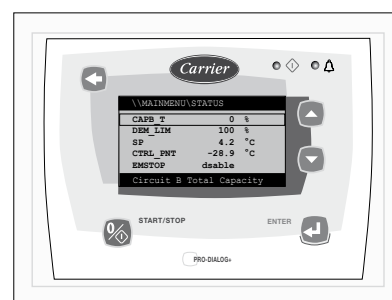




38RBS 039-160

Pro-Dialog+ Control

PRO-DIALOG



Operation instructions



Quality and Environment
Management Systems
Approval

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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 38RBS condensing units. These units have one or two refrigerant circuits.

Pro-Dialog control must be completed either by a thermostat or by two temperature sensors (room and supply air).

Control by thermostat (via contacts) is the default operating mode and called remote mode.

For two-stage cooling units the Carrier 33CS thermostat can be used.

The thermostat (programmable or non programmable) ensures the start-up of the indoor fan and controls the unit cooling stages (two to four stages, depending on the unit size). This thermostat can also allow control of the electric heater.

A second control type with temperature sensors is also possible. Selection and parameter setting of this control type are only available via the Carrier Pro-Dialog+ HMI user interface. As an option Carrier offers the complete equipment required for this control type.

To use this control type, three operating modes are available:

- Local on - continuous temperature control.
- Loc/Prog on - temperature control only in the occupancy ranges defined by the user via the local interface.
- CCN bus - temperature control, based on the commands from the Carrier Comfort Network (CCN).

Temperature sensor control permits:

- room temperature control at the desired setpoint,
- ensuring a minimum supply air temperature.

Independent of the selected control type, Pro-Dialog:

- ensures user comfort,
- controls the compressors based on the cooling load,
- controls the fans to optimise operation of each refrigerant circuit,
- ensures unit protection.

The heating stages are not controlled by Pro-Dialog.

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
DGT	Discharge gas temperature
LED	Light Emitting Diode
LEN	Internal communication bus linking the main board to the slave boards
OAT	Outdoor air temperature
SCT	Saturated condensing temperature
SST	Saturated suction temperature

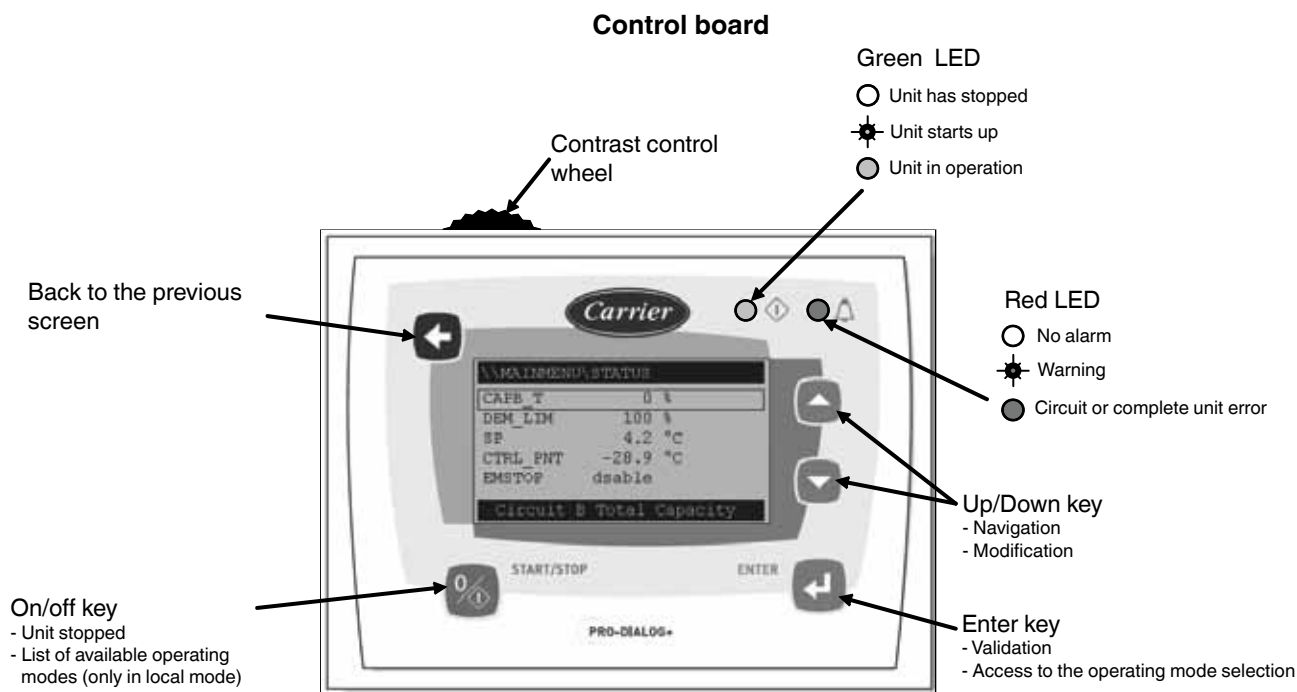
3 - HARDWARE DESCRIPTION

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.

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.



3.2 - Power 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.

If the power supply fails, the unit restarts automatically without the need for an external command. 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) on each board lights when it is operating properly.

- The red LED flashes for a two-second period - one second on, one second off - to indicate 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 outdoor temperature sensor is installed under a metal plate. The compressor suction gas temperature sensors are installed just upstream of the compressor.

If temperature sensor control is selected:

- The NTC 10 K room temperature sensor must be placed in a position that is representative of the room temperature. Avoid exposure to the sun or to humidity.
- The NTC 5 K supply air sensor must be placed in a position that is representative of the supply air temperature (downstream of the evaporator).

3.5 - The controls

Solenoid valves

Two solenoid valves must be installed on the liquid line of each circuit to permit pumpdown of the circuit during shut-down.

Alarm LED

An LED installed at the front of the control box displays the unit alarms.

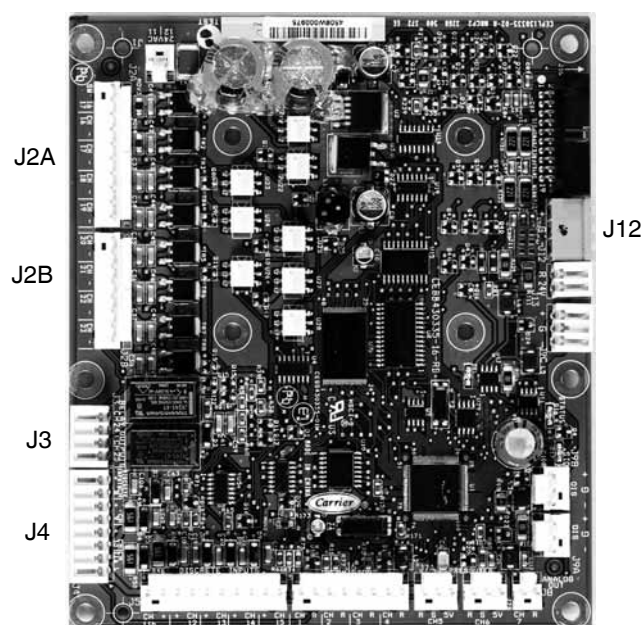
Alarm reset button

A push button installed at the front of the control box permits resetting all activated unit alarms.

3.6 - Connections at the user terminal block

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 the remote operating mode (Remote).

NRCP2-BASE control board



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

Description	Connector/ channel	Terminal	Board	Remarks	
Single-circuit unit					
Contact 1: Indoor unit fan	J4 / CH8	32-33	NRCP-BASE master	This contact can be used to reverse indoor fan operation. If the contact is not used, it must be jumpered.	24 V a.c. - 20 mA. Connection: 8-pin Wago 734-168, pitch 3.5
Contact 2: Cooling 1	J4 / CH9	63-64	NRCP-BASE master	This contact is used to control the first cooling stage: connected to thermostat.	
Contact 3: Cooling 2	J4 / CH10	73-74	NRCP-BASE master	This contact is used to control the second cooling stage: connected to thermostat.	
User safety loop input	J4 / CH11a	34-35	NRCP-BASE master	This contact can be used for any customer safety loop that requires unit shut-down, if it is open. If the contact is not used, it must be jumpered.	
Connection to solenoid valve A1	J2B/CH21	52-12	Customer terminal board	Contact used for solenoid valve control of compressor A1	Maximum 18 VA - 10 W - 24 V a.c.
Connection to solenoid valve A2	J2B/CH22	52a-12	Customer terminal board	Contact used for solenoid valve control of compressor A2	Maximum 18 VA - 10 W - 24 V a.c.
Alarm relay output	J3 / CH24	30-31	NRCP-BASE master	Indicates that the unit is in alarm condition	Volt-free contact 24 V a.c., max. 48 V d.c., min. 20 V a.c. or V d.c., max. 3 A, min. 80 mA min, external supply. Connection: 4-pin WAGO 231-304/026000, pitch 5.08
CCN bus connection	J12		NRCP-BASE master	Permits connection of the CCN communication bus	
24 V a.c. thermostat supply		R.C	Customer terminal board		Maximum 10 VA
Dual-circuit unit					
Contact 1: Indoor unit fan	J4 / CH8	32-33	NRCP-BASE master	This contact can be used to reverse indoor fan operation. If the contact is not used, it must be jumpered.	24 V a.c. - 20 mA. Connection: 8-pin Wago 734-168, pitch 3.5
Contact 2: Cooling 1	J4 / CH9	63-64	NRCP-BASE master	This contact is used to control the first cooling stage: connected to thermostat.	
Contact 3: Cooling 2	J4 / CH10	73-74	NRCP-BASE master	This contact is used to control the second cooling stage: connected to thermostat.	
User safety loop input	J4 / CH11a	34-35	NRCP-BASE master	This contact can be used for any customer safety loop that requires unit shut-down, if it is open. If the contact is not used, it must be jumpered.	
Contact 2: Cooling 3	J4 / CH9	63-64	NRCP-BASE slave	This contact is used to control the third cooling stage: connected to thermostat.	
Contact 3: Cooling 4	J4 / CH10	73-74	NRCP-BASE slave	This contact is used to control the fourth cooling stage: connected to thermostat.	
Connection to solenoid valve A1	J2B/CH21	52-12	Customer terminal board	Contact used for solenoid valve control of compressor A1	Maximum 18 VA - 10 W - 24 V a.c.
Connection to solenoid valve A2	J2B/CH22	52a-12	Customer terminal board	Contact used for solenoid valve control of compressor A2	Maximum 18 VA - 10 W - 24 V a.c.
Connection to solenoid valve B1	J2B/CH21	53-12	Customer terminal board	Contact used for solenoid valve control of compressor B1	Maximum 18 VA - 10 W - 24 V a.c.
Connection to solenoid valve B2	J2B/CH22	53a-12	Customer terminal board	Contact used for solenoid valve control of compressor B2	Maximum 18 VA - 10 W - 24 V a.c.
Alarm relay output	J3 / CH24	30-31	NRCP-BASE master	Indicates that the unit is in alarm condition	Volt-free contact 24 V a.c., max. 48 V d.c., min. 20 V a.c. or V d.c., max. 3 A, min. 80 mA min, external supply. Connection: 4-pin WAGO 231-304/026000, pitch 5.08
CCN bus connection	J12		NRCP-BASE master	Permits connection of the CCN communication bus	
24 V a.c. thermostat supply		R.C	Customer terminal board		Maximum 10 VA
Unit with temperature sensor control					
Room sensor input	J6 / CH1	278-0 278-1	Customer terminal board	Permits connection of the room air sensor if the control mode is selected.	NTC10 K
Contact 1: Start of occupied mode	J4 / CH8	278-2 278-3	Customer terminal board	This contact can be used to start unit operation outside pre-defined occupancy periods.	Push button
Setpoint offset input	J6 / CH1	278-4 278-5	Customer terminal board	Permits connection of the room air sensor, includes a potentiometer to offset the setpoint	10 K
Supply air sensor input	J6 / CH2	278-6 278-7	Customer terminal board	Permits connection of the supply air sensor	NTC 5 K
Output for indoor unit fan control	J2B/CH23	278-6 278-8	Customer terminal board	This contact can be used to control the indoor fan or to signal that the unit is running	Maximum 18 VA - 10 W - 24 V a.c.
Output for indoor unit fan control	J3 / CH24		NRCP-BASE slave	This contact can be used to control the indoor fan	Volt-free contact 24 V a.c., max. 48 V d.c., min. 20 V a.c. or V d.c., max. 3 A, min. 80 mA, external supply. Connection: 4-pin WAGO 231-304/026000, pitch 5.08. One terminal strip per board.

4. SETTING UP PRO-DIALOG+ CONTROL (OPTION)

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
Room temperature		Description of the first parameter
ROOMT	25.3°C	Abbreviation and value with unit of measurement of the first parameter
Control point		Description of the second parameter
CTRL_PNT	22.5°C	Abbreviation and value with unit of measurement of the second parameter
Percent total capacity		Description of the third parameter
CAP_T	50%	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	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.

Enter password

1_**

(0 = basic access)

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

Enter password

11_**

0 = basic access)

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	ALARMS	Selection cursor to the left of the first column
TEMP	RUNTIME	
PRESSURE	MODES	Menu list
SETPOINT	LANGUAGE	
INPUTS	LOGOUT	
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 air temperature setpoints.

\MAINMENU\TEMP		Current path in the menu structure
ROOMT	25.3°C	List of items
SPOFFSET	0.3°C	Cursor position
OAT	35.0°C	
SAT	19.2°C	
SCT_A	57.0°C	
Room Setpoint Offset		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
roomtocc	21.0°C	List of items
roomtuno	28.0°C	Cursor position
satmin	14.0°C	
satmax	30.0°C	
potreset	3°C	
Room T, unoccupied		Description of the item framed by the selection cursor

The following screen allows modification of a parameter.

Modify value		Screen description
	roomtuno	
28.0	°C	Current value
-	°C	Cursor position
Room T, unoccupied		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
	roomtuno	
28.0	°C	Current value
27.5_	°C	Cursor position
Room T, unoccupied		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).

\MAINMENU\SETPOINT		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.

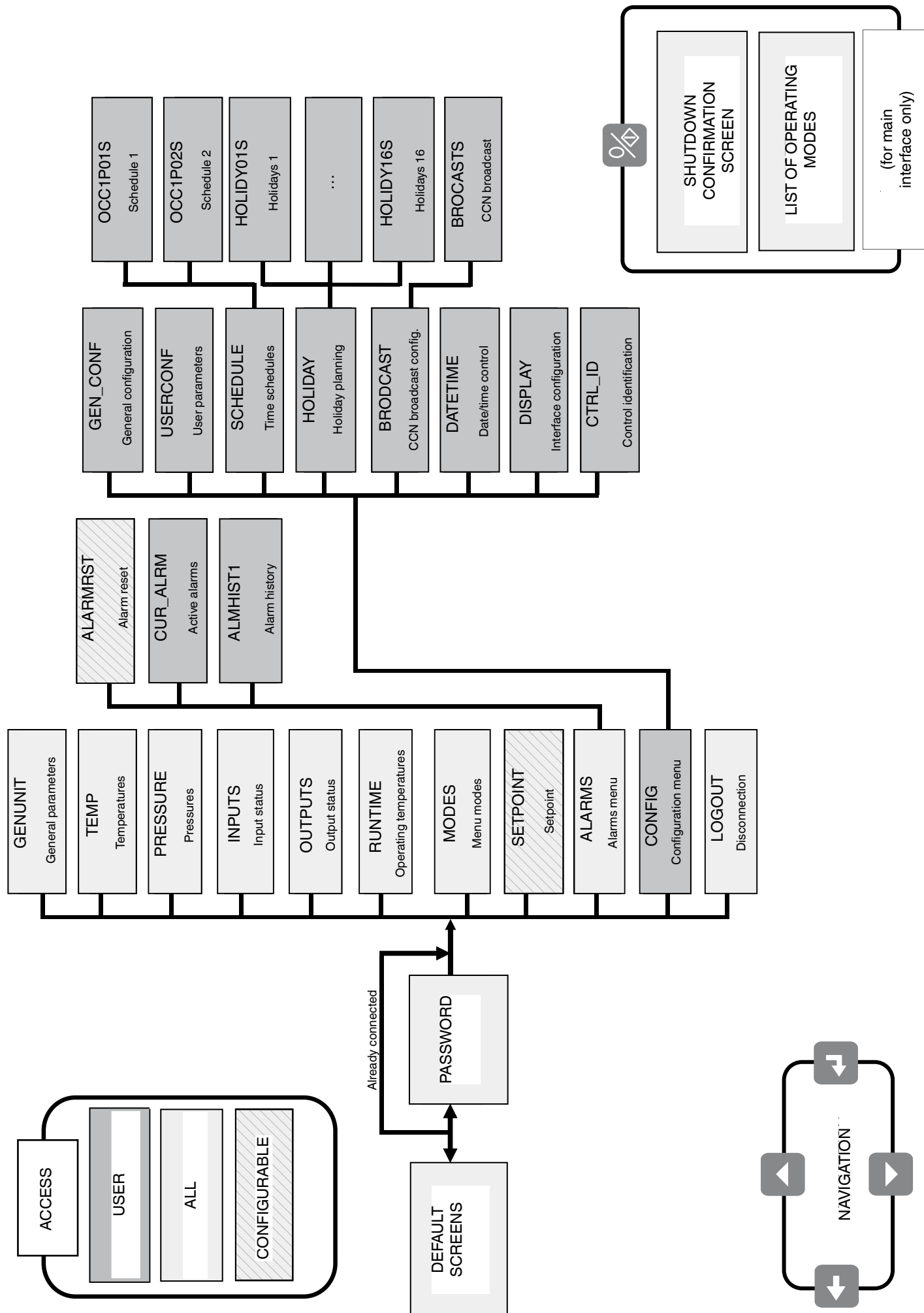
When the operating mode has been selected, the new operating mode can be validated with the Enter key.

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	-	Control mode type 0 = Control via local interface 1 = Control via CCN network 2 = Control via volt-free contacts
STATUS	STATUS = 0 --> Off STATUS = 1 --> Running STATUS = 2 --> Stopping STATUS = 3 --> Delay STATUS = 4 --> Tripout STATUS = 5 --> Ready STATUS = 6 --> override STATUS = 7 --> defrost STATUS = 8 --> FreeCool STATUS = 9 --> RunTest STATUS = 10 --> Test	-	Operating status
ALM	ALM = 0 --> Normal ALM = 1 --> Partial ALM = 2 --> Shutdown	-	Alarm status
min_left	-	min	Start-up delay
HEATCOOL	HEATCOOL = 0 --> Cool HEATCOOL = 1 --> Heat HEATCOOL = 2 --> Standby HEATCOOL = 3 --> Both	-	Heating/cooling status (not used)
LOCAL_HC	0/1/2	-	Heating/cooling selection via the main interface (not used)
HC_SEL	0/1/2	-	Heating/cooling selection via the CCN network 0 = cooling, 1 = heating, 2 = auto (not used)
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 = Setpoint 1, 2 = Setpoint 2
SP_OCC	No/Yes	-	Selection of setpoint 1, occupied mode
CHIL_S_S	Disable/Enable	-	Operation demand from the CCN bus
CHIL_OCC	No/Yes	-	Occupancy demand from the CCN bus
CAP_T	0 to 100	%	Total capacity in %
CAPA_T	0 to 100	%	Capacity circuit A in %
CAPB_T	0 to 100	%	Capacity circuit B in %
DEM_LIM	0 to 100	%	Current capacity limit
SP	-	°C	Current setpoint
CTRL_PNT	-20 to 67.2	°C	Final control point
EMSTOP	Disable/Enable	-	Emergency stop

4.9.2 - TEMP menu

NAME	FORMAT	UNIT	DESCRIPTION
ROOMT	-50 to 50	°C	Room temperature
SPOFFSET	-	^C	Room temperature setpoint offset
OAT	-50 to 50	°C	Outdoor temperature
SAT	-50 to 50	°C	Supply air temperature
-	-	-	Refrigerant circuit temperature
-	-	-	Circuit A
SCT_A	-	°C	Saturated condensing temperature
SST_A	-	°C	Saturated evaporating temperature
DEFR_T_1	-	°C	Defrost temperature 1 (not used)
SUCT_A	-	°C	Compressor suction temperature
-	-	-	Circuit B
SCT_B	-	°C	Saturated condensing temperature
SST_B	-	°C	Saturated evaporating temperature
DEFR_T_2	-	°C	Defrost temperature 2 (not used)
SUCT_T_B	-	°C	Compressor suction temperature

4.9.3 - PRESSURE menu

NAME	FORMAT	UNIT	DESCRIPTION
DP_A	-	kPa	Discharge pressure, circuit A
SP_A	-	kPa	Suction pressure, circuit A
DP_B	-	kPa	Discharge pressure, circuit B
SP_B	-	kPa	Suction pressure, circuit B

4.9.4 - SETPOINT menu

NAME	FORMAT	DEFAULT	UNIT	DESCRIPTION
roomtocc	15 to 30	21.05	°C	Room temperature setpoint in occupied mode
roomtuno	5 to 35	28	°C	Room temperature setpoint in unoccupied mode
satmin	10 to 18	14	°C	Minimum supply air temperature
satmax	25 to 35	30	°C	Maximum supply air temperature
potreset	0 to 3	3	^C	Maximum room air setpoint reset
oat1_cor	-20 to 14	-10	°C	OAT threshold 1
corlo oat	-5 to 0	-2	^C	Correction if OAT < oat1
oat2_cor	15 to 35	30	°C	OAT threshold 2
corhioat	0 to 5	2	^C	Correction if OAT > oat2
oat_cor	No/Yes	no	-	Setpoint reset based on OAT
lim_sp1	0 to 100	100	%	Capacity limit 1
lim_sp2	0 to 100	100	%	Capacity limit 2
lim_sp3	0 to 100	100	%	Capacity limit 3

4.9.5 - INPUTS menu

NAME	FORMAT	UNIT	DESCRIPTION
ONOFF_SW	Open/Closed	-	Indoor fan reversal, start/stop
STAGE_1	Open/Closed	-	Contact stage 1
STAGE_2	Open/Closed	-	Contact stage 2
STAGE_3	Open/Closed	-	Contact stage 3
STAGE_4	Open/Closed	-	Contact stage 4
LOCK	Alarm/Normal	-	Customer contact status (safety loop)
AL_RESET	Open/Closed	-	Alarm reset demand
HC_SW	Open/Closed	-	Remote contact for heating/cooling mode selection (not used)
on_ctrl	-	-	Current control
SP_SW	Open/Closed	-	Remote contact for setpoint 1 selection, occupied mode
LIM_SW1	Open/Closed	-	Status limit contact 1 (not used)
LIM_SW2	Open/Closed	-	Status limit contact 2 (not used)
OCC_SW	Open/Closed	-	Start of occupied mode

4.9.6 - OUTPUTS menu

NAME	FORMAT	UNIT	DESCRIPTION
CP_A1	On/Off	-	Output compressor 1
CP_A2	On/Off	-	Output compressor 2
CP_A3	On/Off	-	Output compressor 3
fan_a1	-	-	Fan output A1
fan_a2	-	-	Fan output A2
HD_POS_A	-	%	Fan variator output A
RV_A	On/Off	-	Four-way valve
LLS_A1	Closed/Open	-	Liquid line valve A1
LLS_A2	Closed/Open	-	Liquid line valve A2
CP_B1	On/Off	-	Output compressor 1
CP_B2	On/Off	-	Output compressor 2
fan_b	-	-	Fan output B
HD_POS_B	-	%	Fan variator output B
RV_B	On/Off	-	Four-way valve
LLS_B1	Closed/Open	-	Liquid line valve B1
LLS_B2	Closed/Open	-	Liquid line valve B2
IN_FAN	On/Off	-	Indoor fan control
ALRM_LED	On/Off	-	Alarm LED status
ALARM	On/Off	-	Alarm relay status
RUNNING	On/Off	-	Unit operation status

4.9.7 - RUNTIME menu

NAME	FORMAT	UNIT	DESCRIPTION
hr_mach	-	hours	Number of unit operating hours
st_mach	-	-	Number of start-ups, unit
HR_CP_A1	-	hours	Number of operating hours compressor A1
st_cp_a1	-	-	Number of start-ups compressor A1
HR_CP_A2	-	hours	Number of operating hours compressor A2
st_cp_a2	-	-	Number of start-ups compressor A2
HR_CP_A3	-	hours	Number of operating hours compressor A3
st_cp_a3	-	-	Number of start-ups compressor A3
HR_CP_B1	-	hours	Number of operating hours compressor B1
st_cp_b1	-	-	Number of start-ups compressor B1
HR_CP_B2	-	hours	Number of operating hours compressor B2
st_cp_b2	-	-	Number of start-ups compressor B2
hr_fana1	-	hours	Number of operating hours fan 1, circuit A
hr_fana2	-	hours	Number of operating hours fan 2, circuit A
hr_fanb1	-	hours	Number of operating hours fan, circuit B
st_fana1	-	-	Number of start-ups fan 1, circuit A
st_fana2	-	-	Number of start-ups fan 2, circuit A
st_fanb1	-	-	Number of start-ups fan 1, circuit B
nb_def_a	-	-	Number of defrost cycles, circuit A (not used)
nb_def_b	-	-	Number of defrost cycles, circuit B (not used)

4.9.8 - MODES menu

NAME	FORMAT	UNIT	DESCRIPTION
m_limit	No/Yes	-	Capacity limit active
m_night	No/Yes	-	Night mode active
m_auto	No/Yes	-	Change-over auto active (not used)
m_defr_a	No/Yes	-	Defrost active, circuit A (not used)
m_defr_b	No/Yes	-	Defrost active, circuit B (not used)
m_sst_a	No/Yes	-	Low SST, circuit A
m_sst_b	No/Yes	-	Low SST, circuit B
m_dgt_a	No/Yes	-	High DGT, circuit A
m_dgt_b	No/Yes	-	High DGT, circuit B
m_hp_a	No/Yes	-	High pressure override, circuit A
m_hp_b	No/Yes	-	High pressure override, circuit B
m_sh_a	No/Yes	-	High superheat, circuit A
m_sh_b	No/Yes	-	High superheat, circuit B

4.9.9 - ALARMS menu

NAME	DESCRIPTION
ALARMRST	Alarm reset
CUR_ALRM	Current alarms
ALMHIST1	Alarm history

4.9.10 - ALARMST menu

NAME	FORMAT	UNIT	DESCRIPTION
RST_ALM	No/Yes	-	Alarm reset
ALM	-	-	Alarm status
alarm_1c	-	-	Current alarm 1
alarm_2c	-	-	Current alarm 2
alarm_3c	-	-	Current alarm 3
alarm_4c	-	-	Current alarm 4
alarm_5c	-	-	Current alarm 5
alarm_1	-	-	JBus alarm 1 active
alarm_2	-	-	JBus alarm 2 active
alarm_3	-	-	JBus alarm 3 active
alarm_4	-	-	JBus alarm 4 active
alarm_5	-	-	JBus alarm 5 active

4.9.11 - CUR_ALRM menu

This menu lists up to ten 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.

... \ALARMS \CUR_ALM
HH:MM DD-MM-YY : alarm text
Alarm #1

4.9.12 - 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.

... \ALARMS \ALMHIST1
HH:MM DD-MM-YY : alarm text
Alarm #1

4.9.13 - GEN_CONF menu

NAME	FORMAT	DEFAULT	UNIT	DESCRIPTION
capactrl	0 to 1	0	-	Capacity control mode selection 0 = thermostat control, 2 to 4 contacts 1 = room temperature sensor control with minimum supply air temperature control
ifan_occ	Auto/On	On	-	Indoor fan control type during occupied mode Auto = fan "On" if capacity > 0% On = fan always active
ifanunoc	Auto/On	Auto	-	Indoor fan control type during unoccupied mode Auto = fan "On" if capacity > 0% On = fan always active
lead_cir	0 to 2	0	-	Master circuit selection 0 = Auto, 1 = circuit A, 2 = circuit B
seq_typ	No/Yes	No	-	Circuit loading stage
off_on_d	1 to 15	1	min	Start-up delay
nh_limit	0 to 100	100	%	Night capacity limit value
nh_start	-	0	-	Night mode start hour
nh_end	-	0	-	Night mode stop hour
auto_sel	No/Yes	No	-	Automatic heating/cooling mode selection (function not available in this software version)
heat_th	-20 to 0	-15	°C	OAT threshold for heating mode (function not available in this software version)
bas_menu	0 to 3	0	-	Configuration of access rights to the "Alarms" and "Setpoints" menus 0 = No access to these menus without password 1 = Access without password to the "Alarms" menu 2 = Access without password to the "Setpoints" menu 3 = Access without password to both menus

4.9.14 - USERCONF menu

NAME	FORMAT	DEFAULT	UNIT	DESCRIPTION
language	0 to 5	0	-	Language selection 0 = English, 1 = Spanish, 2 = French, 3 = German, 4 = Italian, 5 = Other language
use_pass	1 to 9999	11	-	User password
extratim	0 to 4	1	hours	Occupied mode start duration

4.9.15 - BROCASTS 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
stopdow	1 to 7	7	-	Day of the week (1 = Monday)
stopwom	1 to 5	5	-	Week of the month

4.9.16 - 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

4.9.17 - CTRL_ID menu

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+ 38RBS		Description
		CSA-SR-20H430NN		Software version
		-		Serial number

4.9.18 - 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.

If the auto mode is selected, the second timer program (schedule 2) provides a means to automatically switch the active setpoint from an occupied setpoint to an unoccupied setpoint.

Each schedule consists of eight time periods set by the operator. These time periods can be flagged to be active or not 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 active. 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

4.9.19 - 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.

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
- Remote start/stop contact: this contact is used when the unit is in remote operating type (Remote).
- 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.
- Time schedule: occupied or unoccupied status of the unit as determined by the chiller 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					PARAMETER STATUS					CONTROL TYPE	UNIT STATUS
LOFF	L-C	L-SC	REM	CCN	On/off contact indoor fan reversed	CHIL_S_S CCN on/off control	Time schedule	Emergency CCN stop	General alarm		
-	-	-	-	-	-	-	-	Active	-	-	Stop
-	-	-	-	-	-	-	-	-	Yes	-	Stop
Active					-	-	-	-	-	Local	Stop
	Active				-	-	-	Disabled	No	Local	Start
		Active			-	-	Unoccupied	Disabled	No	Local	Stop
		Active			-	-	Occupied	Disabled	No	Local	Start
-	-	-	Active	-	Stop	-	-	-	-	-	Stop
			Active		Start	-	Unoccupied	Disabled	No	Remote	Stop
			Active		Start	-	Occupied	Disabled	No	Remote	Start
				Active	-	-	Unoccupied	Disabled	No	CCN	Stop
				Active	-	Stop	-	Disabled	No	CCN	Stop
				Active	-	Start	Unoccupied	Disabled	No	CCN	Stop
				Active	-	Start	Occupied	Disabled	No	CCN	Start

5.2 - Safety loop

This contact checks the status of a loop (air 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.

5.3 - Control point

The control point represents the air temperature that the unit must control.

Control point = active setpoint + reset

5.3.1 - Active setpoint

Two setpoints can be selected. 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 table summarises 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.
- Setpoint selection contacts: setpoint selection contact status.
- Schedule 2 status: schedule for setpoint selection.

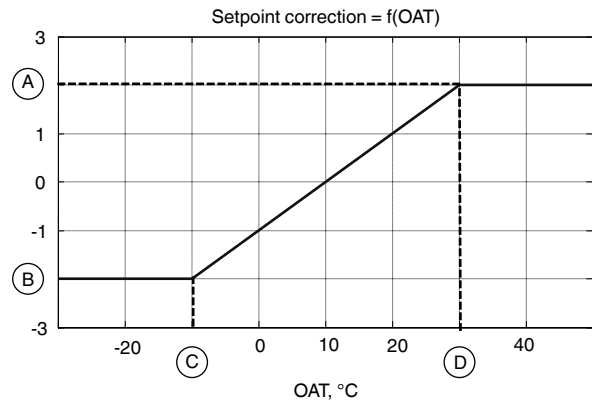
Parameter status				Setpoint active
Active operating type	lsp_sel / sp_sel	Contact	Status time schedule 2	
Local	sp1	-	-	Occupied
Local	sp2	-	-	Unoccupied
Local	auto	-	Occupied	Occupied
Local	auto	-	Unoccupied	Unoccupied
Remote	-	sp1	-	Occupied
Remote	-	sp2	-	Unoccupied
CCN	sp1	-	-	Occupied
CCN	sp2	-	-	Unoccupied
CCN	auto	-	Occupied	Occupied
CCN	auto	-	Unoccupied	Unoccupied

5.3.2 - Reset

Reset means that the active setpoint is modified so that less machine capacity is required. 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 SETPOINT menu: it can be provided either by the outdoor temperature (that gives a measure of the load trends for the building) or imposed by the user.

In response to a drop in the outdoor temperature or to user reset, the setpoint is reset to optimise unit performance or enhance comfort.

If correction, based on the outdoor temperature is selected, it is in accordance with the diagram below.



5.4 - 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.

5.5 - 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.

5.6 - Capacity control

This function adjusts the number of active compressors to keep the air temperature at its setpoint. The precision with which this is achieved depends on the air volume, 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 to determine the optimal 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 the controlled air temperature less precise.

The high and low pressure 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).

5.7 - Indoor fan control

This function is only activated if the unit is not controlled by a thermostat. It starts and stops the indoor fan. The fan can be activated either continuously or only if any capacity is applied. The user selects the desired performance configuration in the GEN_CONF menu. The configuration selected can differ in the occupied mode and unoccupied mode.

5.8 - Head pressure control

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

5.9 - High-pressure unloading function

This option does not require an additional board. It permits avoiding a high-pressure cut-out on a circuit by:

- not allowing any capacity increase on this circuit if the high-pressure value reaches a first threshold,
- unloading one compressor if a second protection threshold is reached.

If a compressor is unloaded, no capacity increase to the affected circuit is allowed for several minutes.

5.10 - Pumpdown

If a circuit is shut down, it is evacuated to purge the refrigerant from the evaporator and the suction line.

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 with the alarm LED

The alarm LED on the unit permits an immediate alarm display. This is followed by a blinking sequence that describes the alarm code: the first one is for tens' number, and the second one for ones' number.

Example:

Alarm 36 is detected by the Pro-Dialog control, the LED lights up continuously for 5 seconds, then blinks three times, stops and blinks six times, stops and continues the cycle.

The Pro-Dialog control permits display of up to five active unit fault codes.

6.3 - Displaying alarms on the Pro-Dialog+ interface

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.

6.4 - 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.

Manual reset must be done with the push button or 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.

6.5 - Alarm codes

Alarm No.	Alarm code	Alarm description	Reset type	Probable cause	Action taken by the control
1	th204	Room sensor thermistor fault	Automatic when the temperature measured by the sensor returns to normal	Defective thermistor, thermistor not connected, short circuit	Unit is shut down if this sensor is used
2	se-01	Setpoint reset fault	Automatic when the value returns to the normal range	Potentiometer not connected, potentiometer resistance too high	Setpoint reset is no longer available
3	th-12	Suction temperature sensor fault, circuit A	Automatic when the temperature measured by the sensor returns to normal	Defective thermistor, thermistor not connected, short circuit	Superheat monitoring is no longer available for this circuit
4	th-13	Suction temperature sensor fault, circuit B	Automatic when the temperature measured by the sensor returns to normal	Defective thermistor, thermistor not connected, short circuit	Superheat monitoring is no longer available for this circuit
5	th-03	Defrost sensor fault, circuit A (not applicable to the control)	Automatic when the temperature measured by the sensor returns to normal	Defective thermistor, thermistor not connected, short circuit	Unit is shut down if this sensor is used
6	th-04	Defrost sensor fault, circuit B (not applicable to the control)	Automatic when the temperature measured by the sensor returns to normal	Defective thermistor, thermistor not connected, short circuit	Unit is shut down if this sensor is used
7	th-10	Outdoor temperature sensor fault	Automatic when the temperature measured by the sensor returns to normal	Defective thermistor, thermistor not connected, short circuit	Unit is shut down if this sensor is used
8	th202	Supply air thermistor fault	Automatic when the temperature measured by the sensor returns to normal	Defective thermistor, thermistor not connected, short circuit	Unit is shut down if this sensor is used
9	Pr-01	Discharge pressure sensor fault, circuit A	Automatic when the voltage transmitted by the sensor returns to normal	Defective thermistor or wiring fault	Circuit is shut down
10	Pr-02	Discharge pressure sensor fault, circuit B	Automatic when the voltage transmitted by the sensor returns to normal	Defective thermistor or wiring fault	Circuit is shut down
11	Pr-04	Suction pressure sensor fault, circuit A	Automatic when the voltage transmitted by the sensor returns to normal	Defective thermistor or wiring fault	Circuit is shut down
12	Pr-05	Suction pressure sensor fault, circuit B	Automatic when the voltage transmitted by the sensor returns to normal	Defective thermistor or wiring fault	Circuit is shut down
13	Co-O1	Communication loss with auxiliary board 1	Automatic when communication is re-established	Defective auxiliary board or wiring fault	Depending on configuration, compressor A3 shut down, circuit B shut down or unit shut down
14	CoDr1	Communication loss with frequency variator of fan 1	Automatic when communication is re-established	Defective variator or wiring fault	The circuit using this fan is shut down
15	CoDr2	Communication loss with frequency variator of fan 2	Automatic when communication is re-established	Defective variator or wiring fault	The circuit using this fan is shut down
16	FC-01	Illegal factory configuration number 1 to nn	Automatic when a correct configuration is entered	Incorrect configuration	Unit is shut down
17	FC-nO	No factory configuration	Automatic when a correct configuration is entered	No configuration (unit size)	Unit is shut down
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.	Defective pressure sensor, TXV blocked or refrigerant charge too low	Circuit is shut down
19	P-06	Low suction temperature, circuit B	Automatic when the temperature returns to normal, and if this alarm has not appeared during the last 24 hours, otherwise manual.	Defective pressure sensor, TXV blocked or refrigerant charge too low	Circuit is shut down
20	P-11	Low superheat, circuit A	Manual	Defective sensor, TXV blocked	Circuit is shut down
21	P-12	Low superheat, circuit B	Manual	Defective sensor, TXV blocked	Circuit is shut down
22	P-16	Compressor A1 not started or no pressure increase registered	Manual	Defective compressor or wiring fault	Compressor is shut down
23	P-17	Compressor A2 not started or no pressure increase registered	Manual	Defective compressor or wiring fault	Compressor is shut down
24	P-18	Compressor A3 not started or no pressure increase registered	Manual	Defective compressor or wiring fault	Compressor is shut down
25	P-20	Compressor B1 not started or no pressure increase registered	Manual	Defective compressor or wiring fault	Compressor is shut down
26	P-21	Compressor B2 not started or no pressure increase registered	Manual	Defective compressor or wiring fault	Compressor is shut down
27	P-204	No air flow or customer safety loop open	Manual	Safety loop open, pressure switch fault, air flow or wiring fault	Unit is shut down
28	P-31	Unit emergency stop	CCN	An emergency stop command has been issued by the CCN	Unit is shut down
29	P-37	Repeated overrides, high discharge temperature, circuit A	Automatic	Defective transducer, condenser air temperature too high, condenser fouled or fan air flow too low.	Signalling
30	P-38	Repeated overrides, high discharge temperature, circuit B	Automatic	Defective transducer, condenser air temperature too high, condenser fouled or fan air flow too low.	Signalling
31	P-40	Repeated exceeded low suction temperature, circuit A	Automatic	Defective pressure sensor or refrigerant charge too low	Circuit is shut down
32	P-41	Repeated exceeded low suction temperature, circuit B	Automatic	Defective pressure sensor or refrigerant charge too low	Circuit is shut down
33	P-63	High pressure switch fault, circuit A	Manual and the high pressure switch must be manually reset	Fan circuit fault, air or condenser temperature too high	Circuit is shut down
34	P-64	High pressure switch fault, circuit B	Manual and the high pressure switch must be manually reset	Fan circuit fault, air or condenser temperature too high	Circuit is shut down
35	P-100	Incorrect indoor fan status	Automatic	Thermostat transmits a cooling stage demand when the indoor fan is shut down	Unit is shut down
36	V0-xx	Fan voltage variator fault, circuit A	Manual or automatic	Variator fault or alert	Alert: circuit continues to operate, variator slows the motor down Alarm: circuit is shut down
37	V1-xx	Fan voltage variator fault, circuit B	Manual or automatic	Variator fault or alert	Alert: circuit continues to operate, variator slows the motor down Alarm: circuit is shut down



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