Carrier

United Technologies

CONTROLS MANUAL

Touch Pilot Control

30XW-V/30XWHV
30XW-V-ZE

AquaForce ® PUREtec with R-1234ze(E)

TOUCHPILOT

greenspeed AQUAFORCE

Original document

CONTENTS

This generic controls manual covers one or several product ranges. Certain functions, options or accessories may not be available. The cover images are solely for illustration and form no part of any offer for sale or any sale contract.

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.

IMPORTANT: Some specific safety precautions should be taken in case of HFO units. For more information about handling the equipment safely, please refer to the IOM Unit documentation (Installation, Operation and Maintenance instructions).

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 uses and emits electromagnetic signals. Tests have shown that the equipment conforms to all applicable codes with respect to electromagnetic compatibility.

RISK OF ELECTROCUTION: Even when the main circuit breaker or isolator is switched off, certain circuits may still be energised, since they may be connected to a separate power source.

RISK OF BURNS: Electrical currents cause components to get hot either temporarily or permanently. Handle power cable, electrical cables and conduits, terminal box covers and motor frames with great care.

2 - GENERAL DESCRIPTION

2.1 - General

Touch Pilot is a system for controlling 30XW-V/30XWHV single-circuit or dual-circuit water-cooled units with R-134a refrigerant as well as 30XW-V-ZE single-circuit or dual-circuit water-cooled chillers with R-1234ze refrigerant (HFO).

Touch Pilot controls the start-up of the compressors needed to maintain the desired heat exchanger entering or leaving water temperature. Touch Pilot constantly monitors safety devices to ensure unit protection. Touch Pilot also gives access to a Quick Test program covering all inputs and outputs.

All Touch Pilot controls can work in accordance with three independent modes:

- Local mode: the machine is controlled by commands from the user interface.
- Remote mode: the machine is controlled by volt-free contacts.
- Network mode: the machine is controlled by commands from the Carrier Comfort Network (CCN) or the BACnet/IP network (option). A data communication cable is used to connect the unit to the CCN communication bus. To connect the unit to the BACnet network, an Ethernet cable is used.

The operating mode must be chosen with the Start/Stop button described in chapter 4. When the Touch Pilot system operates autonomously (Local or Remote mode) it retains all of its own control capabilities but does not offer any of the functions of the CCN or the BACnet/IP network, except the "CCN emergency stop" command (if this command is active, it stops the unit whatever the active operating type).

2.2 - Abbreviations used

In this manual, the refrigeration circuits are called circuit A and circuit B.

The following abbreviations are used frequently:

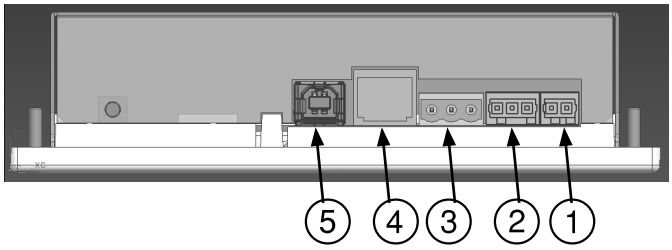
1. Local-Off	Operating type: Local Off
2. Local-On	Operating type: Local On mode
3. Local-Schedule	Operating type: Local On following a time schedule
4. Network mode	CCN or BACnet/IP operating type
5. Remote mode	Operating type: by remote contacts
6. Master mode	Operating type: master unit (master/slave assembly)
7. CCN	Carrier Comfort Network. This is the Carrier communication network
8. LED	Light-emitting diode
9. SCT	Saturated condensing temperature
10. LEN	Internal communication bus linking the basic board to the slave boards
11. SST	Saturated suction temperature
12. OAT	Oudoor Air Temperature
13. BACnet	Building Automation and Controls network: open communication network, compatible with most control/monitoring/ interoperability functions
14. VFD	Variable Frequency Drive

3 - HARDWARE DESCRIPTION

3.1 - General

Touch Pilot control interface

Touch Pilot control - view from below



Legend
1 Power supply connector (24 VAC)
2 LEN connector
3 CCN connector
4 Ethernet connector
5 USB connector

The control system consists of an NRCP2-BASE main board, variators for compressor control, PD-AUX boards and an NRCP2-BASE board for units equipped with energy management option. All boards communicate via an internal LEN bus. The ST3 touch control interface board continuously manages the information received from the various pressure and temperature probes, and incorporates the program that controls the unit.

3.2 - Power supply to boards

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

CAUTION: Maintain the correct polarity when connecting the power supply to the boards, otherwise the boards may be 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 flashing for a two-second period on the NRCP2-BASE board 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.

When the unit is energised, all boards must flash in a synchronised way. If a board does not flash at the same time as the others, verify its connection at the LEN bus.

3.4 - The sensors

Pressure sensors
Two types of electronic sensors are used to measure the following pressures in each circuit:

- Discharge gas pressure (high pressure type)
- Suction pressure (low pressure type)
- Oil pressure (high pressure type)

These electronic sensors deliver 0 to 5 VDC. The pressure sensors are connected to the AUX or NRCP2-BASE main board.

Discharge pressure sensors
These are on the high pressure side of each circuit. They are used to control head pressure or high pressure load shedding.

Oil pressure sensors
These sensors are located at the oil pressure port of each compressor.

Suction pressure sensors
They measure the low-pressure side of each circuit.

Thermistors
These all have similar characteristics.

Evaporator entering and leaving water temperature sensor
The evaporator entering and leaving water temperature sensors are installed in the entering and leaving side water box.

Discharge gas sensor
This sensor is used to control the discharge gas temperature, and permits control of the discharge superheat. It is located at the discharge side of each compressor.

Suction gas sensor
This sensor is used to control the suction gas temperature. It is located at the suction side of each compressor.

Motor sensor
This is used to control the motor temperature of each compressor.

Condenser entering/leaving water temperature sensor
These sensors measure the entering and leaving water temperatures in water-cooled units or air-cooled units with the heat reclaim option.

Temperature setpoint reset sensor
This is an optional 4-20 mA sensor (energy management option) which can be installed remotely from the unit. It is used to reset the setpoint on the unit.

3.5 - The controls

Evaporator pumps
The controller can regulate one or two evaporator pumps and takes care of the automatic changeover between pumps.

Condenser pumps
The controller can regulate one or two condenser pumps and takes care of the automatic changeover between pumps.

Electronic expansion valve (EXV)
The EXV is used to adjust the refrigerant flow to changes in the operating conditions of the machine. To adjust the refrigerant flow, a piston moves constantly up or down to vary the cross-section of the refrigerant path. This piston is driven by an electronically controlled linear stepper motor. The high degree of accuracy with which the piston is positioned ensures that the flow of refrigerant is precisely controlled.

The water flow switch configuration
This permits automatic control of the minimum water flow setpoint of the water flow switch.

3.6 - Frequency variator

The frequency variator is used to control the compressor. It allows compressor start-up and capacity control by modifying the supply frequency. The variator continually monitors many compressor parameters in order to ensure its protection. If a problem occurs, the frequency variator triggers an alarm and if necessary stops the compressor.

The high-pressure switch is directly connected to the frequency variator.

3.7 - Connections at the user's terminal block

3.7.1 - General description
The contacts below are available at the user's terminal block on the NRCP2-BASE board (see figure of the control board). Some of them can only be used if the unit operates in remote operating type (Remote mode).

The table on the next page summarises the connections at the user's terminal block.

3.7.2 - Volt-free contact on/off/cooling/heating
If the unit works in the remote operating mode (Remote), the operation of on/off contacts and heating/cooling contacts is as follows:

Without multiplexing			
	Off	**Cooling**	**Heating**
On/off contact	Open	Closed	Closed
Cooling/heating contact	-	Open	Closed

3.7.3 - Volt-free setpoint selection contact

	Cooling		**Heating**	
	csp1	**csp2**	**hsp1**	**hsp2**
Setpoint selection contact	Open	Closed	Open	Closed

3.7.4 - Volt-free capacity limit selection contact

	100%	**Limit 1**	**Limit 2**
Capacity limit 1	Open	Closed	Open
Capacity limit 2	Open	Open	Closed

Terminal block connections				
Description	**Connector/ channel**	**Terminal**	**Board (item in wiring diagram) / option**	**Remarks**
Control evaporator pump 1	J2A/Ch16	90-12	NRCP2-BASE main board (A1)	The controller can regulate one or two evaporator pumps and takes care of the automatic changeover between pumps.
Control evaporator pump 2	J2A/Ch17	90A-12	NRCP2-BASE main board (A1)	The controller can regulate one or two evaporator pumps and takes care of the automatic changeover between pumps.
Control condenser pump 1	J2A/Ch18	95-12	NRCP2-BASE main board (A1)	The controller can regulate one or two condenser pumps and takes care of the automatic changeover between pumps.
Control condenser pump 2	J2A/Ch19	95A-12	NRCP2-BASE main board (A1)	The controller can regulate one or two condenser pumps and takes care of the automatic changeover between pumps.
Alarm relay output	J3/Ch24	30A-31A	NRCP2-BASE main board (A1)	Indicates the alarms.
Running relay output	J3/Ch25	37-38	NRCP2-BASE main board (A1)	This output is ON when at least one compressor is running.
Contact 1: on/off	J4/Ch08	32-33	NRCP2-BASE main board (A1)	This contact is used for the unit on/off control. It is only taken into consideration if the unit is in the remote operating mode (remote mode).
Contact 2: selection of second setpoint	J4/Ch09	65-66	NRCP2-BASE main board (A1)	This contact is only taken into consideration if the unit is in the remote operating mode (remote mode).
Contact 3: capacity limit selection 1	J4/Ch10	73-74	NRCP2-BASE main board (A1)	See description in chapter 3.7.4.
Contact 4: heating/cooling mode selection (water-cooled heat pump unit only)	J5/Ch12 (shown on terminal)	34-35	NRCP2-BASE main board (A1)	This contact is only taken into consideration if the unit is in the remote operating mode (remote mode).
User safety loop input	J4/Ch11a	34-35	NRCP2-BASE main board (A1)	This contact is used for the customer safety loops that require unit shut-down if it is closed. Alarm P-91 is triggered.
Options				
Three-way valve control output (0-10 V)	J8/Ch7 (shown on terminal)	80-80+	NRCP2-BASE main board (A1 - option 152)	The control allows control of a three-way valve based on the saturated condensing temperature.
Contact, occupancy mode override	J4/Ch08	77-78	NRCP2-BASE EMM (A3)/energy management (option 156)	In the remote operating mode this allows control of the unit occupancy (occupied/unoccupied).
Contact 3bis: capacity limit selection 2	J4/Ch09	73A-74A	NRCP2-BASE EMM (A3)/energy management	This contact is only available with the energy management option (see chapter 3.7.4).
User safety loop input	J4/Ch10	34A-35A	NRCP2-BASE EMM (A3)/energy management (option 156)	This contact is used for the customer safety loops that require unit shut-down if it is closed. This contact is only available with the energy management option.
Ice storage contact	J4/Ch11a	75-76	NRCP2-BASE EMM (A3)/energy management (option 156)	This contact is used to select the chilled-water setpoint.
Relay output for unit shut-down after an alarm	J3/Ch24	30-31	NRCP2-BASE EMM (A3)/energy management (option 156)	Indicates if the unit has completely shut down due to an alarm.
Relay output for an alert	J3/Ch25	30B-31B	NRCP2-BASE EMM (A3)/energy management (option 156)	Indicates alerts.
Condenser flow switch input	J5/Ch13 (shown on terminal)	96-97	NRCP2-BASE EMM (A3)/energy management (option 156)	Shows that there is water flow on the condenser side.
Space temperature input for setpoint reset	J6/Ch02 (shown on terminal)	71A-72A	NRCP2-BASE EMM (A3)/energy management (option 156)	Allows setpoint reset, if space temperature reset is selected.
Setpoint reset input	J7A/Ch05 (shown on terminal)	71-72	NRCP2-BASE EMM (A3)/energy management (option 156)	Allows setpoint reset, if reset via the 4-20 mA input is selected.
Capacity limitation input	J7B/Ch06 (shown on terminal)	67-68	NRCP2-BASE EMM (A3)/energy management (option 156)	Allows capacity limitation with a 4-20 mA signal.
Compressor A operation input	J2A/Ch16 (shown on terminal)	37A1-38A1	NRCP2-BASE EMM (A3)/energy management (option 156)	Compressor A operating status.
Compressor B operation input	J2A/Ch17 (shown on terminal)	37B1-38B1	NRCP2-BASE EMM (A3)/energy management (option 156)	Compressor B operating status.
Unit capacity output (0-10 V)	J8/Ch7 (shown on terminal)	79+-79-	NRCP2-BASE EMM (A3)/energy management (option 156)	This output reports the capacity percentage of the unit.
Refrigerant leak detection input 1	J7/Ch13 (shown on terminal)	45-1-46-1	PD-AUX (A4)/leak detection (option 159)	This input is used with the refrigerant leak detection option.
Refrigerant leak detection input 2	J8/Ch14 (shown on terminal)	45-2-46-2	PD-AUX (A4)/leak detection (option 159)	This input is used with the refrigerant leak detection option.
CCN connection			ST3-HMI	An RS-485 bus is used for connection to the CCN. - Pin 1: signal + - Pin 2: ground - Pin 3: signal -

4 - SETTING UP THE TOUCH PILOT USER INTERFACE

4.1 - User interface

The user interface is a numerical 800 x 480 mm touch screen. Navigation is either directly from the touch screen interface or by connecting to a web interface at the IP port of the controller.

The navigation menus are the same for both connection methods. Only two web connections are authorised by the interface at the same time.

4.2 - Web connection

Connection is from a PC using a web browser with Java.

To connect to the Touch Pilot control, enter the IP address of the unit in the address bar of the web browser.

Unit default address: 169.254.0.1.

Minimum web browser configuration:

- Microsoft Internet Explorer version 8 or Mozilla Firefox version 26 or higher (in the advanced connection options add the unit address to the address list. Do not use a proxy server).
- Java platform version 6 or higher (in the control panel untick the option that allows storing temporary internet files and use a direct connection).

For more information on the web browser and Java platform configuration refer to the applicable Carrier documentation and contact your network administrator.

Two users can be connected simultaneously, with no priority between users; the last modification is taken into account.

4.3 - General features

4.3.1 - Buttons

Unit is running or in standby	Unit is off	Home
Access to menus	Not logged in	Logged in
No alarm	Alert	Alarm
Back	Previous page	Next page
More information	Click this button	Value which can be modified

4.3.2 - Screens

The interface includes different screens that are listed below:

- Welcome screen,
- Synoptic screen 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 and language selection screen,
- Parameter modification screen,
- Time schedule screen.

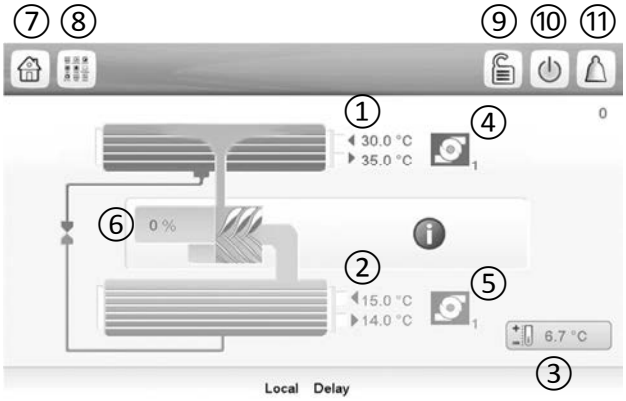
NOTE: If the interface is not used for a long period, it will go blank. The control is always active, the operating mode remains unchanged. The interface screen is re-animated, when the user presses the screen. The welcome screen is displayed.

4.3.3 - Welcome screen

The welcome screen is the first screen shown after switching the unit on or after re-animation of the screen. It displays the application name as well as the applicable software version number.

To exit from this screen press button 

4.3.4 - Synoptic screen



1	Condenser water inlet and outlet
2	Evaporator water inlet and outlet
3	Setpoint
4	Condenser pump status
5	Evaporator pump status
6	Unit capacity percentage
7	Synoptic screen access button
8	Menu access button
9	Connection/language screen access button
10	Start/stop screen access
11	Alarm menu access

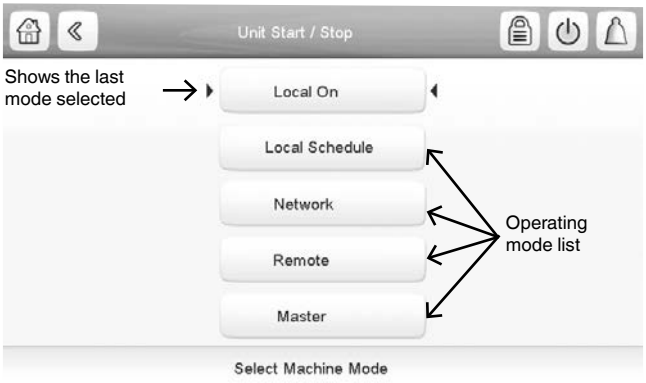
Message: All screens described below can display an information message in the band at the bottom.

Message	Status
COMMUNICATION FAILURE!	Equipment controller did not respond while reading the table content.
ACCESS DENIED!	Equipment controller does not allow accessing one of the table data blocks.
LIMIT EXCEEDED!	The value entered exceeds the table limits.
Save changes?	Modifications have been made. The web interface waits to confirm exit by pressing Save or Cancel.
HIGHER FORCE IN EFFECT!	Force or Auto command was rejected by the equipment controller because the interface force level is lower than the equipment controller's level.

4.4 - On/off screen

4.4.1 - Unit start-up

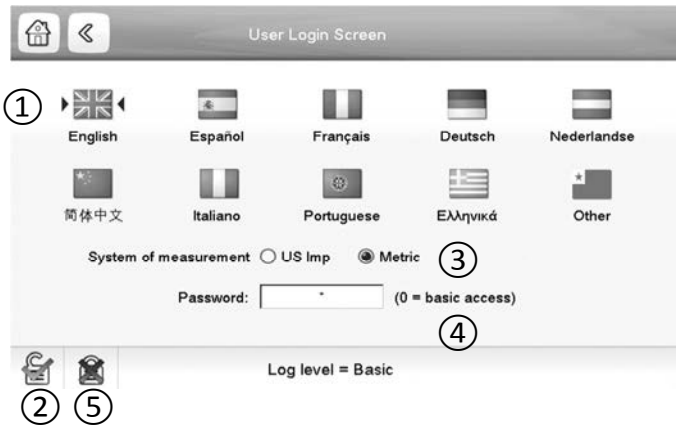
With the unit in Local Off mode, press ⏻ to display the list of operating modes. Select the required mode.



Stopping the unit: press button ⏻

Confirm the unit shut-down or return to the previous screen.

4.5 - Password/language screen

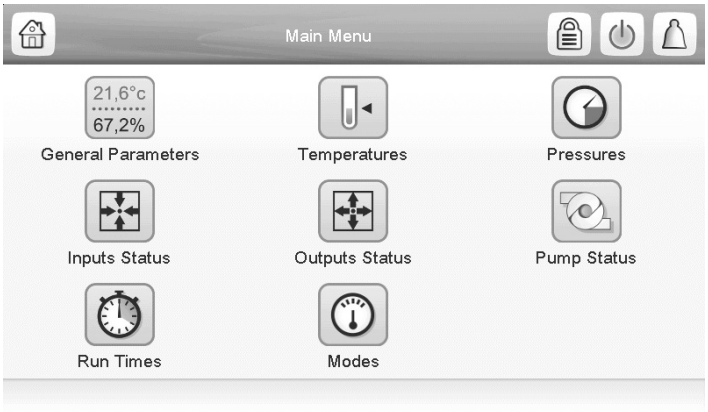


1	Cursor showing the activated language
2	Logged in
3	Unit of measurement selection: Metric/Imperial
4	Enter the password
5	Logged off

ATTENTION: Validation of password only effective after the log-in button has been pressed.

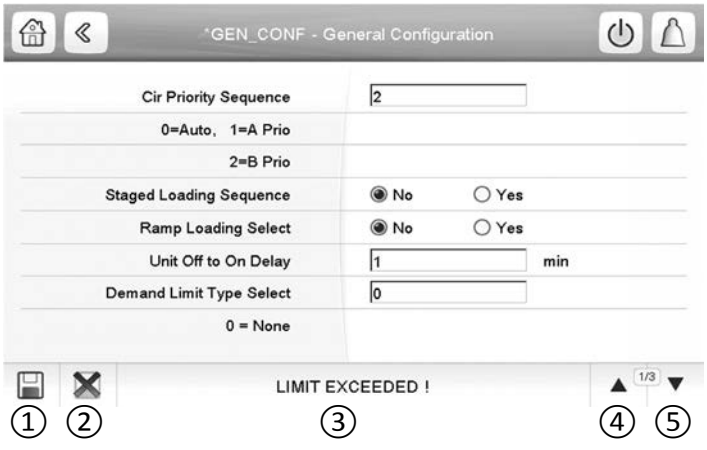
4.6 - Menu screen

To access the menu press button 



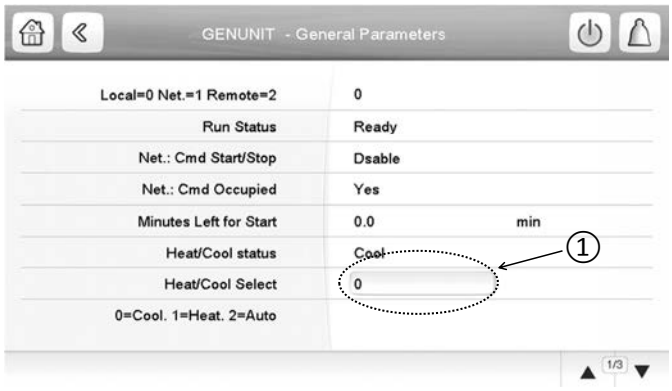
Touch the required item to access the table/menu.

4.7 - Configuration screen



1	Save
2	Cancel
3	Message
4	Previous page
5	Next page

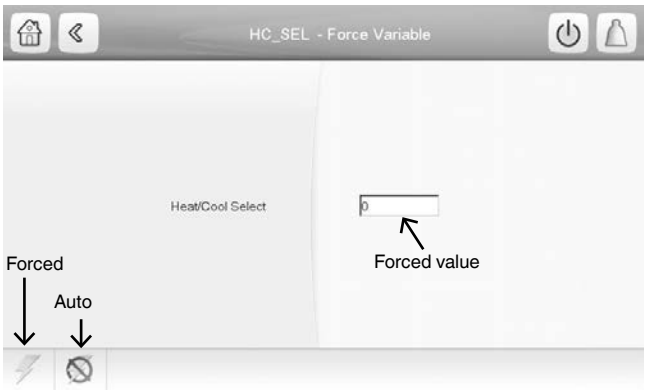
4.8 - Data screen



1	Forceable point

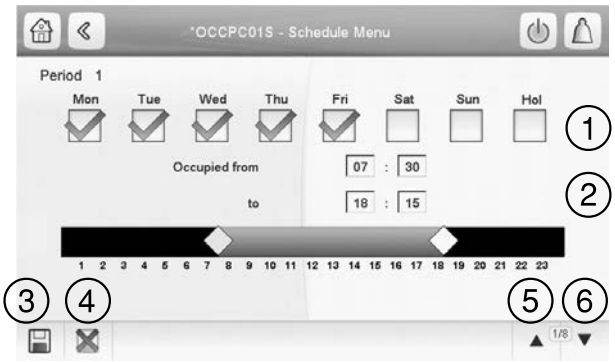
4.9 - Override screen

To access this screen press on a forceable point of a data screen.



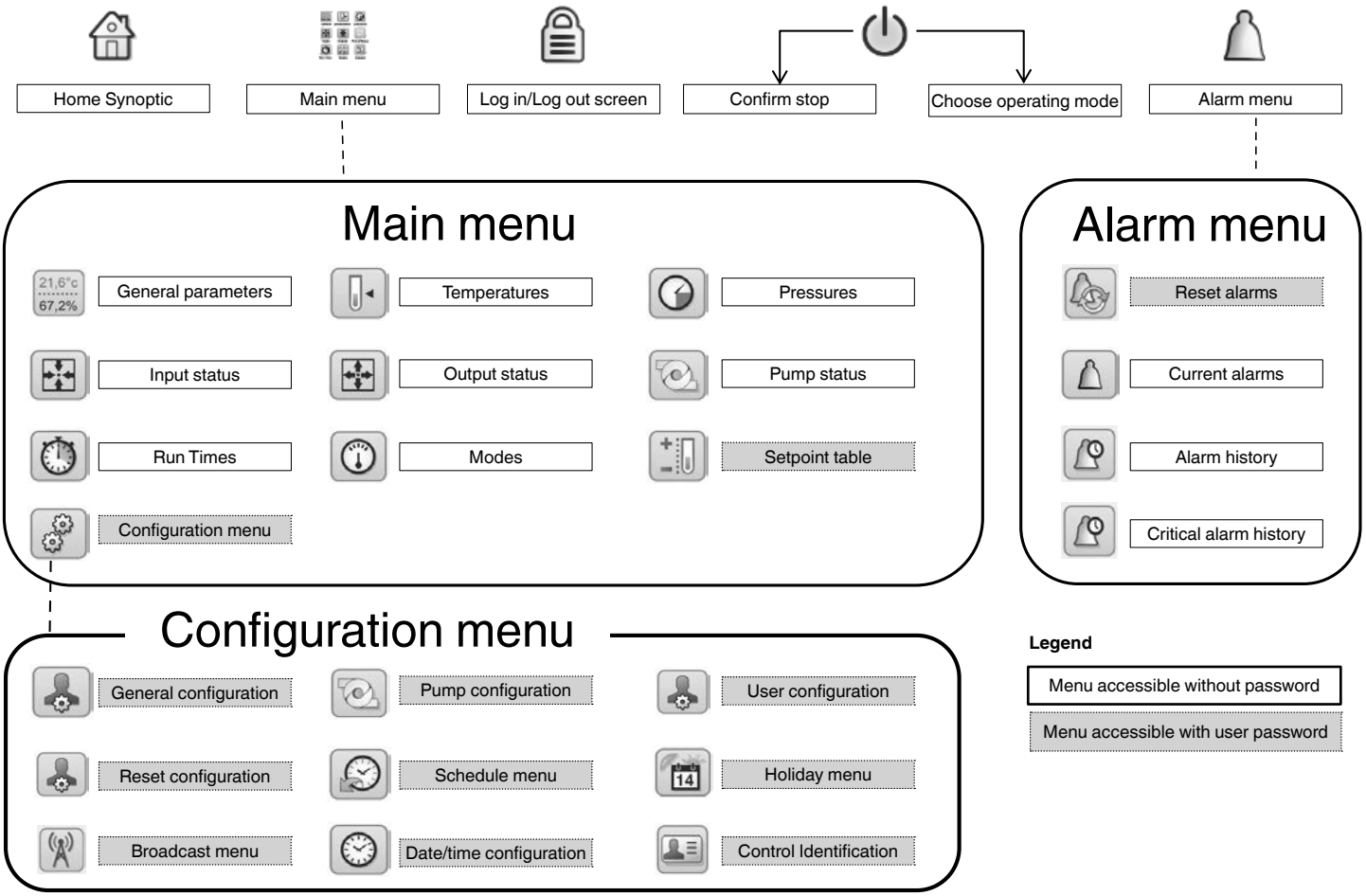
The auto button cancels a forced point.

4.10 - Time schedule screen



1	Selection of the applicable days for the time schedule
2	Modification of the period start and end schedules
3	Save
4	Cancel
5	Previous period
6	Next period

4.11 - Screen structure



4.12 - Detailed menu description

icon	Displayed text*	Description	Associated table
	General parameters	General parameters	GENUNIT
	Temperatures	Temperatures	TEMP
	Pressures	Pressures	PRESSURE
	Input status	Input status	INPUTS
	Output status	Output status	OUTPUTS
	Pump status	Pump status	PUMPSTAT
	Run times	Run times	RUNTIME
	Modes	Modes	MODES
	Setpoint table	Setpoint table	SETPOINT
	Configuration Menu	Configuration Menu	CONFIG

* Depends on selected language, default is English

Associated table: GENUNIT - General parameters

No.	Status	Default	Unit	Displayed text*	Description
1	0 to 2	-	-	Local = 0. Net = 1. Remote = 2	Local = 0, Network = 1, Remote = 2
2	-	-	-	Run status	Run status
3	disable/ enable	disable	-	Net: Cmd start/stop	Unit start/stop via CCN or BACnet/IP (option)
4	yes/no	no	-	Net: Cmd occupied	Unit time schedule via CCN or BACnet/IP (option)
5	-	-	min	Minutes left for start	Delay before start-up
6	-	-	-	Heat/cool status	Heat/cool status
7	0 to 2	-	-	Heat/cool select	Heating/cooling selection via CCN or BACnet/IP (option)
8	-	-	-	0 = Cool. 1 = Heat. 2 = Auto	0 = Cool. 1 = Heat. 2 = Auto
9	0 to 2	-	-	Setpoint select	Setpoint selection via CCN or BACnet/IP (option)
10				0 = Auto. 1 = Spt1. 2 = Spt2	0 = Auto.1 = Setpoint 1. 2 = Setpoint 2
11	yes/no	yes	-	Setpoint occupied?	Occupancy setpoint
12	-	-	%	Percent total capacity	Total unit capacity
13	-	-	°C	Current setpoint	Current setpoint
14	-20.0 to 67.2	-	°C	Control point	Control point
15	-	-	A	Actual chiller current	Total unit current
16	0 to 2000	-	A	Chiller current limit	Unit current limit
17	disable/ enable	disable	-	Emergency stop	CCN or BACnet/IP (option) emergency stop
18	0 to 100	0	%	Active demand limit val	Demand limit value from the CCN or BACnet/IP network

Associated table: TEMP - Temperatures

No.	Unit	Displayed text*	Description
1	°C	Cooler Entering Fluid	Evaporator entering water temperature
2	°C	Cooler Leaving Fluid	Evaporator leaving water temperature
3	°C	Condenser Entering Fluid	Condenser entering water temperature
4	°C	Condenser Leaving Fluid	Condenser leaving water temperature
5	°C	Saturated Cond Tmp cir A	Saturated condensing temperature, circuit A
6	°C	Saturated Suction Temp A	Saturated suction temperature, circuit A
7	°C	Compressor Suction Tmp A	Suction temperature, circuit A
8	°C	Discharge Gas Temp cir A	Discharge gas temperature, circuit A
9	°C	Motor Temperature cir A	Motor temperature, circuit A
10	°C	Saturated Cond Tmp cir B	Saturated condensing temperature, circuit B
11	°C	Saturated Suction Temp B	Saturated suction temperature, circuit B
12	°C	Compressor Suction Tmp B	Suction temperature, circuit B
13	°C	Discharge Gas Temp cir B	Discharge gas temperature, circuit B
14	°C	Motor Temperature cir B	Motor temperature, circuit B
15	°C	Optional Space Temp	Optional space temperature
16	°C	CHWS Temperature	Master/slave temperature
17	°C	CHWS Heat Temp	Master/slave heating temperature
18	°C	Dry Cool Leav Water Tmp	Dry cooler - leaving water temperature
19	°C	External Temperature	External temperature (dry cooler OAT)

Associated table: PRESSURE - Pressures

No.	Unit	Displayed text*	Description
1	kPa	Discharge Pressure A	Discharge gas pressure, circuit A
2	kPa	Main Suction Pressure A	Suction gas pressure, circuit A
3	kPa	Oil Pressure A	Oil pressure, circuit A
4	kPa	Oil Pressure Difference A	Oil pressure difference, circuit A
5	kPa	Discharge Pressure B	Discharge gas pressure, circuit B
6	kPa	Main Suction Pressure B	Suction gas pressure, circuit B
7	kPa	Oil Pressure B	Oil pressure, circuit B
8	kPa	Oil Pressure Difference B	Oil pressure difference, circuit B

Associated table: INPUTS - Input status

No.	Status	Unit	Displayed text*	Description
1	open/closed	-	Remote On/Off Switch	Remote On/Off Switch
2	open/closed	-	Remote HeatCool Switch	Heating/cooling selection switch
3	open/closed	-	Remote Setpoint Switch	Setpoint selection switch
4	open/closed	-	Limit Switch 1	Capacity limitation switch 1
5	open/closed	-	Limit Switch 2	Capacity limitation switch 2
6	open/closed	-	Oil Level Input A	Oil level input, circuit A
7	open/closed	-	Oil Level Input B	Oil level input, circuit B
8	-	mA	Reset/Setpnt4-20mA Sgnl	4-20 mA signal, setpoint reset
9	-	mA	Limit 4-20mA Signal	4-20 mA signal, capacity limitation
10	-	V	Leakage detector 1 val	Leak detection input 1
11	-	V	Leakage detector 2 val	Leak detection input 2
12	open/closed	-	Customer Interlock	Customer interlock status
13	open/closed	-	Ice Done Storage Switch	Ice storage end switch
14	open/closed	-	Occupied Override Switch	Occupied override switch
15	no/yes	-	BACnet Dongle	BACnet dongle

Associated table: OUTPUTS - Output status

No.	Status	Unit	Displayed text*	Description
1	on/off	-	Compressor A	Output, compressor A
2	on/off	-	Oil Solenoid Output A	Oil solenoid output, circuit A
3	on/off	-	Slide Valve 1 Output A	Slide valve 1 output, circuit A
4	on/off	-	Slide Valve 1 Output A	Slide valve 2 output, circuit A
5	-	Volt	Capacity Signal Cir A	0-10 V signal, capacity circuit A
6	on/off	-	Compressor B	Output, compressor B
7	on/off	-	Oil Solenoid Output B	Oil solenoid output, circuit B
8	on/off	-	Slide Valve 1 Output B	Slide valve 1 output, circuit B
9	on/off	-	Slide Valve 1 Output B	Slide valve 2 output, circuit B
10		Volt	Capacity Signal Cir B	0-10 V signal, capacity circuit B
11		Volt	Chiller Capacity signal	Chiller capacity signal
12	on/off	-	Alarm Relay Status	Alarm status
13	on/off	-	Running Relay Status	Run status
14	on/off		Alert Relay Status	Alert status
15	on/off	-	Shutdown Indicator Status	Shutdown status
16	0 to 100	%	Cond 3 Way Valve Pos	Position of three-way valve
17	on/off	-	Drycooler Fan 1	Output, dry cooler 1
18	on/off	-	Drycooler Fan 2	Output, dry cooler 2
19	on/off	-	Drycooler Fan 3	Output, dry cooler 3
20	on/off	-	Drycooler Fan 4	Output, dry cooler 4
21	on/off	-	Drycooler Fan 5	Output, dry cooler 5

* Depends on selected language, default is English

No.	Status	Unit	Displayed text*	Description
22	on/off	-	Drycooler Fan 6	Output, dry cooler 6
23	on/off	-	Drycooler Fan 7	Output, dry cooler 7
24	on/off	-	Drycooler Fan 8	Output, dry cooler 8
25	0 to 10	V	Dry Cool Vfan 1 Output	Dry Cooler variable speed fan 1 output
26	0 to 10	V	Dry Cool Vfan 2 Output	Dry Cooler variable speed fan 2 output

Associated table: PUMPSTAT - Pump status

No.	Status	Unit	Displayed text*	Description
1	yes/no	-	Cooler Flow Setpoint Out	Evaporator flow setpoint output
2	on/off	-	Cooler Pump #1 Command	Evaporator pump control 1
3	on/off	-	Cooler Pump #2 Command	Evaporator pump control 2
4	on/off	-	Rotate Cooler Pumps ?	Evaporator pump rotation?
5	open/closed	-	Cooler Flow Switch	Flow switch
6	on/off	-	Condenser Pump Command1	Condenser pump control 1
7	on/off	-	Condenser Pump Command2	Condenser pump control 2
8	on/off	-	Rotate Condenser Pumps ?	Condenser pump rotation?
9	open/closed	-	Condenser Flow Status	Condenser flow status

Associated table: RUNTIME - Run times

No.	Status	Unit	Displayed text*	Description
1	-	hour	Machine Operating Hours	Unit operating hours
2	-	-	Machine Starts Number	Number of unit starts
3	-	hour	Compressor A Hours	Operating hours, compressor A
4	-	-	Compressor A Starts	Number of starts, compressor A
5	-	hour	Compressor B Hours	Operating hours, compressor B
6	-	-	Compressor B Starts	Number of starts, compressor B
7	-	hour	Cooler Pump #1 Hours	Operating hours, evaporator pump 1
8	-	hour	Cooler Pump #2 Hours	Operating hours, evaporator pump 2
9	-	hour	Condenser Pump #1 Hours	Operating hours, condenser pump 1
10	-	hour	Condenser Pump #2 Hours	Operating hours, condenser pump 2

Associated table: MODES - Modes

No.	Status	Unit	Displayed text*	Description
1	yes/no	-	Start-up delay in effect	Start-up delay in effect
2	yes/no	-	Second Setpoint in Use	Second setpoint in use
3	yes/no	-	Reset in effect	Setpoint reset active
4	yes/no	-	Demand limit active	Demand limit active
5	yes/no	-	Cooler Pump Rotation	Evaporator pump rotation
6	yes/no	-	Pump Periodic Start	Periodic pump start-up
7	yes/no	-	Night Low Noise Active	Night mode active
8	yes/no	-	Master Slave Active	Master/slave active
9	yes/no	-	Auto Changeover Active	Automatic changeover active
10	yes/no	-	Condenser Pump Rotation	Condenser pump rotation
11	yes/no	-	Cond Pump Periodic Start	Periodic condenser pump start-up
12	yes/no	-	Ice Mode in Effect	Ice storage mode active

Associated table: SETPOINT - Setpoint table

No.	Status	Default	Unit	Displayed text*	Description
1	-28.9 to 26.0	6.7	°C	Cooling Setpoint 1	Cooling setpoint 1
2	-28.9 to 26.0	6.7	°C	Cooling Setpoint 2	Cooling setpoint 2
3	-28.9 to 26.0	6.7	°C	Cooling Ice Setpoint	Ice storage setpoint
4	0.1 to 11.1	0.6	^C	Cooling Ramp Loading	Cooling ramp loading
5	26.7 to 63.0	37.8	°C	Heating Setpoint 1	Heating setpoint 1
6	26.7 to 63.0	37.8	°C	Heating Setpoint 2	Heating setpoint 2
7	0.1 to 11.1	0.6	^C	Heating Ramp Loading	Heating ramp loading
8	3.9 to 50.0	23.9	°C	Cool Changeover Setpt	Auto changeover setpoint, cooling
9	0 to 46.1	17.8	°C	Heat Changeover Setpt	Auto changeover setpoint, heating
10	26.7 to 48.9	35.0	°C	Water Val Condensing Stp	Water valve condensing setpoint
11	0 to 100	100	%	Switch Limit Setpoint 1	Limit setpoint switch 1
12	0 to 100	100	%	Switch Limit Setpoint 2	Limit setpoint switch 2
13	0 to 100	100	%	Switch Limit Setpoint 3	Limit setpoint switch 3

* Depends on selected language, default is English

4.13 - Menu configuration

icon	Displayed text	Description	Associated table
	General Configuration	General configuration	GEN_CONF
	Pump Configuration	Pump configuration	PUMPCONF
	User Configuration	User configuration	USERCONF
	Reset Configuration	Setpoint reset	RESETCFG
	Schedule Menu	Time schedule	SCHEDULE
	Holiday Menu	Holidays	HOLIDAY
	Broadcast Menu	Broadcast menu	BROCASTS
	Date/Time configuration	Date/time configuration	DATETIME
	Control Identification	Control identification	CTRL_ID

Associated table: GEN_CONF - General configuration

No.	Status	Default	Unit	Displayed text*	Description
1	0 to 2	0	-	Cir Priority Sequence	Circuit priority
2				0 = Auto, 1 = A Prio	0 = auto, 1 = priority circuit A
3				2 = B Prio	2 = priority circuit B
4	yes/no	no	-	Staged Loading Sequence	Staged loading sequence
5	yes/no	no	-	Ramp Loading Select	Ramp loading selection
6	1 to 15	1	-	Unit Off to On Delay	Start-up delay
7	0 to 2	0	-	Demand Limit Type Select	Limitation type selection
8				0 = None	0 = none
9				1 = Switch Control	1 = switch control
10				2 = 4-20 mA Control	2 = 4-20 mA signal control
11	00:00	0	-	Night Mode Start Hour	Night mode start hour
12	00:00	0	-	Night Mode End Hour	Night mode end hour
13	-	100	%	Night capacity Limit	Night mode capacity limit
14	yes/no	no	-	Current Limit select	Active limitation selection
15	yes/no	no	-	Ice mode enable	Ice storage validation
16	0 to 4000	2000	A	Maximum Current Limit	Maximum current limit
17	yes/no	no	-	short cycle management	Short cycle management (compressor protection)

Associated table: PUMPCONF - Pump configuration

No.	Status	Default	Displayed text*	Description
1	0 to 4	0	Condenser Pump Sequence	Condenser pump sequence
2	0 to 4	0	Cooler Pump Sequence	Evaporator pump sequence
3			0 = No Pump	0 = No pump
4			1 = One Pump Only	1 = 1 pump
5			2 = Two Pumps Auto	2 = 2 pumps automatic
6			3 = Pump#1 Manual	3 = pump 1 manual
7			4 = Pump#2 Manual	4 = pump 2 manual
8	24 to 3000	48	Pump Auto Rotation Delay	Pump rotation delay
9	yes/no	no	Pump Sticking Protection	Pump sticking protection
10	yes/no	no	Stop Pump During Standby	Stop pump when unit is in standby
11	yes/no	yes	Flow Checked if Pump Off	Flow check when pump is off
12	yes/no	no	Cooler pump off in heat	Evaporator pump off in heating
13	yes/no	no	Cond pump off in cool	Condenser pump off in cooling

* Depends on selected language, default is English

Associated table: USERCONF - User configuration

No.	Status	Default	Unit	Displayed text*	Description
1	1 to 9999	11	-	User Password	User password

Associated table: RESETCFG - Reset Configuration (Setpoint reset)

No.	Status	Default	Unit	Displayed text*	Description
1	0 to 4	0	-	Cooling Reset Select	Cooling reset selection
2	0 to 4	0	-	Heating Reset Select	Heating reset selection
3				0 = None, 1 = OAT	0 = none, 1 = outdoor temperature
4				2 = Delta T, 4 = Space Temp	2 = delta T, 4 = space temperature
5				3 = 4-20 mA control	3 = 4-20 mA control
6					
7				Cooling	Cooling mode
8	-10.0 to 51.7	-10	°C	OAT No Reset Value	Outdoor temperature, no reset
9	-10.0 to 51.7	-10	°C	OAT Full Reset Value	Outdoor temperature, max. reset
10	0 to 13.9	0	^C	Delta T No Reset Value	Delta T, no reset
11	0 to 13.9	0	^C	Delta T Full Reset Value	Delta T, max. reset
12	0 to 20	0	mA	Current No Reset Value	Current, no reset
13	0 to 20	0	mA	Current Full Reset Value	Current, max. reset
14	-10.0 to 51.7	-10	°C	Space T No Reset Value	Space temperature, no reset
15	-10.0 to 51.7	-10	°C	Space T Full Reset Value	Space temperature, max. reset
16	-30 to 30	0	^C	Cooling Reset Deg. Value	Maximum cooling reset value
17					
18				Heating	Heating mode
19	-10.0 to 51.7	-10	°C	OAT No Reset Value	Outdoor temperature, no reset
20	-10.0 to 51.7	-10	°C	OAT Full Reset Value	Outdoor temperature, max. reset
21	0 to 13.9	0	^C	Delta T No Reset Value	Delta T, no reset
22	0 to 13.9	0	^C	Delta T Full Reset Value	Delta T, max. reset
23	0 to 20	0	mA	Current No Reset Value	Current, no reset
24	0 to 20	0	mA	Current Full Reset Value	Current, max. reset
25	-10.0 to 51.7	-10	°C	Space T No Reset Value	Space temperature, no reset
26	-10.0 to 51.7	-10	°C	Space T Full Reset Value	Space temperature, max. reset
27	-16.7 to 16.7	0	^C	Heating Reset Deg. Value	Maximum heating reset value

Associated table: DATETIME - Date/time configuration

Name	Format	Units	Description
d_of_m	1 to 31	-	Day of the month
month	1 to 12	-	Month
year	0 to 99	-	Year
dow	1 to 7	-	Day of the week
hour	0 to 24	h	Hour
minutes	0 to 59	min	Minutes
dlig_off	yes/no	-	Winter time change-over active?
tod_hol	yes/no	-	Holiday today?
tom_hol	yes/no	-	Holiday tomorrow?

* Depends on selected language, default is English

Associated table: CTRL_ID - Control identification

Name	Format	Description
elemt_nb	1 to 239	Element number
bus_nb	0 to 239	Bus number
baudrate	9600 to 38400	Communication speed
30XWV Touch Pilot		Device description
----------		Location description
CSA-SR-20M49010		Software number
----------		Serial number

4.13.1 - Schedule menu - Time schedule

Icon	Name	Description
	SCHEDULE1 (OCCPC01S)	Unit on/off time schedule
	SCHEDULE2 (OCCPC02S)	Unit setpoint selection time schedule

4.13.2 - Holiday menu - Holidays

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

4.13.3 - BROCASTS menu - Broadcast menu 

Name	Format	Value	Description
Ccnbroad	0/1/2	2	Activates broadcast 0 = deactivated, 1 = broadcast time holidays, on the network, 2 = broadcast time, holidays, stand alone unit only
OAT Broadcast			
Oatbusnm	0 to 239	0	Outdoor temperature broadcast, bus number of the unit with outdoor temperature
Oatlocad	0 to 239	0	Element number of the unit with outdoor temperature
dayl_sel	Disable/Enable	Disable	Summer/winter time activation
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

4.13.4 - Alarm menu

icon	Displayed text	Description	Associated table
	Reset Alarms	Reset Alarms Alarm reset	ALARMRST
	Current Alarms	Current Alarms Current alarms	CUR_ALM
	Alarm History	Alarm history	ALMHIST1
	Critical Alarm History	Critical alarm history	ALMHIST2

 **Associated table: ALARMRST - Alarm reset**

No.	Status	Displayed text*	Description
1	0 to 1	Alarm Reset	Alarm reset
2		Alarm Status	Alarm status
3		Current Alarm 1	Current alarm 1
4		Current Alarm 2	Current alarm 2
5		Current Alarm 3	Current alarm 3
6		Current Alarm 4	Current alarm 4
7		Current Alarm 5	Current alarm 5
8		Jbus Current Alarm 1	Current JBus alarm 1
9		Jbus Current Alarm 2	Current JBus alarm 2
10		Jbus Current Alarm 3	Current JBus alarm 3
11		Jbus Current Alarm 4	Current JBus alarm 4
12		Jbus Current Alarm 5	Current JBus alarm 5

* Depends on selected language, default is English

5 - TOUCH PILOT 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
NET	Network

- **Remote start/stop contacts:** these contacts are used when the unit is in remote operating type (Remote). See chapter 3.7.2.
- **CHIL_S_S:** this network command relates to the unit start/stop when the unit is in network mode.
- **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 unit start/stop program (Schedule 1).
- **Network emergency shutdown:** if this CCN or BACnet/IP (option) 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 MODE
LOFF	L-C	L-SC	REM	NET	MAST	CHIL_S_S	Remote start/stop contact	Master control type	Start-Stop time schedule	NET emergency shutdown	General alarm		
-	-	-	-	-	-	-	-	-	-	Active	-	-	Off
-	-	-	-	-	-	-	-	-	-	-	Yes	-	Off
-	-	-	-	Active	-	Off	-	-	-	-	-	Network	Off
-	-	-	-	Active	-	-	-	-	Unoccupied	-	-	Network	Off
-	-	-	-	-	Active	Off	-	Network	-	-	-	Network	Off
-	-	-	-	-	Active	-	-	Network	Unoccupied	-	-	Network	Off
-	-	-	-	Active	-	On	-	-	Occupied	Disabled	No	Network	On
-	-	-	-	-	Active	On	-	Network	Occupied	Disabled	No	Network	On
Active	-	-	-	-	-	-	-	-	-	-	-	Local	Off
-	-	Active	-	-	-	-	-	-	Unoccupied	-	-	Local	Off
-	-	-	-	-	Active	-	-	Local	Unoccupied	-	-	Local	Off
-	Active	-	-	-	-	-	-	-	-	Disabled	No	Local	On
-	-	Active	-	-	-	-	-	-	Occupied	Disabled	No	Local	On
-	-	-	-	-	Active	-	-	Local	Occupied	Disabled	No	Local	On
-	-	-	Active	-	-	-	Open	-	-	-	-	Remote	Off
-	-	-	Active	-	-	-	-	-	Unoccupied	-	-	Remote	Off
-	-	-	-	-	Active	-	Open	Remote	-	-	-	Remote	Off
-	-	-	-	-	Active	-	-	Remote	Unoccupied	-	-	Remote	Off
-	-	-	Active	-	-	-	Closed	-	Occupied	Disabled	No	Remote	On
-	-	-	-	-	Active	-	Closed	Remote	Occupied	Disabled	No	Remote	On

5.2 - Unit stop function

This function controls the unit compressor capacity reduction. If there is an alarm or a demand to stop it forces the compressors to the minimum capacity before stopping them.

This stop sequence is not followed if there is a unit protection alarm such as "water heat exchanger frost protection" or "low saturated suction temperature".

Once the circuit has stopped, the EXV waits for the pressure balancing or one minute, before it closes completely.

5.3 - Evaporator water pump control

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

The pump is kept running for 20 seconds after the unit goes to stop mode. It is turned off if the unit is shut down due to an alarm, unless the fault is a frost protection fault.

If two pumps are controlled and the reversing function has been selected (see User configuration), the control tries to limit the pump run time delta to the configured pump changeover delay. If this delay has elapsed, the pump reversing function is activated when the unit is running. During the reversing function both pumps run together for two seconds.

If a pump has failed and a second pump is available, the unit is stopped, because no water flow is detected, and then restarted with the second pump.

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

5.4 - Condenser water pump control

Control of the condenser water pumps is the same as for the evaporator water pumps. See previous chapter.

NOTE: If a pump fails, the Energy Management Module (EMM) as well as a condenser water flow detector are required for automatic changeover to the second pump.

5.5 - Water flow switch

The controller is configurable. The configuration depends on the unit size and is made automatically at the start-up.

If the measured flow rate in the water loop is lower than the configured flow rate, an alarm condition shuts off the unit.

5.6 - Heating/cooling selection

For units configured in the heat pump mode, heating/cooling selection can be controlled in various ways, depending on the active operating type:

- locally at the unit using the HC_SEL item in the GENUNIT table,
- remotely via the heating/cooling selection contact, if the unit is in the Remote mode operating type,
- via a CCN or BACnet/IP (option) network command, if the unit is in the network operating type.

Parameter status					
On/off status	**Control type**	**Heating/cooling selection in local mode**	**Heating/cooling contact in remote mode**	**HC_SEL**	**Operating mode**
Off	-	-	-	-	Cooling
On	Local	Cooling	-	-	Cooling
On	Local	Heating	-	-	Heating
On	Remote	-	On cooling	-	Cooling
On	Remote	-	On heating	-	Heating
On	Network	-	-	Cooling	Cooling
On	Network	-	-	Heating	Heating

5.7 - Control point

The control point represents the water temperature that the unit must satisfy.

In cooling mode the evaporator outlet water is controlled by default, but the evaporator inlet water can also be controlled (requires a Service configuration modification).

In heating mode the condenser outlet water is controlled by default, but the condenser inlet water can also be controlled (requires a Service configuration modification).

Control point = active setpoint + reset

5.7.1 - Active setpoint

Two setpoints can be selected. Usually, the second cooling setpoint is used for unoccupied periods. Depending on the current operation type, the active setpoint can be selected by choosing the item in the table Status => Genunit, with the volt-free user contacts, with network commands or with 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 "Setpoint select" in the table Status => Genunit permits selection of the active setpoint, if the unit is in local operating type.
- **Control contacts 2:** status of control contact 2.
- **Schedule 2 status:** schedule for setpoint selection.

LOCAL OPERATING MODE

Parameter status					Active setpoint
Heating/cooling operating mode	**Local setpoint selection**	**Ice storage configuration***	**Ice storage contact status***	**Schedule 2 status**	
Cooling	csp 1	-	-	-	Cooling setpoint 1
Cooling	csp 2	-	-	-	Cooling setpoint 2
Cooling	auto	Activated	Open	Unoccupied	Ice storage setpoint
Cooling	auto	Activated	Closed	Unoccupied	Cooling setpoint 2
Cooling	auto	-	-	Occupied	Cooling setpoint 1
Cooling	auto	Deactivated	-	Unoccupied	Heating setpoint 2
Heating	hsp 1	-	-	-	Heating setpoint 1
Heating	hsp 2	-	-	-	Heating setpoint 2
Heating	auto	-	-	Occupied	Heating setpoint 1
Heating	auto	-	-	Unoccupied	Heating setpoint 2

REMOTE OPERATING MODE

Parameter status					Active setpoint
Heating/cooling operating mode	**Local setpoint selection**	**Ice storage configuration***	**Ice storage contact status***	**Control contact 2**	
Cooling	csp control	-	-	-	Control setpoint
Cooling	-	-	-	csp 1 (open)	Cooling setpoint 1
Cooling	-	-	-	csp 2 (closed)	Cooling setpoint 2
Cooling	-	Activated	-	Open	Cooling setpoint 1
Cooling	-	Activated	Open	Closed	Ice storage setpoint
Cooling	-	Activated	Closed	Closed	Cooling setpoint 2
Heating	-	-	-	Open	Heating setpoint 1
Heating	-	-	-	Closed	Heating setpoint 2

NETWORK OPERATING MODE

Parameter status					Active setpoint
Heating/cooling operating mode	**Local setpoint selection**	**Ice storage configuration***	**Ice storage contact status***	**Schedule 2 status**	
Cooling	-	-	-	Occupied	Cooling setpoint 1
Cooling	-	-	-	Unoccupied	Cooling setpoint 2
Cooling	-	Activated	Open	Unoccupied	Ice storage setpoint
Cooling	-	Activated	Closed	Unoccupied	Cooling setpoint 2
Heating	-	-	-	Occupied	Heating setpoint 1
Heating	-	-	-	Unoccupied	Heating setpoint 2

* Only with energy management option

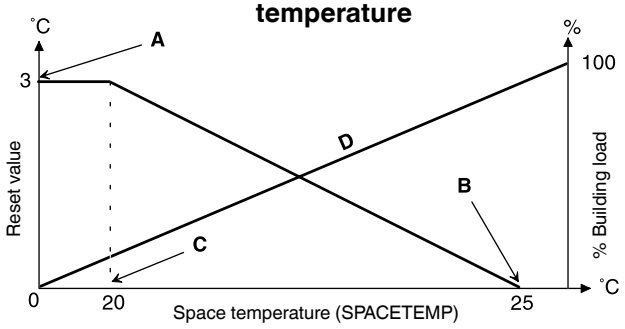
5.7.2 - Reset

Reset means the active setpoint is modified so that less machine capacity is required (in cooling mode the setpoint is increased, in heating mode it is decreased). This modification is in general a reaction to a drop in the load. For the Touch Pilot control system, the reset source can be configured in the menu Status => RESETCFG: it can be based on the outdoor temperature (gives a measure of the load trends for the building) or used with the energy management option at the reset setpoint. In response to a drop in the space temperature or to a drop in ΔT, the cooling setpoint is normally reset upwards to optimise unit performance.

In the three cases the reset parameters, i.e. slope, source and maximum value, are configurable in the Setpoint menu. Reset is a linear function based on three parameters:

- A reference at which reset is zero (space temperature or ΔT - no reset value).
- A reference at which reset is maximum (space temperature or ΔT - full reset value).
- The maximum reset value.

Reset example in cooling mode for the space temperature



Legend

A Maximum reset value
B Space temperature for zero reset
C Space temperature for maximum reset
D Building load

5.8 - Capacity limitation

The Touch Pilot control system allows limitation of the unit capacity, using one of two methods:

- by means of user-controlled volt-free contacts. The units without energy management option only have one contact (control contact 3). The units equipped with energy management option permit three capacity limitation levels (2 contacts). The unit capacity can never exceed the limit setpoint activated by these contacts. The limit setpoints can be modified in the Setpoint table.
- by means of a capacity limitation setpoint output on the energy management board. The capacity limitation value in night mode is selectable if the value is below the selected limit. A limit value of 100% means that the unit can use all capacity stages.

ATTENTION: In certain conditions, the unit power consumption can exceed the capacity limitation threshold to protect the compressors.

5.9 - Night mode

The night period is defined (see menu Config => GEN_CONF) by a start time and an end time that are the same for each day of the week. During the night period unit capacity is limited (a maximum capacity value can be configured - see configuration menu GEN_CONF).

5.10 - Capacity control

This function adjusts the compressor capacity to keep the heat exchanger water temperature at its setpoint. The control system continuously takes account of the temperature error with respect to the setpoint, as well as the rate of change in this error and the difference between entering and leaving water temperatures, in order to determine the optimum moment at which to add or withdraw capacity.

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

5.11 - Compressor short cycling protection

The Touch Pilot control constantly monitors the control point which determines the operation of compressor(s). Compressors are turned on and off in order to maintain the required control point and satisfy the current cooling/heating demand.

To avoid the risk of compressor short cycling, the Touch Pilot control provides a protection that prevents the premature starting of compressors. The service-configured temperature threshold (acting upon the control point) is used for compressor(s) control.

This compressor short cycling protection can be enabled via the touch screen by setting the “short cycle management” parameter in the General Configuration menu (GEN_CONF) to “yes”.

5.12 - Option 152 - saturated condensing temperature control

Saturated condensing temperature control is assured if the three-way valve option is selected. The saturated condensing temperature is controlled based on a fixed setpoint that can be configured by the user via the SETPOINT table. The three-way valve control can be configured by the service department via the SERVICE table.

5.13 - Time schedule function

The control includes two time schedules.

The first schedule **(schedule 1 OCCPC01S)** allows automatic changeover of the unit from occupied to unoccupied mode: the unit is started during occupied periods.

The second schedule **(schedule 2 OCCPC02S)** allows automatic change of the active setpoint (if auto mode is selected) from the occupied setpoint to the unoccupied setpoint.

Cooling or heating setpoint 1 is active during occupied periods. Cooling or heating setpoint 2 is active during unoccupied periods.

Each time schedule consists of eight user configurable periods. Each of these periods can be validated as active or not active for each day of the week as well as for holiday periods. The day begins at 00:00 and ends at 23:59.

The schedule is in unoccupied mode unless a time period is active. If two periods coincide or are active on the same day, priority is given to the unoccupied period. Each of the eight periods can be displayed and modified using a sub-menu. The following table shows how to configure a period. The method is the same for time schedule 1 and 2.

To access and configure them see the table below. Also refer to chapter 4.10 - Time schedule screen.

5.13.1 - SCHEDULE menu

Name	Description
SCHEDULE1	Unit start/stop time schedule
SCHEDULE2	Unit setpoint selection time schedule

5.13.2 - HOLIDAYS menu

This function is used to define 16 holiday periods. Each period is defined by three parameters: month, start day and holiday period duration. During the holiday periods the controller is in occupied or unoccupied mode, depending on the periods validated as holidays. Each of these holiday periods can be displayed or modified using a sub-menu.

ATTENTION: The Broadcast function must be active for the holiday function to operate, even if the unit is in autonomous mode (not connected to the CCN network).

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

5.14 - Option 156 - energy management option

This option requires the installation of an additional NRCP2-BASE EMM type board. This board permits access to the following functions:

- Reset via 4-20 mA control: see chapter 5.7.2.
- Ice storage contact: if ice storage control has been configured (configuration menu => General configuration), this contact permits activation of the ice storage setpoint.
- User safety loop input: this contact is used for the customer safety loops that require a unit shut-down if it is closed.
- Occupancy control time schedule override contact: if this contact is closed, the unit enters the occupied mode for a configurable override time of 1 to 4 hours.
- Condenser water flow input.
- Demand limit setpoint contact and output: see chapters 3.7.4 and 5.8.

This option also permits display of the following data:

- Current unit capacity via 0-10 VDC. output
- Operating status, compressors A and B
- Unit completely stopped
- Unit in operation

NRCP2 BASE EMM board connections - energy management option

Description	Connector/channel	Type	Remarks
Space temperature	J6/Ch02	Analogue input	Active setpoint reset via space temperature control. See chapter 5.7.2
4-20 mA setpoint control reset	J7A/Ch05	4-20 mA analogue input	Active setpoint reset. See chapter 5.7.2
4-20 mA capacity limitation control reset	J7B/Ch06	4-20 mA analogue input	Active setpoint reset via unit capacity control. See chapter 3.7.4
Occupancy control override	J4/Ch08	Numerical input	If the contact is closed, the unit goes into occupied mode
Capacity limitation	J4/Ch09	Numerical input	See chapter 3.7.4 and 5.8
User safety loop	J4/Ch10	Numerical input	Permits immediate unit shut-down
Ice storage	J4/Ch11	Numerical input	If the contact is closed, the unit enters the ice storage mode
Unit capacity	J8/Ch07	Analogue output	0-10 V output
Status compressor A	J2A/Ch17	Numerical output	Output active (24 V), if compressor A is operating
Status compressor B	J2A/Ch18	Numerical output	Output active (24 V), if compressor B is operating
Unit completely stopped	J3/Ch24	Numerical output	Output active (relay output), if the unit has completely stopped due to an alarm
Unit in alert condition	J3/Ch25	Numerical output	Output active (relay output), if the unit is in alert condition

5.15 - Black box function

The Touch Pilot control registers the values of around 20 predefined variables every 5 seconds. If an operation alarm appears, the control saves a data set of 180 registrations (168 preceding the alarm and 12 following it), for a duration of 15 minutes of unit operation.

Each registration is associated with a time schedule defined in hours, minutes and seconds. The control can store a maximum of 20 data sets in the memory. If the threshold of 20 data sets is reached, a rotary registration mechanism is triggered (a new data set deletes the oldest data set). The data sets can be recovered by a Carrier service technician, using the Carrier S-Service tool that permits downloading them to a PC and later deleting them from the unit.

5.16 - Option 150B - Maximum condenser leaving water temperature = 45°C

When the condenser leaving water temperature reaches 45°C, the increase in the compressor loading is stopped. The capacity is now controlled based on the leaving water limit temperature, if a cooling demand exists.

5.17 - Option 159 - Refrigerant leak detection

This option permits refrigerant leak detection. Two sensors (not supplied) that detect the refrigerant concentration in the air must be installed on the unit. If one of the two sensors detects an abnormal refrigerant level for more than one hour, an alarm is triggered, without shutting the unit down.

The refrigerant level and the time before triggering an alert are configurable. To modify them, contact Carrier Service.

5.18 - Option 149 - BACnet

The BACnet/IP communication protocol is used by the building management system or the programmable controllers to communicate with the Touch Pilot interface. It is activated if the optional BACnet activation key (dongle) is present on the electronic control board. This option may be ordered and installed on site (for software version 3.0 and higher - contact Carrier Service). The BACnet profile of the Touch Pilot interface is B-ASC; refer to the BACnet document included with the control or contact Carrier Service.

5.19 - Option 313 - Dry cooler

30XWV units may come with the dry cooler option that enables the control of a Carrier dry cooler. The chiller and the dry cooler have to be connected through a LEN RS-485.

5.20 - HFO (30XWV-ZE units)

30XWV-ZE chillers using the new HFO-R1234ze refrigerant (HFO) offer higher efficiency (higher EER) and have a larger operating envelope when compared to units with the standard R-134a refrigerant. For 30XWV units with R-1234ze (30XWV-ZE), the saturated condensing temperature can reach a maximum of 55°C (131°F) compared with a maximum of 50°C for units with R-134a (30XWV).

6 - ACCESS TO TECHNICAL DOCUMENTATION FOR THE UNIT

Access to the technical documentation is via a web connection (see chapter 4.2).

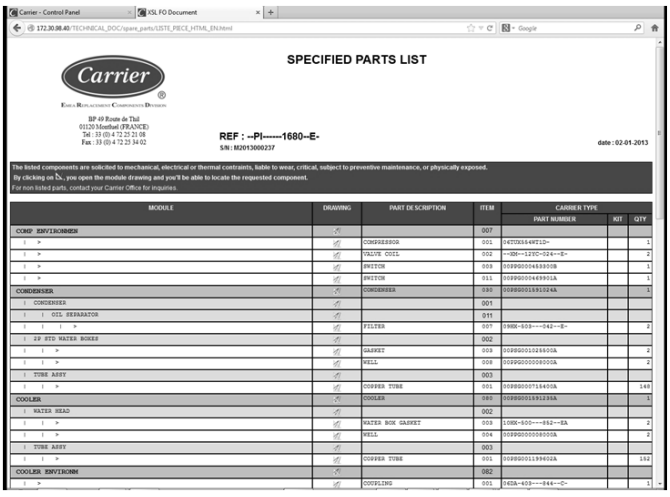
Click on the button  to open the web page index for the technical documentation.

IMPORTANT: Please save all data (documents, drawings, diagrams, etc.), for example, on your computer. If display memory is erased or the display is replaced, all documents will be lost. Make sure that all documents are stored and may be accessed at any time.

6.1 - Spare parts list

Click on the Spare Parts link to get access to the parts list.

A new web page is displayed.



The DRAWING column includes links to the drawings that permit identifying the unit components. Click on the link to show the associated drawing.

6.2 - List of documents on PED conformity

Click on the PED link to get access to the list of documents on PED conformity.

A new web page is displayed with the index of available documents.

6.3 - List of user manuals

Click on the IOM link to get access to the list of user manuals.

6.4 - List of other technical documents

Click on the Misc link to get access to other technical documents (dimensional drawings, wiring diagrams).

7 - DIAGNOSTICS - TROUBLESHOOTING

7.1 - General

The Touch Pilot 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 “Reset alarms” and “Current alarm”.

7.2 - Displaying alarms

The alarm icon on the interface (see chapter 4) 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 “Reset alarms” menu on the main interface displays up to five fault codes that are active on the unit.

7.3 - 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 touch screen interface or the web via the “Reset alarms” menu, item RST_ALM. Alarm reset can be protected by a basic user level password.

7.4 - Critical alarms

Certain alarms linked to the frequency variator are considered as critical (see chapter 7.5.2 - Variator alarm sub-codes).

These alarms can only be cancelled if the user is connected as an advanced user. If an alarm of this type is triggered, contact Carrier Service.

7.5 - Alarm codes

7.5.1 - General alarm codes

Alarm No.	ALARMRST code*	Description of the alarm text	Reset type	Action taken by the control	Probable cause
Thermistor faults					
1	15001	Evaporator entering water thermistor fault	Automatic if the temperature measured by the sensor returns to normal	Unit shuts down	Defective thermistor
2	15002	Evaporator leaving water thermistor fault	As above	Unit shuts down	As above
3	15006	Condenser entering water thermistor fault	As above	Unit shuts down, if entering water control in heating mode. Otherwise none.	As above
4	15007	Condenser leaving water thermistor fault	As above	Unit shuts down, if leaving water control in heating mode. Otherwise none.	As above
5	15011	Common water master/slave thermistor fault	As above	Unit returns to stand-alone mode	As above
6	15032	Common hot water master/slave thermistor fault	As above	Unit returns to stand-alone mode	As above
7	15012	Suction gas temperature sensor fault, circuit A	As above	Circuit A shuts down	As above
8	15013	Suction gas temperature sensor fault, circuit B	As above	Circuit B shuts down	As above
9	15015	Discharge gas temperature sensor fault, circuit A	As above	Circuit A shuts down	As above
10	15016	Discharge gas temperature sensor fault, circuit B	As above	Circuit B shuts down	As above
11	15033	Compressor motor temperature sensor fault, circuit A	As above	Circuit A shuts down	As above
12	15034	Compressor motor temperature sensor fault, circuit B	As above	Circuit B shuts down	As above
13	15021	Space Temperature Thermistor	As above	None	As above
14	15036	Dry Cooler Leaving thermistor Failure	As above	None	As above
15	15010	Outdoor air Thermistor	As above	None	As above
Pressure transducers					
16	12001	Discharge transducer fault, circuit A	Automatic, if the voltage transmitted by the sensor returns to normal	Circuit A shuts down	Transducer fault or installation fault
17	12002	Discharge transducer fault, circuit B	As above	Circuit B shuts down	As above
18	12004	Suction transducer fault, circuit A	As above	Circuit A shuts down	As above
19	12005	Suction transducer fault, circuit B	As above	Circuit B shuts down	As above
20	12010	Oil pressure transducer, circuit A	As above	Circuit A shuts down	As above
21	12011	Oil pressure transducer, circuit B	As above	Circuit B shuts down	As above
Communication with slave boards					
22	4401	Communication loss with EXV board 1	Automatic if the communication is re-established	Unit shuts down	Bus installation fault or defective slave board
23	4501	Communication loss with auxiliary board 1	As above	Unit continues to operate, but the functions linked to the board are deactivated	As above
24	4502	Communication loss with auxiliary board 2	As above	Unit shuts down	As above
25	4503	Communication loss with auxiliary board 3	As above	Circuit B shuts down	As above
26	4504	Communication loss with auxiliary board 4	As above	Circuit B shuts down	As above
27	4601	Communication loss with the main NRCP2 board	As above	Unit shuts down	As above
28	4603	Communication loss with energy management board	As above	Unit continues to operate, but the functions linked to the board are deactivated	As above
29	4701	Communication loss with variator, compressor A	As above	Circuit A shuts down	As above
30	4702	Communication loss with variator, compressor B	As above	Circuit B shuts down	As above
Process faults					
31	10001	Evaporator frost protection	Automatic, if the same alarm has not tripped during the last 24 hours, otherwise manual	Unit shuts down. Start-up of the evaporator pump, if the unit has shut down	Lack of water flow or defective thermistor
32	10002	Condenser frost protection, circuit A	Automatic, if the saturated discharge temperature is above 4.4°C	Circuit shuts down. Start-up of the condenser pump, if the unit has shut down	Discharge pressure transducer defective, refrigerant leak or low condenser water temperature
33	10003	Condenser frost protection, circuit B	As above	As above	As above
34	10005	Low saturated suction temperature, circuit A	Automatic, if the temperature returns to normal and if the same alarm has not tripped during the last 24 hours	Compressor capacity increase or unloading stopped, depending on the temperature value	Pressure sensor, EXV blocked or lack of refrigerant
35	10006	Low saturated suction temperature, circuit B	As above	As above	As above
40	10014	Customer safety loop fault	Automatic, if the same alarm has not tripped during the last 24 hours	Unit shuts down	-
41	10030	Master/slave communication fault	As above	-	As above
42	10067	Low oil pressure, circuit A	Manual	Circuit A shuts down	Pressure sensor or wiring defective or oil filter badly installed
43	10068	Low oil pressure, circuit B	Manual	Circuit B shuts down	As above
44	10070	Maximum oil filter pressure differential, circuit A	Manual	Circuit A shuts down	As above
45	10071	Maximum oil filter pressure differential, circuit B	Manual	Circuit B shuts down	As above

* Alarm code in ALARMRST table

7.5 - Alarm codes (cont.)

Alarm No.	ALARMRST code*	Description of the alarm text	Reset type	Action taken by the control	Probable cause
Process faults (cont.)					
46	10084	High oil filter pressure drop, circuit A	Manual	None	As above
47	10085	High oil filter pressure drop, circuit B	Manual	None	As above
48	10075	Low oil level, circuit A. (not applicable to 30XWV-ZE)	Manual	Circuit A shuts down	Oil level too low or oil level detector defective
49	10076	Low oil level, circuit B (not applicable to 30XWV-ZE)	Manual	Circuit B shuts down	As above
50	90nn	Configuration error, master unit 1 to nn	Automatic, when the master configuration returns to normal or when the unit is no longer in master/slave mode	Unit cannot start in master/slave mode	-
51	8000	No factory configuration	Automatic, when the configuration is entered	Unit cannot start	The unit size has not been configured
52	7001	Illegal factory configuration	Manual	Unit cannot start	Unit size has been configured with an incorrect value
53	10031	Unit network emergency stop	Manual	Unit shuts down	Network command
54	10032	Fault, evaporator pump 1	Manual	Unit shut-down except if there is a second pump that can take over	Pump overheating or poor pump connection
55	10033	Fault, evaporator pump 2	As above	As above	As above
56	10015	Condenser flow fault	Automatic	Unit shuts down	Defective sensor
57	10037	Circuit A: condensing pressure outside compressor range	Automatic	Circuit A shuts down	Defective transducer or condensing pressure too high or too low
58	10038	Circuit B: condensing pressure outside compressor range	Automatic	Circuit B shuts down	As above
59	10040	Low saturated suction temperature override repetitions, circuit A	Automatic, if no override has occurred for 30 minutes	None	As above
60	10041	Low saturated suction temperature override repetitions, circuit B	Automatic, if no override has occurred for 30 minutes	None	As above
61	10050	Refrigerant leak detection	Automatic	None	Refrigerant leak or leak detector defective
62	10073	Fault, condenser pump 1	Manual	Unit shuts down	Pump overheats or poor pump connection
63	10074	Fault, condenser pump 2	Manual	Unit shuts down	Pump overheats or poor pump connection
64	10078	High discharge gas temperature, circuit A	Manual	Circuit A shuts down	Defective transducer or refrigerant charge too high
65	10079	High discharge gas temperature, circuit B	Manual	Circuit B shuts down	As above
66	10081	Suction valve closed, circuit A	Manual	Circuit A shuts down	Defective transducer or installation fault or suction valve closed
67	10082	Suction valve closed, circuit B	Manual	Circuit B shuts down	As above
68	10090	Flow controller configuration fault	Manual	Unit is not allowed to restart	Defective or incorrectly wired flow controller
69	10091	Flow controller fault	Conditional if at least one compressor operates, otherwise automatic	Unit shuts down	Evaporator pump defect or water flow switch defect
70	10097	Water heat exchanger temperature sensor reversed	Manual	Unit shuts down	Sensors of the evaporator reversed in cooling mode or of the water condenser in heating mode
Maintenance alarm					
71	130nn	Service maintenance alert No. nn	Manual	-	Preventive maintenance date has passed
Variable speed controller alarm					
72	17001	Fault, variable speed controller, circuit A	Manual	Speed controller fault or alert	The circuit continues to operate, the speed controller slows down the motor. The circuit shuts down.
73	18001	Fault, variable speed controller, circuit B	Manual	As above	As above
74	35001	Variable speed controller alert, circuit A	Automatic	Speed controller fault or alert	The circuit continues to operate, the speed controller slows down the motor. The circuit shuts down.
75	36001	Variable speed controller alert, circuit B	Automatic	As above	As above
Compressor fault					
76	1101	Motor temperature compressor A too high	Automatic	Circuit A shuts down	
77	2101	Motor temperature compressor B too high	Automatic	Circuit B shuts down	
78	1103	High pressure protection, compressor A	Manual	Circuit A shuts down	
79	2103	High pressure protection, compressor B	Manual	Circuit B shuts down	
Software fault					
80	55001	Data base module fault	Automatic	Unit shuts down	Software problem. Contact Carrier Service.
81	56001	Lenscan module fault	Automatic	Unit shuts down	Software problem. Contact Carrier Service.

* Alarm code in ALARMRST table

7.5.2 - Variator sub-code alarms

No.	Alarm/alert level	Description	Action taken
Variator sub-code alarms			
2	Alarm	Error at function "Live Zero"	Contact Carrier Service
4	Alarm	Phase loss detection	Check the VFD supply voltage and the phase balance (±3%)
7	Alarm	Overvoltage detected	Contact Carrier Service
8	Alarm	Undervoltage detected	Contact Carrier Service
9	Alarm	Inverter overload	Check the VFD output current/compressor current
10	Alarm	Motor overheated	Check the motor temperature
11	Alarm	Motor overheat thermistor defective	Contact Carrier Service
12	Critical alarm	Torque limit exceeded	Check the VFD output current/compressor current
13	Critical alarm	Overcurrent detected	Check the VFD output current/compressor current
14	Critical alarm	Poor earthing	Check if an earth fault exists
16	Critical alarm	Motor short-circuit detected	Check if there is a short-circuit at the VFD terminals
17	Alarm	Communication loss with the frequency converter	Check the connections and the shielding of the serial communication cable
23**	Alarm	Internal fan operating problem	Check the internal fan rotation
25	Alarm	Brake resistor short-circuited	Contact Carrier Service
26	Alarm	Capacity dissipated by the brake resistor too high	Contact Carrier Service
28	Alarm	Brake verification	Contact Carrier Service
29	Critical alarm	VFD temperature too high	Space temperature too high or VFD ventilation obstructed or damaged
30	Critical alarm	Motor phase U missing	Check wiring of phase U
31	Critical alarm	Motor phase V missing	Check wiring of phase V
32	Critical alarm	Motor phase W missing	Check wiring of phase W
33	Alarm	Current demand too high	Let the VFD cool down for 20 minutes before starting it
34	Alarm	Problem on the site communication bus	Check the connections and the shielding of the serial communication cable
36	Alarm	Supply voltage problem	Check the VFD supply voltage and the phase balance (±3%)
38	Critical alarm	Internal frequency variator problem	Contact Carrier Service
47	Alarm	24 V supply too low	Contact Carrier Service
48	Alarm	1.8 V supply too low	Contact Carrier Service
57***	Alarm	No response from AMA	Contact Carrier Service
65	Alarm	Control board overheated	Check the space temperature and the VFD fan
67	Critical alarm	Option configuration modifications	Contact Carrier Service
68	Alarm	Numerical input 37 - emergency stop activated	Contact Carrier Service
71	Alarm	Emergency stop at thermistor PTC1	Contact Carrier Service
72	Critical alarm	Emergency stop	Contact Carrier Service
80	Alarm	Frequency variator reset to default values	Contact Carrier Service
94	Alarm	Curve end	Contact Carrier Service
95	Alarm	Torque loss	Contact Carrier Service
243	Alarm	IGBT defective	Contact Carrier Service
251†	Critical alarm	New parts detached	Contact Carrier Service
301	Alarm	Problem in set 1 of the configuration parameters	Check the communication bus connections and the software version
302	Alarm	Problem in set 2 of the configuration parameters	Check the communication bus connections and the software version
303	Alarm	Problem in set 3 of the configuration parameters	Check the communication bus connections and the software version
Variator sub-code alerts (WY-XXX*)			
1	Alert	10 V supply to low	Contact Carrier Service
2	Alert	Error at function "Live Zero"	Contact Carrier Service
3	Alert	No motor	Check the motor connections
4	Alert	Phase loss detection	Check the VFD supply voltage and the phase balance (±3%)
5	Alert	Intermediate voltage too high	Check the VFD supply voltage and the phase balance (±3%)
6	Alert	Intermediate voltage too high	Check the VFD supply voltage and the phase balance (±3%)
7	Alert	Intermediate voltage too high	Contact Carrier Service
8	Alert	Intermediate voltage too high	Contact Carrier Service
9	Alert	Inverter overload	Check the VFD output current/compressor current
10	Alert	Motor overheated	Check the motor temperature
11	Alert	Motor overheat thermistor defective	Contact Carrier Service
12	Alert	Torque limit exceeded	Check the VFD output current/compressor current
13	Alert	Overcurrent detected	Check the VFD output current/compressor current
14	Alert	Poor earthing	Check if an earth fault exists
17	Alert	Motor short-circuit detected	Check the connections and the shielding of the serial communication cable
23**	Alert	Communication loss with the frequency converter	Check the internal fan rotation
25	Alert	Brake resistor short-circuited	Contact Carrier Service
26	Alert	Capacity dissipated by the brake resistor too high	Contact Carrier Service
28	Alert	Brake verification	Contact Carrier Service
34	Alert	Problem on the site communication bus	Check the connections and the shielding of the serial communication cable
36	Alert	Supply voltage problem	Check the VFD supply voltage and the phase balance (±3%)
47	Alert	24 V supply too low	Contact Carrier Service
49	Alert	Motor speed limit exceeded	Contact Carrier Service
59	Alert	Current limit exceeded	Check the VFD output current/compressor current
62	Alert	Frequency at the maximum limit	Check the VFD output current/compressor current
64	Alert	Voltage limit	Supply voltage too low
65	Alert	Control board overheated	Check the space temperature and the VFD fan
66	Alert	Internal frequency variator temperature too low	Space temperature too low

* Y = 0: circuit A; Y=1: circuit B; XXX = sub-code
** Error 24 and 104 possible
*** Error 50 to 58 possible
† Error 250 or 70 possible
†† Not applicable for variator size 102

7.5.2 - Variator sub-code alarms (continued)

No.	Alarm/alert level	Description	Action taken
Variator sub-code alerts (WY-XXX*)			
71	Alert	Emergency stop at thermistor PTC1	Contact Carrier Service
72	Alert	Emergency stop	Contact Carrier Service
90 ††	Alert	Encoder loss	Contact Carrier Service
94	Alert	Curve end	Contact Carrier Service
95	Alert	Torque loss	Contact Carrier Service
96	Alert	Start-up delayed	Contact Carrier Service
97	Alert	Stop delayed	Contact Carrier Service
98	Alert	Clock problem	Contact Carrier Service
243	Alert	IGBT defective	Contact Carrier Service
247	Alert	Capacity board temperature	Contact Carrier Service

* Y = 0: circuit A; Y=1: circuit B; XXX = sub-code
** Error 24 and 104 possible
*** Error 50 to 58 possible
† Error 250 or 70 possible
†† Not applicable for variator size 102

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