



# Tracer CH535 Unit Controller

on models CGAX/CXAX  
with refrigerant charge R454B or R410A



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TRANE  
TECHNOLOGIES

Confidential and proprietary Trane information  
Original instructions

# Table of Contents

General information .....	3
Foreword .....	3
Warranty.....	3
Reception .....	3
General information .....	3
Tracer CH535 Presentation.....	4
Module description .....	4
LED .....	4
Micro switches.....	5
USB ports .....	5
Serial ports.....	5
Tracer CH535 Hardware.....	6
Built-In driver module connections terminals .....	6
Tracer CH535 Extention Hardware .....	7
Tracer CH535 module connections Terminals.....	8
Alarms display and resetting.....	9
Alarms .....	9
User interface display.....	14
Access to sub-menus .....	15
Data display menu .....	15
Setting menu .....	15
Clock menu .....	15
Configuration menu .....	16
Notes.....	17

# General information

## Foreword

These instructions are given as a guide to good practice in the installation, operation and periodic maintenance by the user of TRACER CH535 chiller controller.

They do not contain the full service procedures necessary for the continued successful operation of this equipment. The services of a qualified service technician should be employed, through the medium of a maintenance contract with a reputable service company.

## Warranty

Warranty is based on the general terms and conditions of the constructor. The warranty is void if the equipment is modified or repaired without the written approval of the constructor, if the operating limits are exceeded, or if the control system or the electrical wiring is modified. Damage due to misuse, lack of maintenance, or failure to comply with the manufacturer's instructions, is not covered by the warranty obligation. If the user does not conform to the rules of "Maintenance", it may entail cancellation of warranty and liabilities by the constructor.

## Reception

When the unit arrives on site, check it has not been damaged in any way during transport. If damage is observed, or even merely suspected, notify the carrier within 24 hours by registered letter. Notify the local Trane Sales office at the same time. The unit should be totally inspected within 3 days of delivery. If damage is observed, notify the last carrier by registered letter and notify the local sales office.

## General information

### About this manual

Cautions appear at appropriate places in this instruction manual. Your personal safety and the proper operation of this machine require that you follow them carefully. The constructor assumes no liability for installations or servicing performed by unqualified personnel.

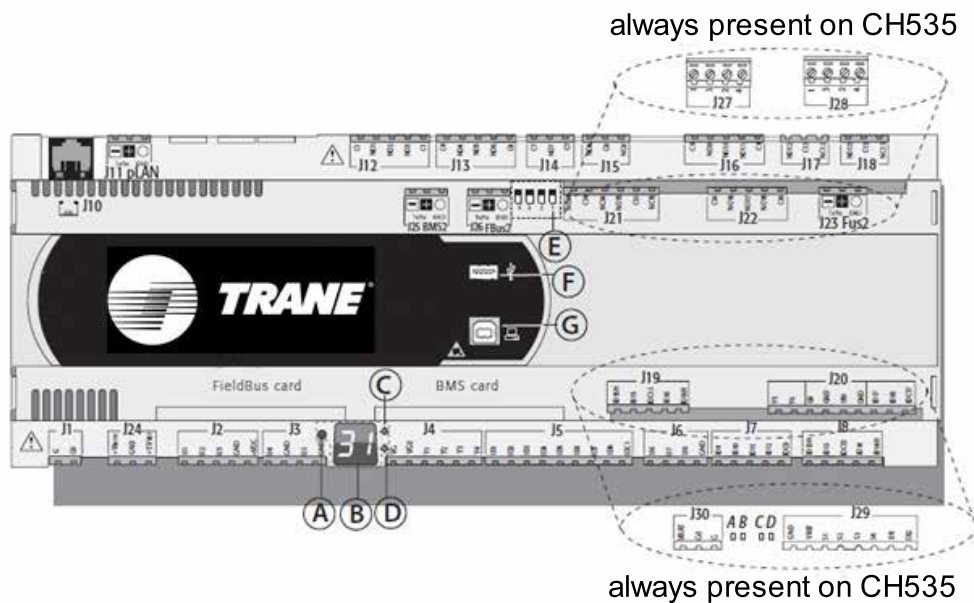
# Tracer CH535 Presentation

**Important note:** This document describes all the functions available on TRACER CH535 with software version 1.x and explains how to program it. Certain parameters must only be modified by qualified personnel. Before changing any parameter, always check that the change does not affect the good and safe operation of the equipment. Operation must always stay within the catalogued limits.

Tracer CH535 is a programmable microprocessor electronic controller dedicated to handle safe and optimized operation of the scroll compressor chiller, series Conquest, only cooling (CGAX) and heat pumps (CXAX).

## Module description

**Figure 1 – Programmable microprocessor electronic controller**



- A = pLAN Address selection key
- B = pLAN Address display
- C = Power Supply Presence LED
- D = Overcharge LED
- E = Fieldbus/BMS on port J26 micro switch
- F = USB host (master ) port
- G = USB slave (device) port

Each controller is provided with connectors for the inputs/output and the pLAN address display, which has a button and a LED for setting the pLAN address.

## LED

Tracer CH535 provides 6 LEDs:

- 1 yellow LED indicating that the device is powered;
- 1 red LED indicating an overload on the +VDC (J2-5) terminal;
- 4 LEDs indicating valve status:

Flashing LEDs mean the valve is moving; steadily-on LEDs mean the valve is completely open or closed.

**Table 1 – LED descriptions**

LED	Colour	Description
A	Yellow	Close A (connector J27)
B	Green	Open A (connector J27)
C	Yellow	Close B (connector J28)
D	Green	Open B (connector J28)

## Tracer CH535 Presentation

### Micro switches

Four micro switches are provided to configure port J26 as a Fieldbus or BMS port. They must not be modified (Fieldbus mandatory).

### USB ports

There are 2 USB ports which can be accessed after removing the cover:

- A "host" USB port for connecting pen drives;
- A "slave" USB port for direct connection to the USB port of a computer on which pCOManager is installed, which can be used to upload the application program, commissioning the system, etc.

### Serial ports

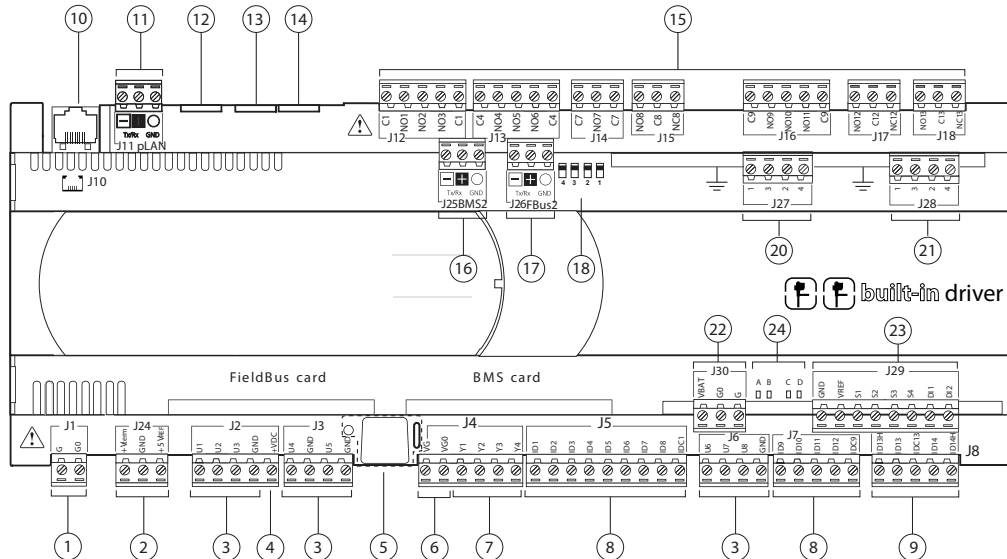
**Table 2 – Serial port descriptions**

Serial	Type/connectors	Features
Serial ZERO	pLAN/J10, J11	<ul style="list-style-type: none"> <li>• Built into main board</li> <li>• HW driver: asynchronous half duplex RS485 pLAN</li> <li>• Not optically isolated</li> <li>• Connectors: telephone jack + 3-pin plug-in connector                             <ul style="list-style-type: none"> <li>– For standard display connection</li> </ul> </li> </ul>
Serial ONE	BMS 1 Serial Card	<ul style="list-style-type: none"> <li>• Not built into main board</li> <li>• HW driver: not present</li> <li>• Can be used with all the BMS expansion cards of the Tracer CH535 family                             <ul style="list-style-type: none"> <li>– For Modbus, BACnet, LonTalk, Web connections</li> </ul> </li> </ul>
Serial TWO	Field Bus 1 Serial Card	<ul style="list-style-type: none"> <li>• Not built into main board</li> <li>• HW driver: not present</li> <li>• Can be used with all Fieldbus expansion cards of the Tracer CH535 family                             <ul style="list-style-type: none"> <li>– Not used</li> </ul> </li> </ul>
Serial THREE	BMS 2 / J25	<ul style="list-style-type: none"> <li>• Built into main board</li> <li>• HW driver: asynchronous half duplex RS485 slave</li> <li>• Optically-isolated/non-optically-isolated serial</li> <li>• 3-pin plug-in connector                             <ul style="list-style-type: none"> <li>– For Deluxe display connection</li> </ul> </li> </ul>
Serial FOUR	Field Bus 2 / J26	<ul style="list-style-type: none"> <li>• Built into main board</li> <li>• HW driver: asynchronous half duplex RS485 Master or Slave (see par. 3.2)</li> <li>• J26: optically isolated/not optically isolated</li> <li>• 3-pin plug-in connector                             <ul style="list-style-type: none"> <li>– For Tracer CH535 ext connections</li> </ul> </li> </ul>

# Tracer CH535 Hardware

## Built-in driver module connections terminals

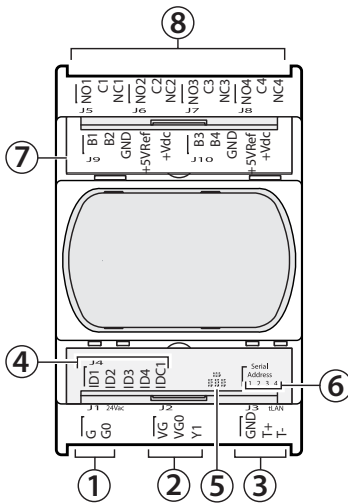
Figure 2 – Built-in driver terminal locations



- 1 = Power Supply connection (G (+) , GO (-) )
- 2 = +Vterm: additional terminal power supply  
-VREF power supply for rasiometric probes
- 3 = Universal Input / Outputs
- 4 = +VDC: power supply for active probes
- 5 = pLAN address setup key, secondary display LED
- 6 = VG: power supply voltage A for options  
VG0: power supply for optically isolated analog output at 0 Vac/Vdc
- 7 = Analog outputs
- 8 = ID: digital inputs at low voltage
- 9 = ID...: digital inputs at low voltage  
IDH...: digital inputs at high voltage
- 10 = pLAN telephone connector for terminal/download application programme
- 11 = pLAN removable connector
- 12 = Reserved
- 13 = Reserved
- 14 = Reserved
- 15 = Relay digital outputs

# Tracer CH535 Extention Hardware

Figure 3 – CH535 extention terminal locations



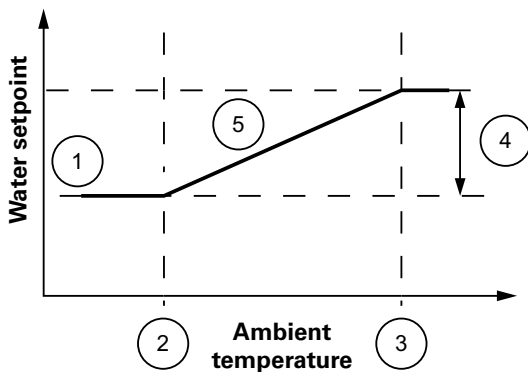
- 1 = Power Supply connection (G (+), G0 (-))
- 2 = Optically-isolated analog output, 0 to 10 V
- 3 = RS485 network connector (GND, T+, T-)
- 4 = Optically-isolated digital inputs, at 24 Vac/Vdc
- 5 = Yellow power LED and 3 indicator LEDs
- 6 = Serial address
- 7 = Analog inputs and power to probes
- 8 = Relay digital outputs

# Tracer CH535 module connections Terminals

TRACER CH535 offers customer the possibility to use inputs or outputs in order to:

- use an external water setpoint reset using an analog input (option),
- use an auxiliary setpoint (option),
- connect a remote on/off of the circuit/unit (standard),
- connect a remote Cooling/Heating switch (standard),
- return a circuit fault (option),
- receive unit capacity percent (option).

**Note: External water setpoint** based on an external signal input (0-20mA or 4-20mA), it will be possible to offset the active setpoint from 0°C to 20°C. This function can be used in conjunction with the automatic setpoint reset function.



1 = Leaving water temperature setpoint

2 = Minimum value

3 = Maximum value

4 = Reset = 20°C

5 = Active setpoint

**Note: External demand limit setpoint** based on an external signal input (0-20mA or 4-20mA), it will define the number of compressors allowed to start.

**Table 3 – External demand limit setpoint allowances**

Percent	Current 0-20mA	Nb of CMP allowed		
		Simplex Duo	Simplex Trio	Duplex
0.0%	0	1	1	1
25.0%	5	1	1	2
33.3%	6.66	1	2	2
50.0%	10	2	2	3
66.7%	13.34	2	3	3
75.0%	15	2	3	4
100.0%	20	2	3	4

Percent	Current 4-20mA	Nb of CMP allowed		
		Simplex Duo	Simplex Trio	Duplex
20.0%	4	1	1	1
40.0%	8	1	1	2
46.7%	9.33	1	2	2
60.0%	12	2	2	3
73.4%	14.67	2	3	3
80.0%	16	2	3	4
100.0%	20	2	3	4



# Alarms


## Alarms display and resetting

A fault on a unit will be shown through the user interface or through 2 digital outputs, one for each refrigerant circuit. The alarms are divided into 3 categories:


**Warning:** Shows that something is wrong on the unit but unit can be kept in operation. A message is displayed on the user interface screen. These messages are not recorded in the history list.

**Fault with automatic reset:** when the cause of the fault disappears, the fault is cancelled and unit operation will return to normal. The messages displayed on the user interface screen disappear but are recorded in the history list of faults. The fault is relayed through the digital output if I/O parameter is set to show a circuit fault.

**Fault with manual reset:** when the cause of the fault disappears, a manual reset is required to restart the unit. The messages displayed on the user interface screen disappear and are recorded in the history list of faults. The fault is relayed through the digital output if I/O parameter is set to show a circuit fault.

Should an alarm occur,  will be lit in red.

Pressing  once will display the alarm message (refer to Table 6 for possible messages)

When alarm message is displayed press  to reset the default if necessary.

## Alarms

**Table 4 – Status, Warning and Alarm messages**

N°	Message	Reset Type	Unit Status	Description
1	No Alarm	-	Unit On	See unit status on Main display
2	Alarm Water Pump1	Manual	Unit On	Defective water pump 1
3	Alarm Water Pump2	Manual	Unit On	Defective water pump 2
4	User Ckt1 Stop	-	Circuit 1 Off	Circuit 1 Disable by Settings (via keyboard)
5	User Ckt2 Stop	-	Circuit 2 Off	Circuit 2 Disable by Settings (via keyboard)
6	Ext. Ckt1 Stop	-	Circuit 1 Off	Circuit 1 Off by Digital Input (Duplex units)
7	Ext. Ckt2 Stop	-	Circuit 2 Off	Circuit 2 Off by Digital Input (Duplex units)
8	Rem. Ckt1 Stop	-	Circuit 1 Off	Circuit 1 Disable by Supervision
9	Rem. Ckt2 Stop	-	Circuit 2 Off	Circuit 2 Disable by Supervision
10	Clock Unit Stop	-	Unit Off	Unit Off by Program (Hourly, Weekly)
11	Operator Stop	-	Unit Off	Unit Off by Operator (via keyboard)
12	Phase Fault	Auto	Unit Off	Phase Loss or Phase Reversal
13	Warning Ckt1 LP Limit	Auto	Circuit 1 Limit	Suction pressure on circuit 1 is below the setpoint (1.5barG).
14	Warning Ckt2 LP Limit	Auto	Circuit 2 Limit	Suction pressure on circuit 2 is below the setpoint (1.5barG).
15	Warning Ckt1 HW Limit	Auto	Circuit 1 Limit	Leaving water temperature is above the setpoint (Default value: 25°C).
16	Warning Ckt2 HW Limit	Auto	Circuit 2 Limit	Leaving water temperature is above the setpoint (Default value: 25°C).
17	Warning Ckt1 HP Limit	Auto	Circuit 1 Limit	Discharge pressure on circuit 1 is above the setpoint (Default value: 43.1barG).
18	Warning Ckt2 HP Limit	Auto	Circuit 2 Limit	Discharge pressure on circuit 2 is above the setpoint (Default value: 43.1barG).
19	Warning Ckt1 HT Limit	Auto	Circuit 1 Limit	Discharge temperature on circuit 1 is above the setpoint (Default value: 128°C).
20	Warning Ckt2 HT Limit	Auto	Circuit 2 Limit	Discharge temperature on circuit 2 is above the setpoint (Default value: 128°C).
21	Warning Ckt1 CIPD Limit	Auto	Circuit 1 Limit	Compressor Involute Pressure Differential on circuit 1 is above 22.2barG or above 18.6barG during 25min.
22	Warning Ckt2 CIPD Limit	Auto	Circuit 2 Limit	Compressor Involute Pressure Differential on circuit 2 is above 22.2barG or above 18.6barG during 25min.
23	Warning Low SuperHeat ckt1	Auto	Circuit 1 Off	Super Heat on circuit 1 is below low limit (2°C)
24	Warning Low SuperHeat ckt2	Auto	Circuit 2 Off	Super Heat on circuit 2 is below low limit (2°C)
	Alarm Outside Air Temp			Ambient temperature is out of range for unit operation:
25	Cooling: Too Low	Auto	Unit Off	Cooling mode: below -10°C (default value)
	Heating: Out of Range			Heating mode: below -15°C (default value) or above 29°C.
26	Ckt1 Defrost	-	Unit On	Defrost on Circuit 1

## Alarms

N°	Message	Reset Type	Unit Status	Description
27	Ckt2 Defrost	-	Unit On	Defrost on Circuit 2
28	Alarm Loss of Water Flow	Auto	Unit Off	Loss of water flow for more than 1 sec. Pump restarts by a manual unit mode changeover
29	Alarm Air Sensor	Auto	Unit Off	Faulty sensor, out of range -30..+80°C (short circuit or open circuit)
30	Alarm Water In Sensor	Auto	Unit Off	Faulty sensor, out of range -30..+80°C (short circuit or open circuit)
31	Alarm Water Out Sensor	Auto	Unit Off	Faulty sensor, out of range -30..+80°C (short circuit or open circuit) (short circuit or open circuit)
32	Alarm HT Sensor Ckt1	Auto	Circuit 1 Off	Faulty sensor, out of range -30..+150°C (short circuit or open circuit)
33	Alarm HP Sensor Ckt1	Auto	Circuit 1 Off	Faulty sensor, out of range 1..46Bar (short circuit or open circuit)
34	Alarm HT Sensor Ckt2	Auto	Circuit 2 Off	Faulty sensor, out of range -30..+150°C (short circuit or open circuit)
35	Alarm HP Sensor Ckt2	Auto	Circuit 2 Off	Faulty sensor, out of range 1..46Bar (short circuit or open circuit)
36	Alarm PHR LWT Sensor	Auto	Unit On	Faulty sensor, out of range -30..+80°C (short circuit or open circuit)
37	Alarm PHR EWT Sensor	Auto	Unit On	Faulty sensor, out of range -30..+80°C (short circuit or open circuit)
38	Alarm Ext. Water SP Signal	Auto	Unit On	Faulty signal, out of range 0..20mA or 4..20mA following configuration
39	Alarm Ext. Demand Limit SP Signal	Auto	Unit On	Faulty signal, out of range 0..20mA or 4..20mA following configuration
40	Alarm Fan1 fault Ckt1	Auto / Manual	Circuit 1 On (Off if only one fan)	The 1st fan on the circuit 1 is faulty
41	Alarm Fan1 fault Ckt2	Auto / Manual	Circuit 2 On (Off if only one fan)	The 1st fan on the circuit 2 is faulty
42	Alarm LP Ckt1 Fault	Auto / Manual	Circuit 1 Off	Suction pressure on circuit 1 is below the setpoint. Manual reset after 3 faults within 1 hour
43	Alarm LP Ckt2 Fault	Auto / Manual	Circuit 2 Off	Suction pressure on circuit 2 is below the setpoint. Manual reset after 3 faults within 1 hour
44	Alarm Comp. 1A Fault	Manual	CMP 1A Off	CMP 1A is faulty
45	Alarm Comp. 1B Fault	Manual	CMP 1B Off	CMP 1B is faulty
46	Alarm Comp. 1C Fault	Manual	CMP 1C Off	CMP 1C is faulty
47	Alarm Comp. 2A Fault	Manual	CMP 2A Off	CMP 2A is faulty
48	Alarm Comp. 2B Fault	Manual	CMP 2B Off	CMP 2B is faulty

## Alarms

N°	Message	Reset Type	Unit Status	Description
49	Warning Comp.1A Maintenance	Manual	Unit On	
50	Warning Comp.1B Maintenance	Manual	Unit On	
51	Warning Comp.1C Maintenance	Manual	Unit On	Compressor running hours above the threshold defined in unit configuration. Each compressor start is equal to 3 running hours.
52	Warning Comp.2A Maintenance	Manual	Unit On	
53	Warning Comp.2B Maintenance	Manual	Unit On	
54	Alarm HT Ckt 1 Fault	Manual	Circuit 1 Off	
55	Alarm HT Ckt 2 Fault	Manual	Circuit 2 Off	High Discharge Temperature Fault on Ckt2
56	Alarm CMP Involute Press Diff Ckt 1	Manual	Circuit 1 Off	High CMP Involute Pressure Differential Fault on Ckt1
57	Alarm CMP Involute Press Diff Ckt 2	Manual	Circuit 2 Off	High CMP Involute Pressure Differential Fault on Ckt2
58	Alarm Low Sat Suction Temp Ckt 1	Manual	Circuit 1 Off	Low Suction Saturated Temperature Fault on Ckt1
59	Alarm Low Sat Suction Temp Ckt 2	Manual	Circuit 2 Off	Low Suction Saturated Temperature Fault on Ckt2
60	Alarm Low SuperHeat Ckt1	Manual	Circuit 1 Off	Low Super Heat warning on circuit 1 occurred three times in one hour
61	Alarm Low SuperHeat Ckt2	Manual	Circuit 2 Off	Low Super Heat warning on circuit 2 occurred three times in one hour
62	Alarm Low water temperature	Manual	Unit Off	LWT < antifreeze or INT (antifreeze-EWT) <= 10°Cxsecond
63	Alarm HP Ckt1 Fault	Manual	Circuit 1 Off	High Pressure Cut-Out circuit 1
64	Alarm HP Ckt2 Fault	Manual	Circuit 2 Off	High Pressure Cut-Out circuit 2
65	Alarm Ckt 1 Fault (1st fan or all CMP)	Manual	Circuit 1 Off	Simultaneous faults on compressors 1A and 1B (1A, 1B and 1C for units #36, #39 and #45) or Fan 1 Fault Ckt1 for units #7 to #20, #35 and #40.
66	Alarm Ckt 2 Fault (1st fan or all CMP)	Manual	Circuit 2 Off	Simultaneous faults on compressors 2A and 2B or Fan 1 Fault Ckt2 for units #7 to #20, #35 and #40.
67	Alarm Unit Fault	Manual	Unit Off	Simultaneous faults on Ckt1 and Ckt2 on duplex units
68	Alarms pCOe 5 offline	Auto	Unit On	pCOextension5 is offline
69	Alarms pCOe 5 Analog input 1	Auto	Unit On	pCOextension5 is in default on Analog input #1
70	Alarms pCOe 5 Analog input 2	Auto	Unit On	pCOextension5 is in default on Analog input #2
71	Alarms pCOe 5 Analog input 3	Auto	Unit On	pCOextension5 is in default on Analog input #3
72	Alarms pCOe 5 Analog input 4	Auto	Unit On	pCOextension5 is in default on Analog input #4

## Alarms

N°	Message	Reset Type	Unit Status	Description
73	Alarms pCOe 5 IO mismatch	Auto	Unit On	pCOextension5 is in default on Analog input #4
74	Alarm Drive Fault	Manual	Unit Off	Variable Primary Flow Drive fault
75	Alarm Low Differential Pressure ckt1	Auto	Circuit 1 Off	Low Differential Pressure on circuit 1 (High Pressure - Low Pressure)
76	Alarm Low Differential Pressure ckt2	Auto	Circuit 2 Off	Low Differential Pressure on circuit 2 (High Pressure - Low Pressure)
77	Warning Cutout Supp Heating	Auto	Unit On	Information that Supplemental Heating is in cut out
78	Warning LRTC limit ckt1	Auto	Circuit 1 Limit	Low Refrigerant Temperature cut-out on circuit 1
79	Warning LRTC limit ckt2	Auto	Circuit 2 Limit	Low Refrigerant Temperature cut-out on circuit 2
80	EVD EVO EXV synchro Please wait	Auto	Unit Off	Expansion Valve is currently initiating
81	Alarm Refrigerant leakage	Auto	Unit Off	Unit stops if R454B is detected

# User interface display

Figure 4 – LCD Display

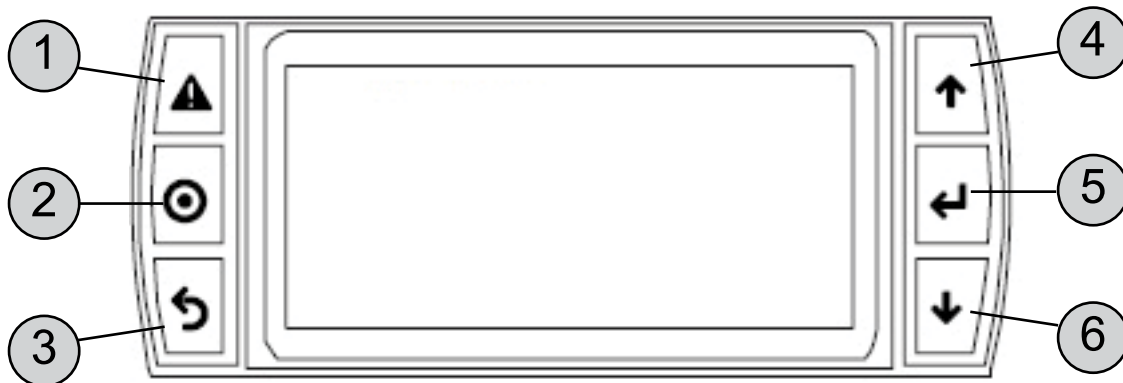


Table 5 – Button functions

Button	Description	Backlighting	Function
1	Alarm	White / Red	<ul style="list-style-type: none"> <li>• Pressed together with UP and power supply allows the controller address to be changed</li> <li>• Pressed together with ENTER accesses the BIOS page</li> </ul>
2	Prg	White / Yellow	Access to sub-menus
3	Esc	White	Return to high level
4	Up	White	<ul style="list-style-type: none"> <li>• Pressed together with DOWN or ENTER allows the terminal address to be changed</li> <li>• Increase value</li> </ul>
5	Enter	White	Confirm value
6	Down	White	<ul style="list-style-type: none"> <li>• Pressed together with UP and ENTER allows the terminal address to be changed</li> <li>• Decrease value</li> </ul>
2 + 5	Language	White	• Pressed together PRG and ENTER allows the terminal language to be changed

Note: In addition to the menu definition, the setting range (within parenthesis or **bold** for discrete data) and the default value (underlined) of each parameter are indicated:

Note: From software version 1.7 the Deluxe touchscreen display is no longer supported.

## User interface display

### Access to sub-menus

Access using the “**Prg**” key

```
Data Display
Settings
Clock
Configuration
```

Data display sub-menu  
 Settings sub-menu  
 Daily/weekly program sub-menu  
 Unit configuration sub-menu  
 (accessible to Trane technicians only, not accessible to end users)

The sub-menu will be selected using the **Up** and **Down** keys and selected using the **Enter** button.

### Data display menu

Show status and values of:

- Temperature sensors
- Pressures sensors
- Compressors
- Fans
- Pump package
- Expansion valve
- Auxiliary heat
- Operating modes
- Setpoints

### Setting menu

Show status and allows modification of:

- Local and auxiliary setpoints
- Setpoint offset
- Operating modes
- Circuit manual lockout

### Clock menu

Show status and allows modification of:

- Actual date and time adjustment
- Scheduling

**Figure 5 – Figure 6 – Scheduling**

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Weekly schedule	Start	-----	-----	-----	Stop		
Unit Status	Unit ON	Unit ON	Unit ON	Unit ON	Unit ON	Unit OFF	Unit OFF

	00:00	03:00	06:00	09:00	12:00	15:00	18:00	21:00	00:00
Daily Schedule			Start	-----	-----	-----	Stop		
Unit Status	Unit OFF	Unit OFF	Unit ON	Unit ON	Unit ON	Unit ON	Unit ON	Unit OFF	Unit OFF

*Example of scheduling where unit is running from Monday to Friday in a time frame from 6:00 to 18:00*

## User interface display

Exemple of hourly scheduling

	00:00	03:00	06:00	09:00	12:00	15:00	18:00	21:00	00:00
Zone #1			"Start CSP 10°C"						
Zone #2				"Start CSP 7°C"					
Zone #3							"Start CSP 10°C"		
Zone #4								"Start CSP 15°C"	
"Unit active cooling setpoint"	15°C	15°C	10°C	7°C	7°C	7°C	10°C	15°C	15°C

*Example of hourly setpoint scheduling where unit is delivering 15°C water during the night and 7°C during peak period of the day (from 9:00 to 15:00). Occupied zone from 6:00 to 21:00.*

## Configuration menu

Shows and allows modification of unit configuration with 2 user levels (Local technician and Trane service technician):

Local technician (by default password = 0005) allows to:

- Show status display version application
- Modification of pump timers, freeze protection and other limits
- Force defrost cycle
- Show status of digital and analog inputs/outputs,
- Manual override of expansion valve.
- Modification of local technician password.





# Notes



## Notes



## Notes

Trane - by Trane Technologies (NYSE: TT), a global climate innovator - creates comfortable, energy efficient indoor environments for commercial and residential applications. For more information, please visit [trane.com](http://trane.com) or [tranetechnologies.com](http://tranetechnologies.com).

Trane has a policy of continuous product and product data improvement and reserves the right to change design and specifications without notice. We are committed to using environmentally conscious print practices.

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