain a constant space temperature. This is a Carrier 10 K sensor.

Outdoor temperature sensor

This Carrier 5 K sensor controls the economizer, allows the gas heating stages to be used on the heat pumps and offsets the space temperature setpoint where this is appropriate.

Water coil frost protection sensor

This Carrier 5 K sensor is used on units fitted with hot-water systems.

Defrost termination sensor

This Carrier 5 K sensor is used by the defrost function on reversible units.

Air quality sensor

This controls room air quality. It is an optional sensor of the 0-10 V d.c. type.

Outdoor air enthalpy sensor

This optional sensor delivers a make-break signal depending on the value for outdoor air heat content (enthalpy). The enthalpy setpoint has to be adjusted on the sensor itself. If the enthalpy value is high (closed signal) the economizer is disabled and lowered to its minimum setting.

3.5 - The controls

Indoor fan

The controller can start or stop the indoor fan thanks to the time schedule.

Heaters

The controller can control additional heating stages for the cooling or heat pump unit.

Economizer

The economizer is controlled for free cooling, fresh air minimum supply, purge mode. The purge mode provides fresh air, if outside air temperature is suitable when the unit entering an occupied time period.

Energy recovery module (ERM)

Pro-Dialog can control an optional energy recovery module for optimised energy management of the exhaust air.

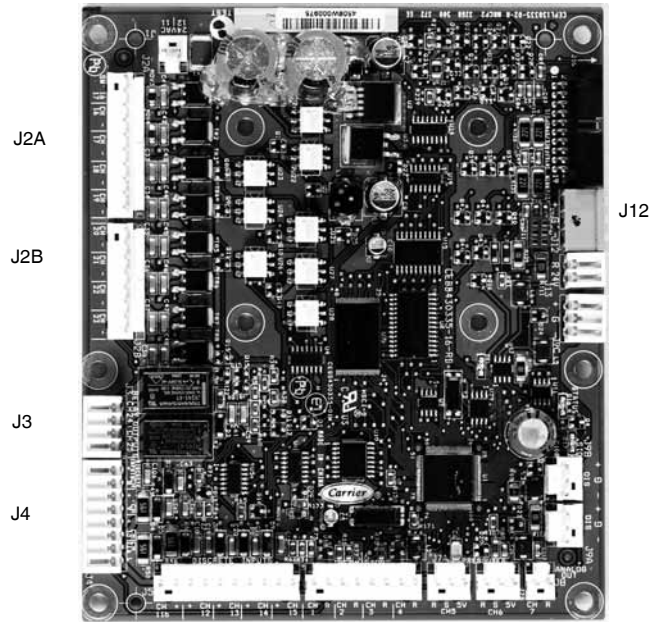
3.6 - Connections at the user terminal block

3.6.1 - General description

The contacts below are available at the user terminal block on the NRCP-BASE board. Depending on the user configuration, some contacts can only be used if the unit operates in remote operating type (Remote) or thermostat operating type (TSTAT).

Rooftop inputs are voltage-free dry contacts. Connecting other than voltage-free outputs to the rooftop inputs will cause electrical damage.

NRCP2-BASE control board



Unit without thermostat input configuration

Description	Connector/channel	Terminal	Board	Remarks
Contact 1: Start/stop	J4/CH 8	32-33	NRCP2-BASE	Used with the remote operating mode (Remote). The Room-mate comfort controller option should be connected to this channel to be able to start and stop the unit.
Contact 2: Demand limit selection	J4/CH 9	63-64	NRCP2-BASE	Used with the remote operating mode (Remote)
Contact 3: Setpoint selection 1	J4/CH 10	73-74	NRCP2-BASE	
Contact 4: Setpoint selection 2	J4/CH 11A	34-35	NRCP2-BASE	
Enthalpy contact	J5/CH 12		NRCP2-BASE	
Filter supply fan contact	J5/CH14		NRCP2-BASE	Indoor air flow verification input
Fire contact	J5/CH15		NRCP2-BASE	Fire safety input
Alarm relay output	J3/CH 24	30A-31A	NRCP2-BASE	
CCN network connection	J12		NRCP2-BASE	RS-485 series connection - Pin 1: signal + - Pin 2: ground - Pin 3: signal -

Cooling only unit or reversible heat pump dual-circuit unit with thermostat input configuration

Description	Connector/channel	Terminal	Board	Remarks
Contact 1: G contact	J4/CH 8	32-33	NRCP2-BASE	Used with the thermostat operating mode (TSTAT).
Contact 2: Y1_W2 contact	J4/CH 9	63-64	NRCP2-BASE	
Contact 3: Y_Y2 contact	J4/CH 10	73-74	NRCP2-BASE	
Contact 2: W_W1 contact	J4/CH 9	63-64	NRCP2-SLAVE	NRCP2-SLAVE board is used for dual-circuit unit OR unit with additional heating stages
Contact 3: O_W2 contact	J4/CH 10	73-74	NRCP2-SLAVE	
Enthalpy contact	J5/CH 12		NRCP2-BASE	
Filter supply fan contact	J5/CH14		NRCP2-BASE	Indoor air flow verification input
Fire contact	J5/CH15		NRCP2-BASE	Fire safety input
Alarm relay output	J3/CH 24	30A-31A	NRCP2-BASE	
CCN network connection	J12		NRCP2-BASE	RS-485 series connection - Pin 1: signal + - Pin 2: ground - Pin 3: signal -

Dual-compressor single-circuit reversible heat pump with thermostat input configuration				
Description	Connector/channel	Terminal	Board	Remarks
Contact 1: G contact	J4/CH 8	32-33	NRCP2-BASE	Used with the thermostat operating mode (TSTAT).
Contact 2: Y1_W2 contact	J4/CH 9	63-64	NRCP2-BASE	
Contact 3: Y_Y2 contact	J4/CH 10	73-74	NRCP2-BASE	
Contact 4: O_W2 contact	J4/CH 11A	34-35	NRCP2-BASE	
Contact 2: W_W1 contact	J4/CH 9	63-64	NRCP2-SLAVE	NRCP2-SLAVE board is used for dual-circuit unit OR unit with additional heating stages
Enthalpy contact	J5/CH 12		NRCP2-BASE	
Filter supply fan contact	J5/CH14		NRCP2-BASE	Indoor air flow verification input
Fire contact	J5/CH15		NRCP2-BASE	Fire safety input
Alarm relay output	J3/CH 24	30A-31A	NRCP2-BASE	
CCN network connection	J12		NRCP2-BASE	RS-485 series connection - Pin 1: signal + - Pin 2: ground - Pin 3: signal -

Reversible single-compressor heat pump with thermostat input configuration				
Description	Connector/channel	Terminal	Board	Remarks
Contact 1: G contact	J4/CH 8	32-33	NRCP2-BASE	Used with the thermostat operating mode (TSTAT)
Contact 2: Y_Y2 contact	J4/CH 9	63-64	NRCP2-BASE	
Contact 3: O_W2 contact	J4/CH 10	73-74	NRCP2-BASE	
Contact 2: W_W1 contact	J4/CH 9	63-64	NRCP2-SLAVE	NRCP2-SLAVE board is used if dual circuit unit OR unit with additional heating stages
Contact 3: Y1_W2 contact	J4/CH 10	73-74	NRCP2-SLAVE	
Enthalpy contact	J5/CH 12		NRCP2-BASE	
Filter supply fan contact	J5/CH14		NRCP2-BASE	Indoor air flow verification input
Fire contact	J5/CH15		NRCP2-BASE	Fire safety input
Alarm relay output	J3/CH 24	30A-31A	NRCP2-BASE	
CCN network connection	J12		NRCP2-BASE	RS-485 series connection - Pin 1: signal + - Pin 2: ground - Pin 3: signal -

The following table shows the thermostat output functions depending on the unit type used.

- G:** indoor fan on/off.
- Y:** compressor 1 on/off (single-circuit unit)
- Y1:** compressor 1 on/off
- Y2:** compressor 2 on/off
- W:** additional heating stage 1 on/off
- W2:** additional heating stage 2 on/off
- O:** cycle reversing valve on/off (heat pump units)

TSTAT types	TSTAT for single-circuit cooling-only unit		TSTAT for dual-circuit cooling-only unit		TSTAT for single-compressor reversible heat pump		TSTAT for dual-circuit reversible heat pump	
Roof top inputs	Thermostat output name	Thermostat output function	Thermostat output name	Thermostat output function	Thermostat output name	Thermostat output function	Thermostat output name	Thermostat output function
G	G	G	G	G	G	G	G	G
Y1_W2	Y1_W2	Y1	Y1_W2	Y1	Y1_W2	W2	Y1_W2	Y1
Y_Y2	Y_Y2	Y2	Y_Y2	Y2	Y_Y2	Y	Y_Y2	Y2
W_W1	W_W1	W	W_W1	W	W_W1	W	W_W1	W
O_W2	O_W2	W2	O_W2	W2	O_W2	O	O_W2	O

3.6.2 - Volt-free setpoint selection contact

Setpoint selection	Occupancy type			Schedule
	Occupied	Unoccupied	Heating: frost protection Cooling: unoccupied	
Contact 1	Open	Closed	Open	Closed
Contact 2	Open	Open	Closed	Closed

3.6.3 - Volt-free demand limit selection contact

Demand limit	100%	Limit
		Open

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.

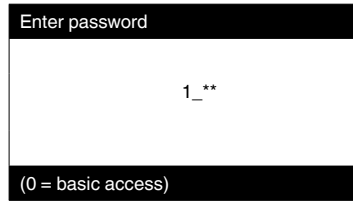
LOCAL OFF	1	On the left the unit status, on the right the screen number
Space temperature SPT	17.2 °C	Description of the first parameter Abbreviation and value with unit of measurement of the first parameter
Supply air temperature SAT	21.0 °C	Description of the second parameter Abbreviation and value with unit of measurement of the second parameter
Outside air temperature OAT	12.4 °C	Description of the third parameter Abbreviation and value with unit of measurement of the third parameter

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

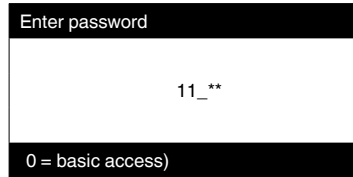
4.3 - Password screens

Enter password	1_**	Description of the password entry screen
	0_**	Password value
(0 = basic access)		Description

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

\\MAINMENU		Current path in the menu structure
GENUNIT	RUNTIME	Selection cursor to the left of the first column
TEMP	MODES	
PRESSURE	LANGUAGE	Menu list
SETPOINT	LOGOUT	
INPUTS		
OUTPUTS		
General Parameters Menu		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 space temperature setpoints.

\MAINMENU\TEMP		Current path in the menu structure
SPT	22.0°C	List of items
SAT	18.0°C	Cursor position
OAT	35.0°C	
CAP_T	50%	
CTRL_PNT	22.0°C	
Leaving Water Temperature		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.

\MAINMENU\SETPOINT		Current path in the menu structure
occ_cool	26.0°C	List of items
uno_cool	28.0°C	Cursor position
occ_heat	19.0°C	
uno_heat	17.0°C	
frst_sp	15.0°C	
Unocc cooling Sp		Description of the item framed by the selection cursor

The following screen allows modification of a parameter.

Modify value		Screen description
	uno_cool	
28.0	°C	Current value
_	°C	Cursor position
Unocc cooling Sp		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.

Modify value		Description of the screen
	uno_cool	
28.0	°C	Current value
27.0_	°C	New value before validation
Unocc cooling Sp		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).

\MAINMENUSETPOINT		Current path in the menu structure
Save changes?		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.

Select Machine Mode		Description of the screen
Local On	↑ ↓	List of the machine operating modes
Local Schedule		Cursor
CCN		
Remote		

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.

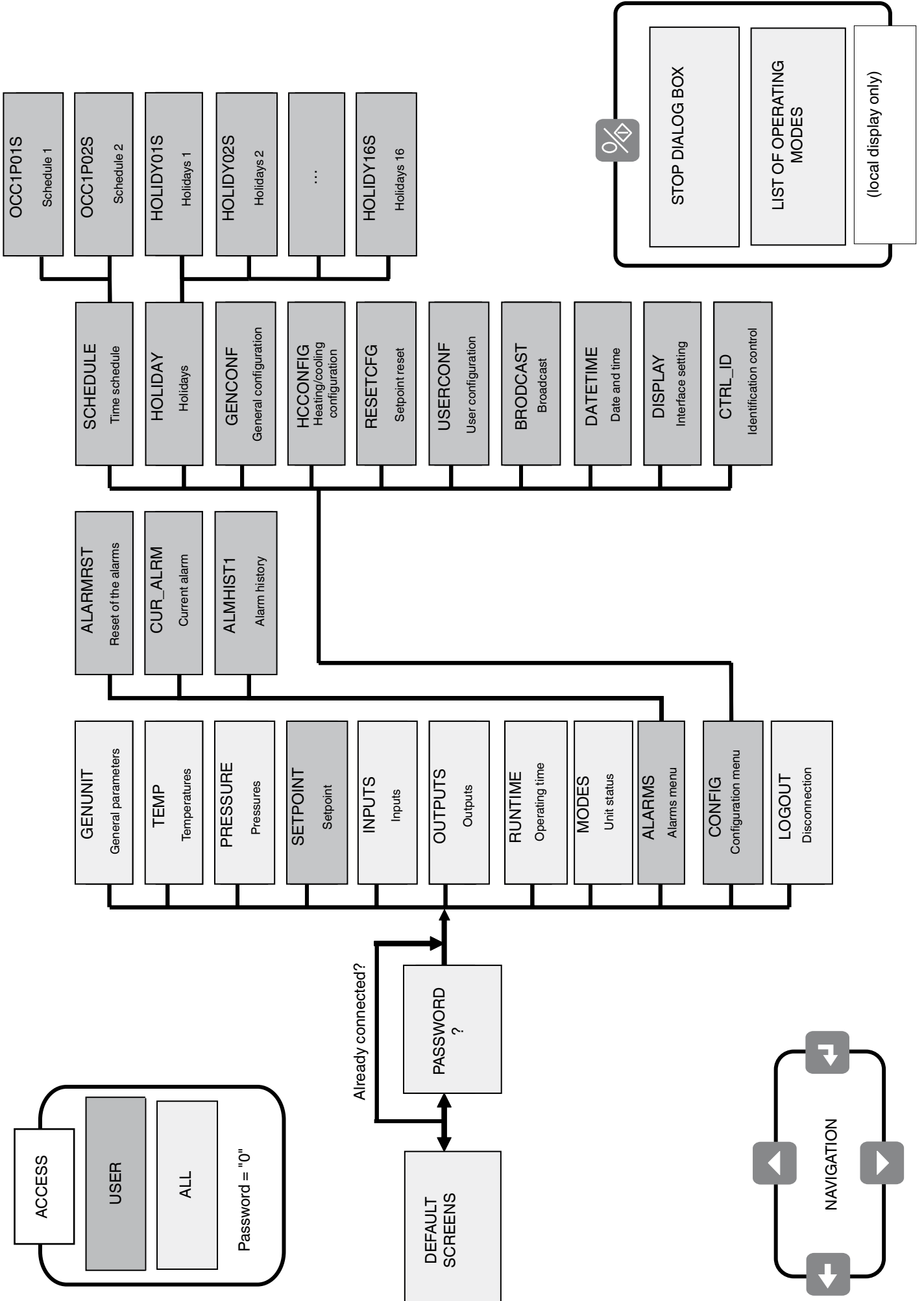
When the operating mode has been selected, the new operating mode can be validated with the Enter key.

Command accepted		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.

PRESS ENTER TO CONFIRM STOP		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 TSTAT = 3
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/ Frost-Pr	-	Heating/cooling status
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
ROOF_S_S	Enable/Disable	-	Unit start/stop via the CCN network
ROOF_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
SPT	±nnn.n	°C	Space temperature
SPT_1	±nnn.n	°C	Space temperature 1
SPT_2	±nnn.n	°C	Space temperature 2
sto	±nnn.n	°C	Offset value - sensor T-56/Room-mate comfort controller
SAT	±nnn.n	°C	Supply air temperature
OAT	±nnn.n	°C	Outside air temperature
LWT	±nnn.n	°C	Leaving water temperature
SCT_A	±nnn.n	°C	Saturated condensing temperature A
SST_A	±nnn.n	°C	Saturated suction temperature A
DEFRT_A	±nnn.n	°C	Defrost temperature A
SCT_B	±nnn.n	°C	Saturated condensing temperature B
SST_B	±nnn.n	°C	Saturated suction temperature B
DEFRT_B	±nnn.n	°C	Defrost temperature B or second coil

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
Temperature setpoints				
occ_cool	10 to 32	26	°C	Occupied cooling setpoint
uno_cool	10 to 32	19	°C	Unoccupied cooling setpoint
occ_heat	10 to 24	17	°C	Occupied heating setpoint
uno_heat	10 to 24	17	°C	Unoccupied heating setpoint
frst_sp	10 to 24	15	°C	Holiday setpoint
Humidity				
oc_rh_sp	10 to 80	50	%	Occupied humidity setpoint
oc_rh_db	10 to 50	10	%	Occupied humidity deadband
un_rh_sp	10 to 80	70	%	Unoccupied humidity setpoint
un_rh_db	10 to 50	30	%	Unoccupied humidity deadband
Miscellaneous				
purg_low	7 to 15	10	°C	Purge: OAT low limit
purg_hig	16 to 43	16	°C	Purge: OAT high limit
purg_du	1 to 5	2	min	Purge duration
iaq_sp	50 to 10000	700	ppm	IAQ setpoint

4.9.5 - INPUTS menu

NAME	FORMAT	UNIT	DESCRIPTION
ONOFF_SW	Close/Open	-	Remote on/off switch
SP_SW1	Close/Open	-	Remote setpoint switch 1
SP_SW2	Close/Open	-	Remote setpoint switch 2
LIM_SW1	Close/Open	-	Limit switch
FTHS_FBK	Close/Open	-	Filter and heat stage status
SFS	Close/Open	-	Supply fan status
FIRE	Close/Open	-	Fire status
ENT_SW	High/Low	-	Outdoor enthalpy contact Closed = high enthalpy, economizer in minimum position
Thermostat			
G	Close/Open	-	Fan contact
Y1_W2	Close/Open	-	Compressor 1/heat 2 thermostat contact
Y_Y2	Close/Open	-	Compressor/compressor 2 thermostat contact
W_W1	Close/Open	-	Heat/heat 1 thermostat contact
O_W2	Close/Open	-	Heat cool/heat 2 thermostat contact
Air control			
IAQ	nnn.n	-	Indoor air quality
RH	nnn.n	%	Relative humidity
HRW_FBK	Close/Open	-	Heat recovery wheel feedback

4.9.6 - OUTPUTS menu

NAME	FORMAT	UNIT	DESCRIPTION
CP_A1	On/Off	-	Compressor A1
CP_A2	On/Off	-	Compressor A2
FAN_A1	0/1/2	-	Fan speed A1
RV_A	On/Off	-	Four-way refrigerant valve A
HEATER_A	On/Off	-	Drain pan heater A
CP_B1	On/Off	-	Compressor B1
CP_B2	On/Off	-	Compressor B2
FAN_B1	0/1/2	-	Fan speed B
RV_B	On/Off	-	Four-way refrigerant valve B
HEATER_B	On/Off	-	Drain pan heater B
SF	On/Off	-	Supply fan status
ecopos	nnn	%	Economizer position
wv	nnn	%	Water valve
HUMID	On/Off	-	Humidifier output
UV_OUT	On/Off	-	UV filter output
PEXHAUST	On/Off	-	Power exhaust
FIRE_DMP	On/Off	-	Fire damper
HS_STEP	0/1/2/3/4	-	Additional heat stage
ALARM	On/Off	-	Alarm relay status
RUNNING	On/Off	-	Running relay status
HRW	On/Off	-	Heat recovery wheel
PEX_VFAN	nnnn.n	Percent	Power exhaust Varifan
air_flow	nnnn.n	KGPH	Exhaust air flow

4.9.7 - RUNTIME menu

NAME	FORMAT	UNIT	DESCRIPTION
hr_mach	nnnnnnnn	hours	Machine operating hours
chr_mach	nnnnnnnn	hours	Cooling operating hours
hhr_mach	nnnnnnnn	hours	Heating operating hours
st_mach	nnnnnnnn	-	Machine start number
hr_sf	nnnnnnnn	hours	Supply fan operating hours
st_sf	nnnnnnnn	-	Supply fan start number
hr_cp_a1	nnnnnnnn	hours	Compressor A1 hours
st_cp_a1	nnnnnnnn	-	Compressor A1 starts
hr_cp_a2	nnnnnnnn	hours	Compressor A2 hours
st_cp_a2	nnnnnnnn	-	Compressor A2 starts
hr_cp_b1	nnnnnnnn	hours	Compressor B1 hours
st_cp_b1	nnnnnnnn	-	Compressor B1 starts
hr_cp_b2	nnnnnnnn	hours	Compressor B2 hours
st_cp_b2	nnnnnnnn	-	Compressor B2 starts
hr_fana1	nnnnnnnn	hours	Fan A1 hours
st_fa_a1	nnnnnnnn	-	Fan A1 starts
hr_fanb1	nnnnnnnn	hours	Fan B1 hours
st_fa_b1	nnnnnnnn	-	Fan B1 starts
hr_hs	nnnnnnnn	hours	Heating stage hours
nb_def_a	nnnnnnnn	-	Defrost number circuit B
nb_def_b	nnnnnnnn	-	Defrost number circuit B

4.9.8 - MODES menu

NAME	FORMAT	UNIT	DESCRIPTION
m_limit	Yes/No	-	Demand limit active
m_ifan	Yes/No	-	Indoor fan cycling
m_night	Yes/No	-	Night condensing mode
m_frostp	Yes/No	-	Frost protection mode
m_master	Yes/No	-	Master/slave active
m_reset	Yes/No	-	Reset in effect?
m_heater	Yes/No	-	Electric heat active
m_eco	Yes/No	-	Economizer mode
m_purge	Yes/No	-	Purge mode
m_pwrh	Yes/No	-	Power exhaust mode
m_humid	Yes/No	-	Humidification mode
m_iaq	Yes/No	-	IAQ mode
m_gas	Yes/No	-	OAT gas threshold
m_fire	Yes/No	-	Fire shutdown active?
m_enth	Yes/No	-	Enthalpy lockout
m_start	Yes/No	-	Optimal start mode
m_defr_a	Yes/No	-	A: Defrost active
m_defr_b	Yes/No	-	B: Defrost active
m_sst_a	Yes/No	-	A: Low suction
m_sst_b	Yes/No	-	B: Low suction
m_dgt_a	Yes/No	-	A: Compressor envelope
m_dgt_b	Yes/No	-	B: Compressor envelope
m_hp_a	Yes/No	-	A: High pressure override
m_hp_b	Yes/No	-	B: High pressure override

4.9.9 - ALARMS menu

NAME	DESCRIPTION
ALARMRST	Alarm reset
CUR_ALRM	Current alarms
ALMHIST1	Alarm history

4.9.10 - CONFIG menu

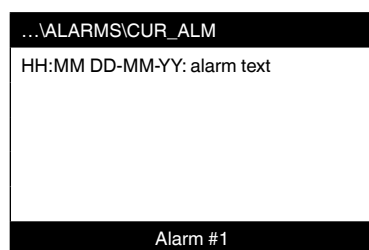
NAME	DESCRIPTION
GEN_CONF	General configuration menu
USERCONF	User configuration menu
HC_CONFIG	Heating/cooling configuration menu
RESETCFG	Reset configuration menu
SCHEDULE	Time schedule
HOLIDAY	Holiday calendar
BROADCAST	Broadcast menu
DATETIME	Date and time menu
DISPLAY	Display configuration menu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

4.9.11 - 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

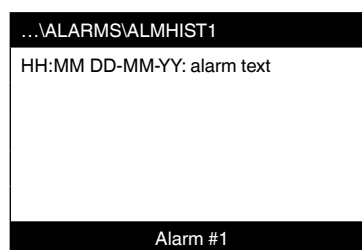
4.9.12 - CUR_ALRM menu

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.



4.9.13 - 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.



4.9.14 - SCHEDULE menu

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

4.9.15 - 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

4.9.16 - BRODCAST menu

NAME	FORMAT	DEFAULT	UNIT	DESCRIPTION
ccnbroad	0/1/2	2	-	Activates the broadcast 0 = deactivated, 1 = broadcast 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

4.9.17 - GENCONF menu

NAME	FORMAT	DEFAULT	UNIT	DESCRIPTION
tst_ctrl	Yes/No	NO		Thermostat control
frst_sel	Yes/No	NO		Frost protection select
spt_ctrl	0 to 4	0		Setpoint calculation select 0 = Average temperature method 1 = High temperature sensor 2 = Low temperature sensor 3 = Cool low temperature, heat high temperature 4 = Cool high temperature, heat low temperature
ifan_sel	0 to 2	0		Indoor fan management 0 = always on 1 = Occupied, on - unoccupied, cycling 2 = Occupied, cycling - unoccupied, cycling
Occupied period start				
purg_sel	Yes/No	No		Purge mode select
ovrd_hr	0 to 4	0		Timed override hours
start_k	0 to 30	0		Optimal start factor
Demand limit				
c_limit	0 to 4	0		Cooling demand limit
h_limit	0 to 8	0		Heating demand limit
d_limit	Yes/No	No		Defrost demand limit
off_on_d	1 to 15	1		Unit off to on delay
nh_start	nn:nn	0		Night mode start hour
nh_end	nn:nn	0		Night mode end hour
bas_menu	0 to 3	0		Basic menu configuration 0 = all access 1 = no alarm menu 2 = no setpoint menu 3 = 1 + 2
synoptic	Yes/No	NO		Synoptic is displayed?

4.9.18 - HCCONFIG menu

NAME	FORMAT	DEFAULT	UNIT	DESCRIPTION
cr_sel	0 to 2	0	-	Cooling reset selection
ehs_th	-5 to 21.2	5	°C	Outside temperature threshold for electric heater stages
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

4.9.19 - 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
cr_deg	-16.7 to 16.7	0	^C	Cooling reset value

4.9.20 - 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

4.9.21 - 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

4.9.22 - 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+ 48/50UA/UH		Description
		CSA-SR-20HB00NN		Software version
		-		Serial number

4.9.23 - 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.

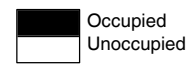
Program is in unoccupied mode unless a schedule time period is in effect. If two periods overlap and are both active on the same day, the occupied mode takes priority over the unoccupied period.

Each of the eight periods can be displayed and changed with the aid of a sub-sub-menu. The table on page 15 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							P6	
21								
22								
23								

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



	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

4.9.24 - 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+ CONTROL OPERATION

5.1 - External thermostat control

In appropriate cases the unit may be controlled by an external thermostat approved by Carrier. This function requires the use of a thermostat with volt-free contacts (contacts without potential), as well as a specific configuration of the Pro-Dialog control. The function is only active when operating type Thermostat (TSTAT) is selected in the GENCONF menu.

In this operating type, the thermostat controls the following functions:

- stopping/starting the internal fan,
- determining the space temperature control point,
- selecting heating/cooling,
- controlling compressor capacity, gas or electric,
- controlling the economizer (fully open position or minimum closed position only).

The Pro-Dialog+ system continues to control the following functions:

- defrosting related to the heat pumps,
- head pressure control,
- power exhaust control,
- minimum stop/start times on the compressors,
- unit diagnostics.

The following functions are disabled:

- humidification,
- controlling a hot-water system,
- timer programming,
- purge.

The description of the thermostat outputs, based on the unit type, is given in the chapter 3.6 - "Connections at the user terminal block".

Cooling only unit

- Contact G open: the internal fan is stopped and the economizer is closed.
- Contact G closed: the internal fan is activated and the economizer is opened to its minimum position.
- Contact Y1 closed and Y2 open: if the unit is fitted with an economizer, it is opened to its maximum position, if external conditions permit (see chapter 5.16 - "Economizer"). Otherwise the economizer is set to its minimum position and the first compressor is started up. If the unit has no economizer, the first compressor is started up.
- Contacts Y1 and Y2 closed: the economizer is held fully open if external conditions are still acceptable. A compressor is started up. If external conditions no longer permit the economizer to be used, it is set to its minimum position and the second compressor is started up. If the outdoor temperature is lower than 15°C, the compressors will not be authorised to start up and only the economizer will be used. If the unit has no economizer, the second compressor is started up.
- Contact W1 closed and W2 open: the first gas or electric stage is started.
- Contacts W1 and W2 closed: the second gas or electric stage is started.

Single-circuit reversible unit

- Contact G open: the internal fan is stopped and the economizer is closed.
- Contact G closed: the internal fan is activated and the economizer is opened to its minimum position.
- Contact O closed and Y closed: if the unit is fitted with an economizer, it is modulated to maintain the minimum supply air temperature setpoint at +2.8°C, if external conditions permit (see chapter 5.16 - "Economizer"). Otherwise the economizer is set to its minimum position and the compressor is started up in cooling mode. If the unit has no economizer, the compressor is started up in cooling mode.
- Contacts O open and Y closed: if the unit is fitted with an economizer, it is set to its minimum position and the first compressor is started up in heating mode.
- Contact W1 closed and W2 open: the first gas or electric stage is started.
- Contacts W1 and W2 closed: the second gas or electric stage is started.

Dual-circuit/dual-compressor reversible unit

- Contact G open: the internal fan is stopped and the economizer is closed.
- Contact G closed: the internal fan is activated and the economizer is opened to its minimum position.
- Contact O closed, Y1 closed and Y2 open: if the unit is fitted with an economizer, it is opened to its maximum position, if external conditions permit (see chapter 5.16 - "Economizer"). Otherwise the economizer is set to its minimum position and the first compressor is started up in cooling mode. If the unit has no economizer, the first compressor is started up in cooling mode.
- Contacts O, Y1 and Y2 closed: the economizer is held fully open, if external conditions are still acceptable. A compressor is started up in cooling mode. If external conditions no longer permit the economizer to be used, it is set to its minimum position and the second compressor is started up in cooling mode. If the outdoor temperature is lower than 15°C, the compressors will not be authorised to start up and only the economizer will be used. If the unit has no economizer, the second compressor is started up in cooling mode.
- Contact O open, Y1 closed and Y2 open: if the unit is fitted with an economizer, it is set to its minimum position and the first compressor is started up in heating mode. If the unit has no economizer, the first compressor is started up in heating mode.
- Contact O open, Y1 and Y2 closed: the economizer is held in its minimum position. The second compressor is started up in heating mode.
- Contact W1 closed: the first gas or electric stage is started.

NOTE: All compressor anti-short cycles remain activated

5.2 - 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, TSTAT: thermostat
- **Remote start/stop contacts:** these contacts are used when the unit is in remote operating type (Remote).
- **G:** this contact is used when unit is in thermostat operating type
- **ROOF_S_S:** this network command relates to the unit start/stop when the unit is in network mode (CCN) schedule.

- 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 rooftop start/stop program (Schedule 1).
- **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	TSTAT	ROOF_S_S	REMOTE START/STOP CONTACT	G	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	-	-	Off	-	-	-	TSTAT	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	-	-	On	-	-	-	TSTAT	On

5.3 - Indoor fan on/off control

The table below summarises the fan operation based on different parameters:

- **heating/cooling:** unit operating mode.
- **indoor fan cycling:** this user parameter permits optimisation of the indoor fan usage.
- **Occupied?:** occupied or unoccupied status of the unit selected by the time schedule.

- **compressor capacity:** number of compressors operating
- **capacity of additional stages:** number of additional stages operating
- **economizer position:** economizer position in relation to the minimum configurable.
- **indoor fan:** fan status.

Unit status	Heating/cooling	Indoor fan cycling	Occupied?	Compressor capacity or additional stages	Capacity of additional stages	Economizer position	Indoor fan
Off	-	-	-	-	-	-	Off
Start-up delay	-	-	-	> 0	-	-	On
On/stopping	-	-	-	> 0	-	-	On
On/stopping	-	-	-	-	> 0	-	On
On/stopping	-	-	-	-	-	Higher than minimum economizer position	On
On	Cooling	-	-	-	-	-	On
On	Heating	-	-	-	-	-	On
On	-	0	-	-	-	-	On
On	-	1	Yes	-	-	-	On
On	Standby	1/2	No	-	-	-	On for at least 2'30"
On	Standby	1/2	No	= 0	= 0	Lower or equal to minimum economizer position	On for at least 2'30" then off
On	Standby	2	Yes	= 0	= 0	Lower or equal to minimum economizer position	On for at least 2'30" then off
On	Standby	2	Yes	= 0	= 0	-	Off
Stopping	-	-	No	-	-	-	On
Stopping	-	-	No	= 0	= 0	<= eco_min	Off

5.4 - Calculating the space temperature

Up to two sensors (one of which is optional) may be used to calculate the space temperature. Depending on the configuration (see see GENCONF menu), space temperature is either calculated as the average of all readings, or is taken from the minimum or maximum reading.

5.5 - Space temperature control point

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 setpoint, 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	-	occ_cool
Cooling	sp 2	-	uno_cool
Cooling	auto	occupied	occ_cool
Cooling	auto	unoccupied	uno_cool
Heating	sp1	-	occ_heat
Heating	sp 2	-	uno_heat
Heating	auto	occupied	occ_heat
Heating	auto	unoccupied	uno_heat

REMOTE OPERATING MODE

PARAMETER STATUS

Heating/cooling operating mode	Setpoint selection contact	Active setpoint
Cooling	sp 1 (open)	occ_cool
Cooling	sp 2 (closed)	uno_cool
Heating	sp 1 (open)	occ_heat
Heating	sp 2 (closed)	uno_heat

Offset

An offset means that the active space temperature setpoint is altered in line with external parameters. This may be carried out in one of the following ways:

- By the user with the aid of an adjustment slider located on the main T-56 space temperature sensor (optional). The offset range is ± 3 K in increments of 1 K.
- Automatically in cooling mode, by reference to the outdoor temperature (if the function has been validated in the HCCONFIG menu). In this case, the function is generally used to limit the difference between the indoor and outdoor temperatures in order to prevent thermal shock.

IMPORTANT: It is not possible to use both types of offset at the same time. If the offset from the T-56 sensor is non-zero, offset based on the outdoor temperature is ignored.

Smart Start

This mode permits heating or cooling the room before it is occupied so that the space temperature has reached its setpoint at the beginning of the occupied period. The control calculates an anticipated start-up value in minutes, based on a user configurable factor (anticipated start-up factor expressed in minutes/degrees that must be adjusted for the installation) and the difference between the setpoint and the space temperature. The higher the anticipated start-up factor or the higher the setpoint difference, the earlier the change-over to occupied mode is anticipated. However, the start-up cannot be anticipated by more than 60 minutes.

5.6 - Heating/cooling mode

Units with heat pumps or additional heating stages may operate in either heating or cooling mode.

- Cooling mode is active when:
 - space temperature is above: occ_cool (occupied mode) or uno_cool (unoccupied mode)
- Heating mode is active when:
 - space temperature is below: occ_heat (occupied mode) or uno_heat (unoccupied mode)
- Units remains in ventilation mode (without cooling or heating) when the space temperature is between occ_heat and occ_cool (occupied mode) or uno_heat and uno_cool (unoccupied mode).

5.7 - Frost protection mode

The unit may be configured to be in frost protection mode when in unoccupied mode (GENCONF menu). In this case the fan is shut down and is only authorised to restart if the space temperature falls below the frost protection setpoint. It shuts down again when space temperature is 1.5 K above the frost protection setpoint. Selecting frost protection does not affect how the unit operates in occupied mode. The frost protection mode for unoccupied periods has to be selected in the GENCONF menu.

5.8 - Controlling space temperature

The controller uses two loops in tandem to control space temperature. The purpose of the first loop (called the external loop) is to calculate the blower temperature required to maintain space temperature at space setpoint. This blower temperature, which is called the blower setpoint or forced air setpoint, is transmitted to a second loop (called the internal loop). This second loop determines the cooling or heating capacity needed to maintain blower temperature at the setpoint transmitted to it by the external loop. This enables it to actuate the compressors and if necessary the additional heating stages or a valve on the hot water system. The precision of the controller depends on the load and the number of stages available on the unit.

On high inertia systems such as these, tandem control has the advantage of allowing space temperature to be finely controlled whilst guaranteeing a good response to disturbing elements associated with non-linear systems.

NOTE: In some cases Carrier Service may adjust the loop gains to suit the installed configurations.

5.9 - Capacity limitation

Capacity limitation is generally used by an energy management system to restrict the amount of electricity consumed by the unit. The Pro-Dialog+ control system enables the capacity of the unit to be limited by means of a user-controlled volt-free contact (active when closed).

The action of this contact depends on the type of unit and the configuration (see GENCONF configuration):

- Reversible unit with gas stages: all compressors are stopped and only gas is used.
- Reversible unit with hot water system: the compressor stages authorised to operate are limited to the value configured and the hot water system is used.
- Electric stages: the electric stages authorised to operate are limited to the value configured.
- Compressor stages: the compressor stages authorised to operate are limited to the value configured.
- Unit in defrosting mode: the electric stages are authorised to operate if authorised by the configuration.

5.10 - Night mode

The night period is defined (see GENCONF configuration) by a start time and an end time that are the same for each day of the week. During the night period, the fan runs at low speed, if permitted by the current operating conditions. In addition, the user can reduce the unit capacity.

5.11 - Capacity control

In heating or cooling mode the capacity control regulates the compressor start-up and shut-down sequence. The control determines the compressor start-up in a way that equalises the start-up number for each compressor (value weighted by the operating time). This means, the compressor with the least number of start-ups is always the first to start up and the first to shut down.

5.12 - Head pressure control

Condensing pressure control is automatically ensured by a two-speed fan (no adjustment).

5.13 - Defrost function

Defrost is activated, when the unit is in heating mode, in order 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. A condensate heater prevents ice formation at the bottom of the heat exchangers, if the defrost cycles are taking place at low outdoor temperature.

NOTE: The indoor fans run during the defrost cycle except in single-circuit units without additional heat option (electric heat stage or hot-water coil).

5.14 - Electric or gas stages

In heating or dehumidification mode, the unit may control up to four electric or gas stages.

5.14.1 - Electric stages

On reversible units, electric stages may only be switched on when the unit is at 100% of available compressor capacity. When defrosting a circuit is in progress, electric stages are authorised to start up regardless of the compressor capacity at the time.

5.14.2 - Gas stages

Gas heating is only available with cooling only units.

5.15 - Controlling a hot-water system valve

Units may control a valve on a hot water system. When the unit is operating in heating mode and compressor capacity is 100%, the valve is continually adjusted to maintain the blower temperature calculated by the external loop (see section 5.8). In cooling mode this valve is kept fully open (completely bypassing the hot-water system). If the unit is reversible, the valve is kept closed during defrost sequences (hot-water system feed).

5.16 - Economizer

The unit may control an economizer which is activated to enable fresh air to be fed in from outside when conditions permit (this is called free cooling). As in the case of controlling gas or electric stages, the controller uses two loops in tandem to control space temperature with the aid of the economizer. The external loop calculates the supply air temperature required to maintain space temperature at space control point. The internal loop determines the economizer position needed to maintain this supply air temperature.

Special conditions:

- The economizer shall be kept closed when the unit is stopped.
- The economizer shall be held at its minimum position of 15% (this value may be configured by Carrier Service) when:
 - the unit is in heating mode,
 - space temperature is below space control point,
 - the difference between space temperature and outdoor temperature is less than the economizer utilisation threshold (i.e. a value of 7 K which may be configured by Carrier Service),
 - blower temperature is below 10°C,
 - the unit is fitted with an outside air enthalpy sensor and this is indicating a high enthalpy which is incompatible with feeding in air from outside,
- The economizer shall be kept fully open when purge mode is active.
- The minimum position of the economizer shall be altered in order to meet air quality requirements (see section 5.18 - "Controlling air quality").

- The minimum position of the economizer shall not exceed 25% if the outdoor temperature is below 6°C. i.e. when OAT < 6°C
 - If the configured economizer minimum position >25%, the economizer minimum position is 25%.
 - If the configured economizer minimum position is <25% (e.g. 5%), the economizer minimum position is 5%.
- If the outdoor temperature is below 15°C, all compressors shall be stopped and only free cooling shall be authorised.

If the unit is fitted with a power exhaust louvre, this shall be open if the position of the economizer is in excess of 50% (this threshold may be modified by Carrier Service).

5.17 - Purge

This function can only be used if the unit is fitted with an economizer. When the unit switches from unoccupied to occupied mode, the economizer is kept fully open for two minutes provided the outdoor temperature is between 10°C and 21°C. A purge will not be activated if the occupied period is intended to last less than two hours. This function must be validated by the user in the GENCONF menu. It is also possible to alter the length of the purge and the limiting outdoor temperatures in the Setpoint menu.

5.18 - Controlling air quality

This function is used if the unit is fitted with an air quality sensor and an economizer. With the aid of a PI function, it enables the position of the economizer to be continually adjusted in order as far as possible to maintain air quality at its setpoint whilst preventing the space temperature from drifting too greatly (in view of the fact that the heating or cooling stages are not authorised to operate at this point). On the other hand if the error in the heating or cooling space setpoint being maintained exceeds 2.2°C, this function is disabled and the economizer returns to its minimum configured position (30%), and the heating or cooling stages are authorised to operate again. Air quality control cannot then be authorised for another hour. This function is not active in unoccupied mode.

5.19 - Master/slave assembly

Up to 6 units can take part in a master/slave assembly. This group then constitutes a zone in which conflicting states of cooling/heating are not allowed between units. The master unit determines the cooling or heating mode for the zone. If one of the slave units is in a different cooling/heating mode from the master unit, the unit concerned is switched to ventilation mode without producing heat or cooling. This function is not active in the frost protection mode. The function operates under all operating types. It requires the use of a communication bus between the units concerned and must be configured by Carrier Service.

5.20 - Fire protection

When the normally closed smoke detection contact is open, the unit is shut down and either the fire output is activated or the economizer damper is opened.

5.21 - Energy recovery module (ERM)

This function can only be used if the unit is fitted with an economizer. The ERM option is used to save energy by recovering heat or cool energy air from the exhaust air and supplying that energy to the outside air passing through the wheel in the rooftop unit.

The ERM option consists of a heat recovery wheel a variable-speed plug fan for the power exhaust and an air pressure sensor. The air pressure sensor is used to calculate the air flow.

The principle is based on exhaust air and outside air passing through a rotating wheel. The exhaust air temperature is about 20°C. Locally in the exhaust air duct, the wheel temperature changes to the exhaust air temperature. The wheel rotates and outside air passes through the wheel. The wheel supplies the energy recovered from exhaust air back to the inlet air.

The power exhaust fan runs when the economizer position is higher than the minimum.

The minimum power exhaust fan speed needs to be adjusted by Carrier Service.

The ERM wheel is working according to four situations:

1. Recirculation mode: economizer is off for air recycling, the ERM wheel is off,
2. Recovery mode in heating: the economizer is opened at the minimum position and the space temperature is higher than the outside temperature. The ERM wheel is on,
3. Recovery mode in cooling: the economizer opened at the minimum position and the space temperature is lower than the outside temperature. The ERM wheel is on.
4. The unit is in free-cooling mode, the economizer is opened, the space temperature is higher than the outside temperature. The ERM wheel is off.

NOTE: The ERM option is not compatible with the humidity control option.

5.22 - 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 GENCONF menu.

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_ALARM and ALARMRST.

6.2 - Displaying alarms

The alarm LED on the interface (see chapter 3 “Hardware description”) 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
1	th-204	Indoor air thermistor 1	Automatic when the temperature measured by the sensor returns to normal	Defective thermistor	Unit is shut down
2	th-205	Indoor air thermistor 2	As above	As above	As above
3	th-202	Supply air thermistor	As above	As above	As above
4	th-206	Space temperature offset	As above	As above	Space temperature offset function is ignored
5	th-02	Water heat exchanger leaving fluid thermistor	As above	As above	Hot-water coil disabled
6	th-03	Circuit A defrost thermistor	As above	As above	Unit is shut down if heating mode
7	th-04	Circuit B defrost thermistor	As above	As above	As above
8	th-10	OAT thermistor	As above	As above	Unit is shut down
9	Pr-01	Circuit A discharge transducer	Automatic when the voltage transmitted by the sensor returns to normal	Defective transducer or installation fault	Circuit is shut down
10	Pr-02	Circuit B discharge transducer	As above	As above	As above
11	Pr-04	Circuit A suction transducer	As above	As above	As above
12	Pr-05	Circuit B suction transducer	As above	As above	As above
13	Se-201	Indoor air quality sensor	As above	defective sensor	Indoor air quality function is disabled
14	Se-203	Relative humidity sensor	As above	As above	Humidity control function is disabled
15	Co-BB	Loss of communication with slave basic board	Automatic when communication is re-established	Installation bus fault or defective slave board	Circuit B is disabled
16	Co-O1	Loss of communication with optional board 1	As above	As above	Humidity control or heat recovery or IAQ disabled
17	P-01	Water heat exchanger frost protection	Manual	Heat exchanger water below 1°C	Indoor fan is off, coil is energised.
18	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
19	P-06	Low suction temperature, circuit B	As above	As above	As above
20	P-16	Compressor A1 not started or pressure increase not established	Manual	Connection problem	Compressor is shut down
21	P-17	Compressor A2 not started or pressure increase not established	As above	As above	As above
22	P-20	Compressor B1 not started or pressure increase not established	As above	As above	As above
23	P-21	Compressor B2 not started or pressure increase not established	As above	As above	As above
24	P-30	Master/slave communication fault	Automatic when communication is re-established	CCN installation bus defective	Unit goes into autonomous mode
25	P-31	Unit is in CCN emergency stop	Manual	Network command	Unit is shut down
26	P-37	Repeated high discharge gas overrides, circuit A	Automatic	Transducer defective or fan circuit fault	None
27	P-38	Repeated high discharge gas overrides, circuit B	Automatic	As above	As above
28	P-40	Repeated low suction temperature overrides, circuit A	Manual	Pressure sensor defective or refrigerant charge too low	Circuit is shut down
29	P-41	Repeated low suction temperature overrides, circuit B	Manual	As above	As above
30	P-63	High-pressure switch, circuit A	Manual	Fan fault	Circuit is shut down
31	P-64	High-pressure switch, circuit B	As above	As above	As above
32	P-204	Filter dirty or supply fan fault	Manual	Air flow fault	Unit is shut down
33	P-209	Fire	As above	The anti-fire contact is open.	Unit is shut down
34	P-210	Heat stage fault	As above	the heating stage fault contact is open	As above
35	P-211	Thermostat fault	Manual	The unit is controlled by an external thermostat and this simultaneously sends a heating or cooling command	The indoor fan shuts down. All functions are deactivated
36	P-212	Space temperature high	Automatic	Automatic when the measured value returns to the admissible range.	
37	P-213	Space temperature low	As above	As above	
38	P-214	Outdoor temperature high	As above	As above	
39	P-215	Outdoor temperature low	As above	As above	
40	P-216	Relative humidity high	As above	As above	
41	P-217	Relative humidity low	As above	As above	
42	P-218	Indoor air quality high	As above	As above	
43	Sr-nn	Service maintenance alert number # nn	Manual	The preventive maintenance date has passed	
44	FC-n0	No factory configuration	Automatic when the configuration is entered	The unit size has not been configured	Unit is shut down
45	FC-01	Illegal factory configuration Number #1 to nn	Manual	The unit size has been configured with the wrong value	As above
46	P-202	Heat recovery wheel fault	Automatic	Wheel is not rotating	ERM option is off
47	P-203	Heat recovery power exhaust fan fault	Automatic	Exhaust fan fault	As above
48	Pr203	Pressure drop exhaust fan transducer fault	Automatic when the voltage transmitted by the sensor returns to normal	Defective transducer or installation fault	As above



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