

# QUICK GUIDE (EN)

Version UMTT-MT OEM rev.1.0 date 01/02/2018

**CUBO**  
smart **2**



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## 1 Introduction

This manual refers to systems for cooling and conservation at medium temperatures, with R744 (CO<sub>2</sub>) as refrigerant and identified as:

UMTT 030 MT DX	UMTT 045 MT DT	UMTT 060 MT DX	UMTT 100 MT DX
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## 2 Safety issues with CO<sub>2</sub> - Safe handling

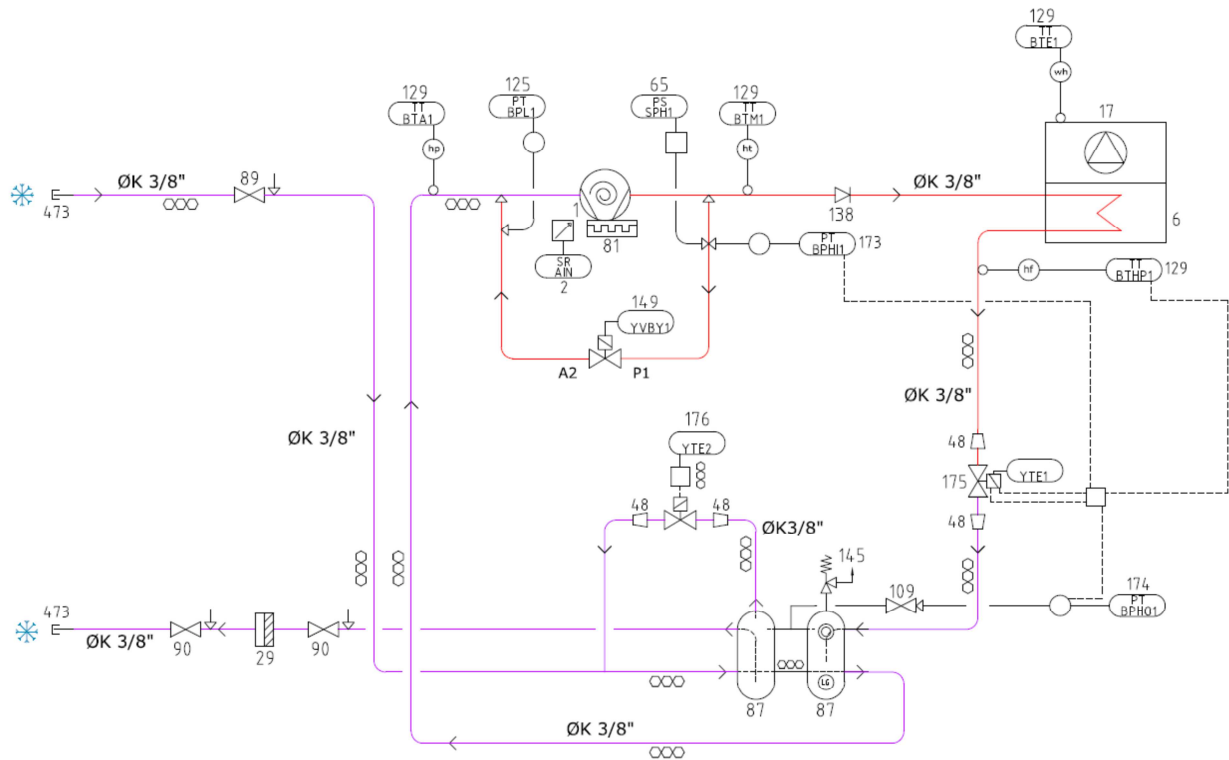
When the R744 (CO<sub>2</sub>) is being handled, a qualified person must be present with the suitable equipment. CO<sub>2</sub> has no smell or colour and the operator would not be aware if there were any leaks. The effects of increased CO<sub>2</sub> levels on adults at good health can be summarized:

CO <sub>2</sub> concentration		Effects
%	ppm	
0,04 %	< 400	Normal outdoor level
0,06 %	< 600	Acceptable levels
0,50 %	5000	8hours - Long Term Exposure Limit
1,5 %	15.000	15 minute - Short Term Exposure Limit.
3 %	30.000	Intoxicating, breathing and pulse rate increase, nausea.
10 %	100.000	Inconscious, further exposure death.
30 %	300.000	Quick death.

### 2.1 Precaution

- Dedicated pressure relief valves are necessary in all those sections of the system which can be isolated by shut valves. Due to the high thermal coefficient of expansion of liquid CO<sub>2</sub>, fluid pipes must not be blocked.
- All SCM units are protected against overpressure with pressure relief valves when required according to EN378 and PED.
- Given the high pressure that system can reach during operation, special attention must be paid to connect and regulate the unit.
- Before carrying out any repairs which involve breaking into the system/soldering or welding, all relevant parts must be emptied of CO<sub>2</sub>.
- Do not use other than the designated refrigerant (for charging, adding or recharging)
- Refrigerant gas leak may cause suffocation.
- Piping, equipment components and tools should be appropriate for use with R744 (CO<sub>2</sub> refrigerant).
- Use of unsuitable components or those designed for HFC refrigerant may cause serious incidents such as equipment failure and rupture of the refrigerant cycle.
- Securely place the cover on the electrical box and enclosure panel. Incomplete attachment may lead to penetration of water and living creatures, meaning potential current leak and fire/electrical shock.
- Do not change the set values of the safety device.
- Using the refrigeration unit with changed values may cause failure of the safety stop function and lead to a burst or fire.
- When abnormal operation is detected, or before starting disassembly or repair, turn off the main power switch.
- Specified components must be used for repair.
- Use of non-specified components may cause failure of the safety stop function and lead to burst or fire.
- Incorrect moving may cause falling or dropping of the refrigeration unit, and cause injury.
- Request a specialty operator for disposing the refrigeration unit.
- Make sure that access and emergency exit ways are not obstructed to comply with the local regulations.

Refrigerant drawing (P&ID)

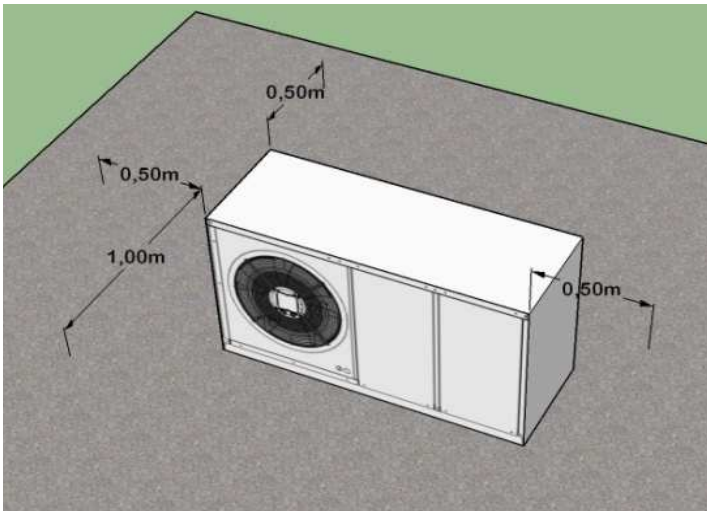


Ref.	Description	Ref.	Description
1	Rotary Compressor	125 (BPL1)	Low pressure transducer
2	Inverter	129 (BTA1)	Comp. Suction temperature probe
6	Gas Cooler coil	129 (BTM1)	Comp. Discharge temperature probe
17	Gas Cooler fan	129 (BTE1)	Ambient temperature probe
29	Refrigerant filter Dryer	129 (BTHP)	GC outlet temperature probe
65	HP safety switch (PZH)	138	Check valve
87	Liquid receivers (parallel)	145	Pressure Relief Valve
89	Suction shut-off valve	149 (YVBY)	By-pass solenoid valve
90	Liquid shut-off valve	173 (BPHI1)	Discharge pressure transducer
109	Service valve	174 (BPHO1)	Receiver pressure transducer
		175 (YVTE)	High Pressure Valve (HPV)
		176 (YVBY1)	Receiver Pressure Valve (RPRV)

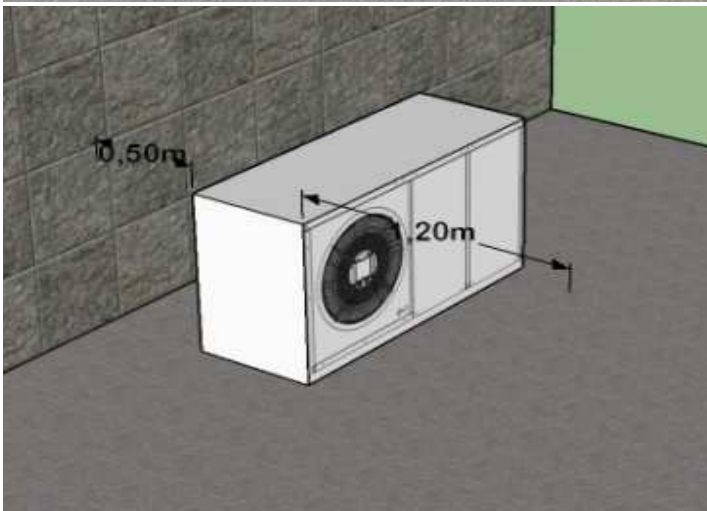
tab.5)

### 3 Unit installation

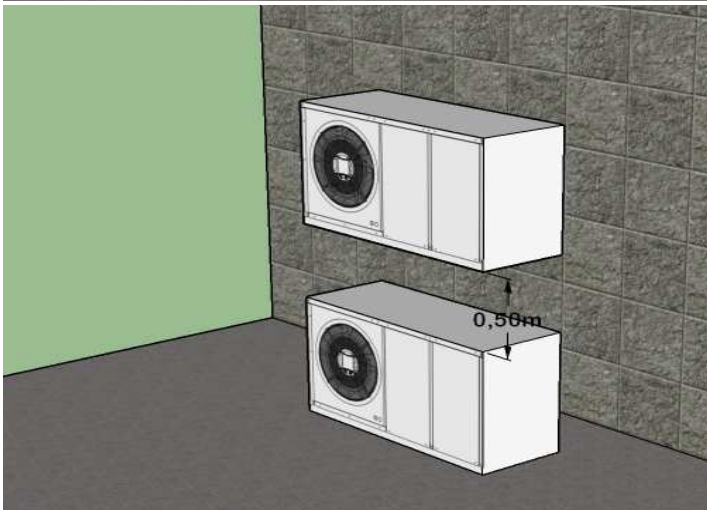
- ☑ The unit has been designed for outdoor installation.
- ☑ Respect distances for correct operation.
- ☑ In the case of several units in series or in parallel mode, respect the minimum distances for properly maintenance.
- ☑ In the case of several units in parallel, avoid the gas cooler air flow direct on second units but install in order to have opposite air flow (see picture).



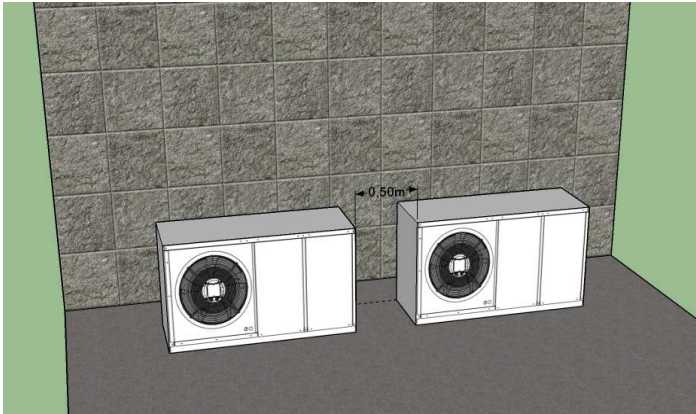
Minimum maintenance distances.



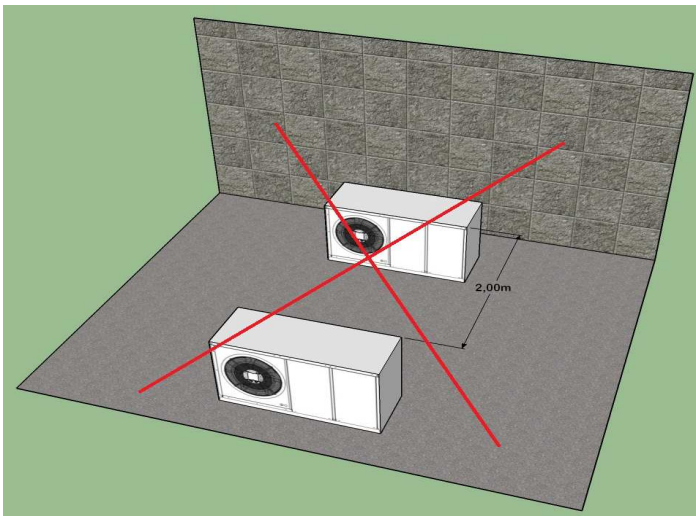
Minimum distances for GC air flow circulation



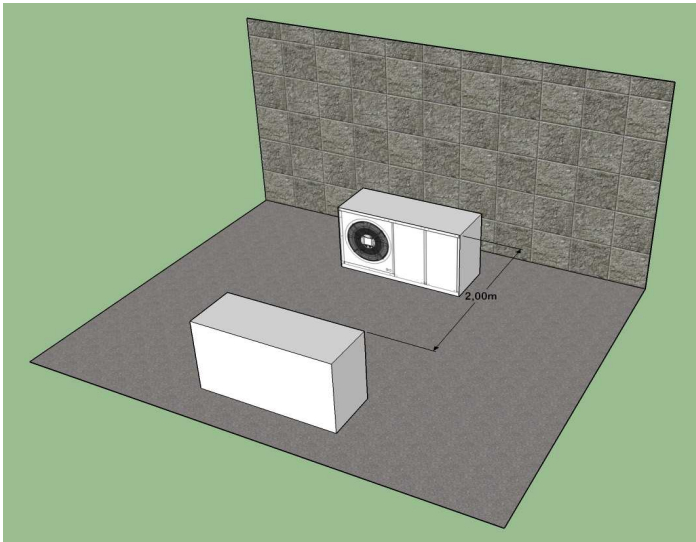
Vertical installation.



Horizontal installation.



Not permitted!



Installation in series (with opposite GC air flow)



## 4 Pipe connections

The connection for more remote evaporators can be:

- Single pipe (Multiplexer)
- By manifold (Multi-split).

**SCM Frigo recommends connection with up to 3 remote evaporators, and with maximum length 15 ÷ 18 meters.**

Liquid line must be properly sized to supply the farther evaporators (liquid velocity < 1 m/s is suggested). Suction line must be properly sized to have a good oil return with a low pressure drop (gas velocity from 8 to 16 m/s are suggested).

### 4.1 Multiplexer

- PRO: less copper usage and easier installation with large diameter tube
  - CONS: more demanding in the design of suction and liquid lines.
- Suction pipe must have an inclination of at least 1% towards the condensing unit, in order to help return of oil.



### 4.2 Multi-split

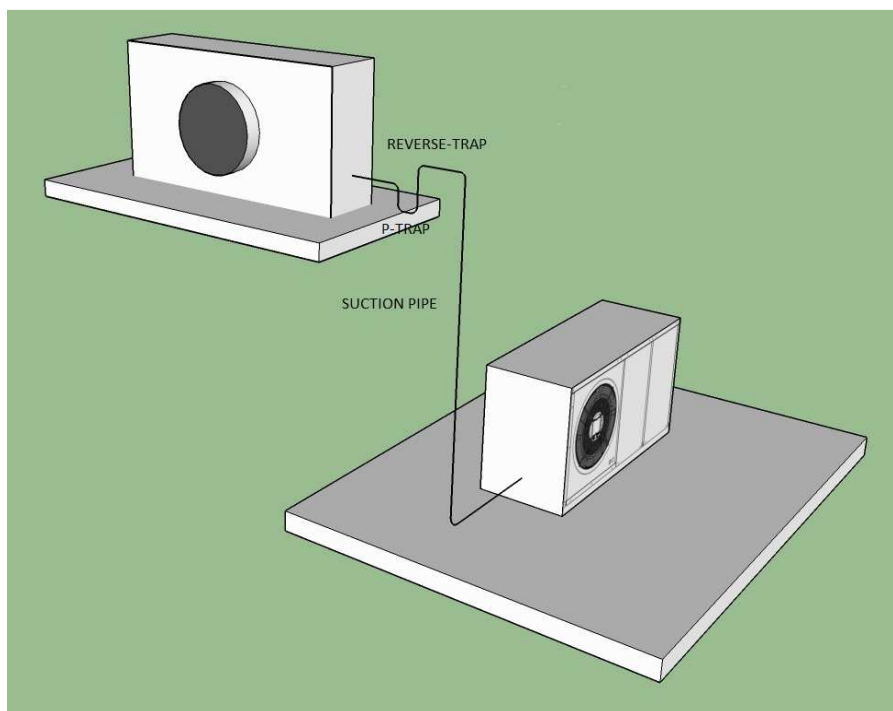
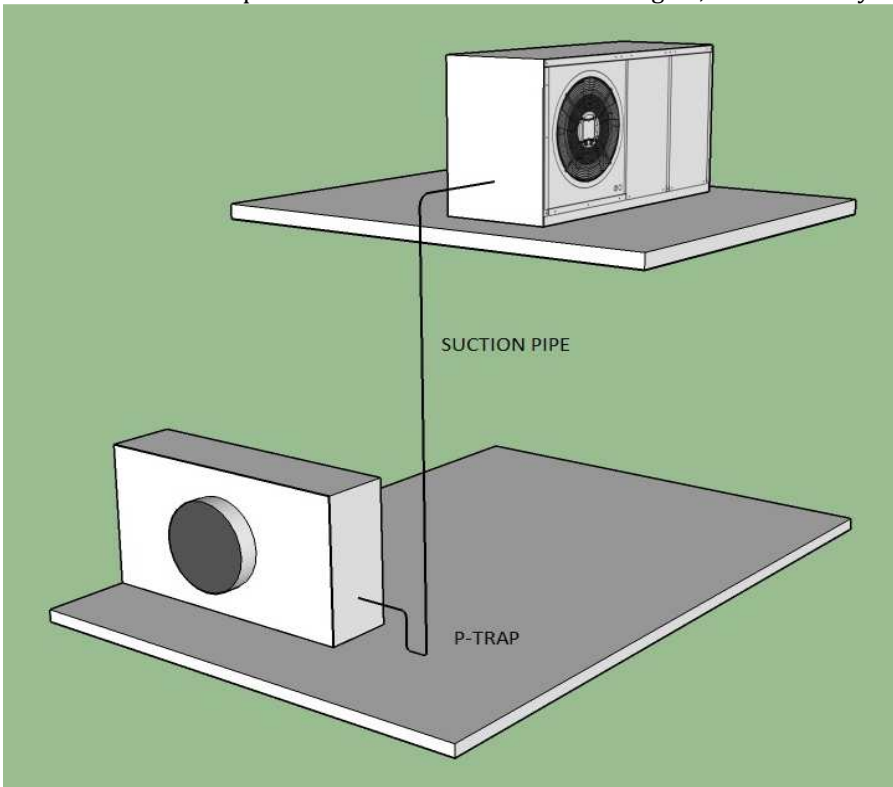
- PRO: good compromise solution between oil return and pressure drop issue can be found.
  - CONS: higher copper pipe usage but with smaller diameters, easier installation.
- The collector must be properly sized and installed in a horizontal position






### 4.3 Oil traps

☑ If UMTT and evaporator are installed at different heights, it is necessary to create piping oil traps.



## 5 Commissioning

### 5.1 Evacuation and pre-charge

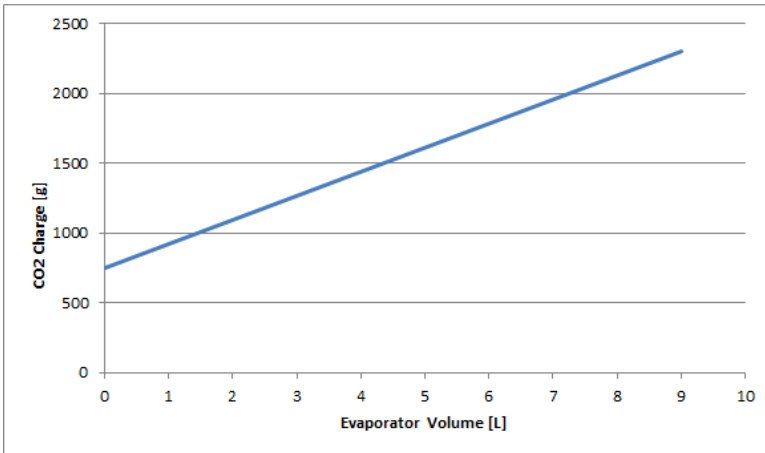


- Before to start the vacuum procedure it is necessary to open by hand, high pressure valve (HPV). For this operation, use magnetic tools supplied with unit. (See photo on side).
- Stop the Vacuum procedure only when the "standing vacuum pressure" reach a value of 0.67mbar. During the vacuum process brake the vacuum several time with dry nitrogen.
- Before starting refrigerant charge, break vacuum WITH ONLY CO2 VAPOUR (all parts of circuit) up to 10bar pressure to avoid dry-ice production.
- Do not switch on the compressor during this phase!

### 5.2 Estimation of the refrigerant charge

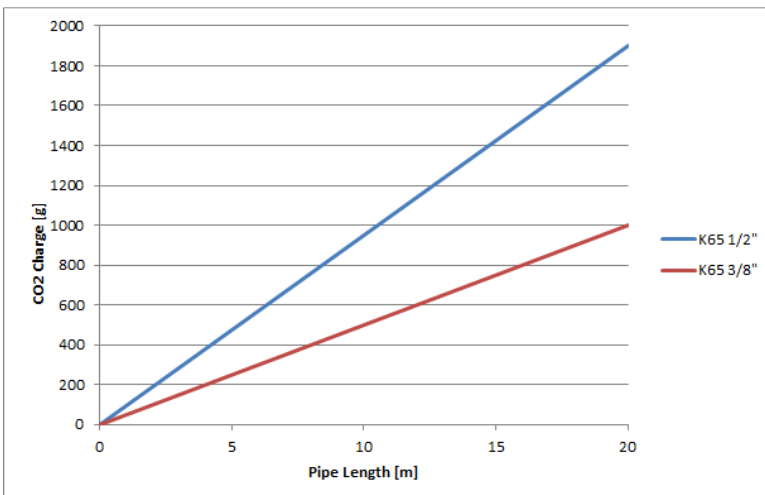
To have an indication of total refrigerant quantity you have to know:

- Volume of evaporator coil.
- Diameter and Length of the piping.



Using this diagram you can calculate refrigerant charge related to the evaporator inner volume.

You can apply also the following formula:  
 $Y \text{ (CO}_2 \text{ charge)} = 172,2222 * X \text{ (Evap. Volume)} + 750$



Using this diagram you can calculate refrigerant charge related to the pipe diameter and lenght.

You can apply also the following formula:  
 $(\text{CO}_2 \text{ charge}) = 50 * X \text{ (Pipe Length K65 3/8")}$   
 $Y \text{ (CO}_2 \text{ charge)} = 95 * X \text{ (Pipe Length K65 1/2")}$

Example of estimated refrigerant charge calculation:

- Evaporator volume: 9lt.

CO2 charge calculated the first diagram is: 2300 gr.

- Piping length: 18mt for K65 3/8".

CO2 charge calculated form the second diagram: 900 gr.

Total refrigerant charge (estimated): 2300 gr + 900 gr = 3200 gr.

In the case that the evaporating volume is not known, it is possible to estimate CO2 charge considering only the pipe length + 2,4 lt (= 2400 gr).

Liquid line	Length [m]													
	5	6	7	8	9	10	11	12	13	14	15	16	17	18
K65 - 3/8" (gr)	250	300	350	400	450	500	550	600	650	700	750	800	850	900
K65 - 1/2" (gr)	475	570	665	760	855	950	1045	1140	1235	1330	1425	1520	1615	1710

tab.4)

Example.

- Piping length: 18mt for K65 3/8".

CO2 charge calculated using the second diagram: 900 gr.

Total refrigerant charge (**estimated**): 900 gr + 2400 gr = 3300 gr.

Don't overfeed the unit with excessive charge to avoid compressor damaged.



- After the pre-charging phase continue to charge the intermediate pressure receiver of the system with liquid CO2 using the liquid service valve. See "charging procedure" chapter" for detailed informations.
- CO2 of purity class of N4.5 or comparable or with moisture content <5ppm must be used.
- Do not mix CO2 with various other refrigerants

### 5.3 Oil charge



- In case of charging R744 refrigerant (CO2) > 4 kg, we recommend an oil fill of PAG VG100 250 ml.

### 5.4 Charging procedure

<p><input checked="" type="checkbox"/> When charging, it is possible to use service access 1/4SAE (7/16"-20UNF)</p>  <p style="color: red; font-size: small;">Gas service valve + Schrader 1/4SAE with pin</p> <p style="color: red; font-size: small;">Liquid service valve + Schrader 1/4SAE with pin</p>	<p><input checked="" type="checkbox"/> We suggest to use special shut-off to insert on service 1/4SAE after removing the pin already present.</p>  <p>(PS120bar - CASTEL 6110E/X15)</p>
--	--

- Charge CO2 liquid only from liquid line.
- Charge CO2 gas only from suction line.
- Never charge CO2 liquid from suction to prevent the breakdown of the compressor.
- Keep liquid level on receiver about 3/4 height of liquid receiver sight glass. A liquid overfeed can compromise correct regulation of the unit and the reliability of the compressor (liquid return).
- Always check liquid level in different condition, especially in trans critical and defrosting mode.

## 6 Electrical connection

Electical Information				
Cubo2Smart line Size	UMTT 030 MT DX	UMTT 045 MT DX	UMTT 060 MT DX	UMTT 100 MT DX
<b>Power Suply</b>	230V/1Ph+N+PE/50Hz			400V/3Ph+N+PE/50Hz
<b>Recommended protection</b>	Circuit Breaker 1+N C16A	Circuit Breaker 1+N C25A	Circuit Breaker 1+N C32A	Circuit Breaker 3P C20A
<b>MRA</b>	14,5 A	20,2 A	28,7 A	18, 3 A
<b>P abs max</b>	3300 W	4650 W	6630 W	12700 W
MRA = Maximjum Rated Abs.				tab.1)

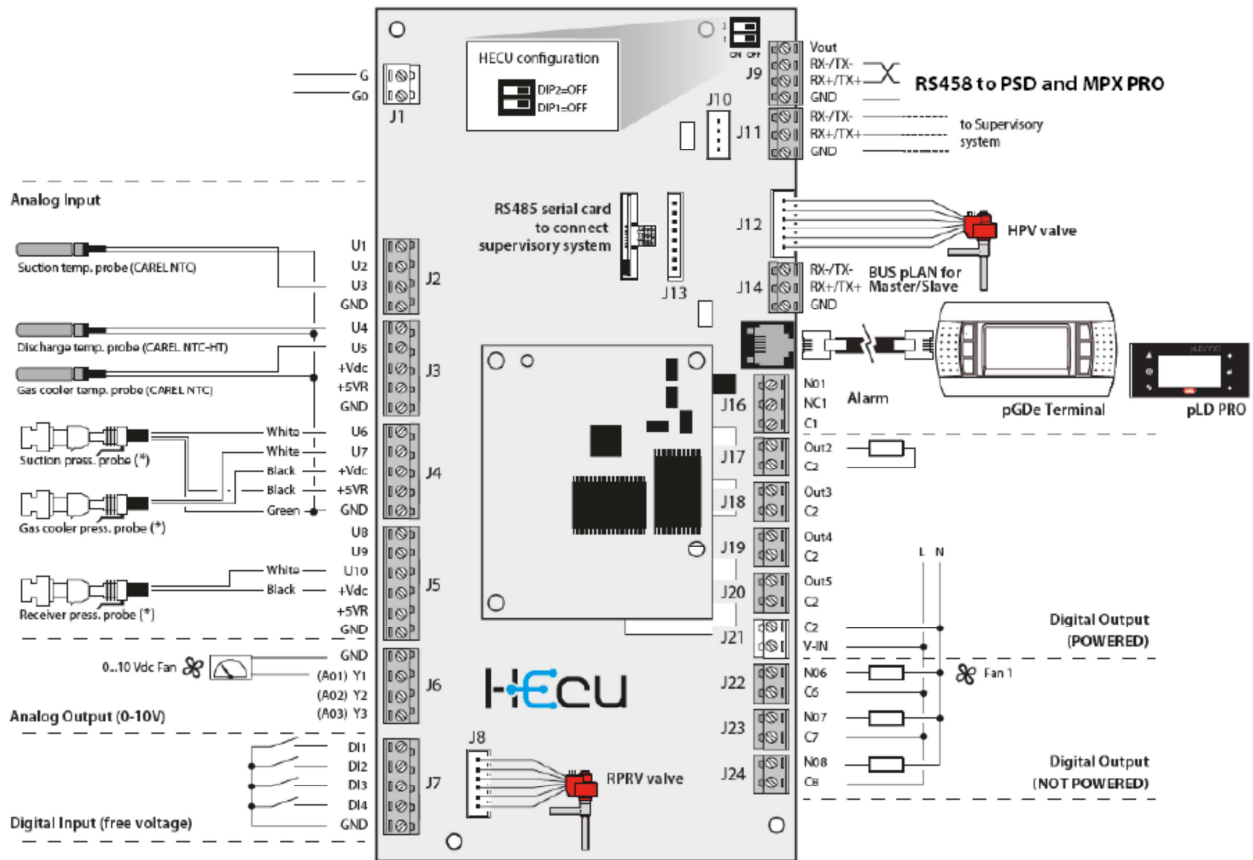
- Unit is made in accordance with EN-60204-1.
- All electrical cabling, in external unit, have been made in accordance with EN-60204-1.
- All connection must be done by qualified persons according to legal standards in force in the relevant countries and to EN-60204-1.
- Supply cable must be connected on terminal of upstream main switch.
- Connect wire of ground (PE), from specific terminal block to system protection.

## 7 General informations and limits.

	General Characteristics				
	Cubo2Smart line models	UMTT 030 MT	UMTT 045 MT	UMTT 060 MT	UMTT 100 MT
Compressor Motor	Refrigerant	R744 (CO2)			
	Toshiba Rotary Compressor	DY30N1F-10FU	DY45N1F-10FU	DY67L1F-10FU	RY100L1F-10FU
	Number of cylinders	1	1	2	2
	Number of poles	4			
	Moto type	DC Brushless			
	Revolution range	25 ~ 100 rps	25 ~ 100 rps	25 ~ 100 rps	25 ~ 100 rps
	Oil charged	520 ml	520 ml	450 ml	450 ml
	Oil type	PAG VG100			
	Discharge working pressure range	125 bar max	125 bar max	125 bar max	125 bar max
	Suction working pressure range	12 ~ 41 bar	12 ~ 41 bar	12 ~ 41 bar	12 ~ 41 bar
	Evaporating temperature	-15 °C ~ +5 °C			
	Susction Superheating	10 K ~ 20 K			
Refrigerant System	Discharge temperature	max 130 °C			
	Ambient temp.	-15 °C ~ +40 °C (Above 35 °C ambient, adiabatic option is required)			
	EC fans (max)	In = 2,2A - P abs = 345W			
	Receveiver	2x 2,4 lt (2,4 lt Receiver max charge)			
	Suction line	3/8" K65 (9,52mm)	3/8" K65 (9,52mm)	3/8" K65 (9,52mm)	1/2" K65 (12,70mm)
	Liquid line	3/8" K65 (9,52mm)	3/8" K65 (9,52mm)	3/8" K65 (9,52mm)	3/8" K65 (9,52mm)
	PS Suction / Liquid	80 bar / 80 bar			
	PED Category	I			
Generic	Dimensions (AxBxH)	1080 x 560 x 803 mm			
	Trasport dimensions (AxBxH)	1300 x 700 x 950 mm			
	Gross weight	140 Kg			
	Transport way	Pallet & Carton			

tab.3)

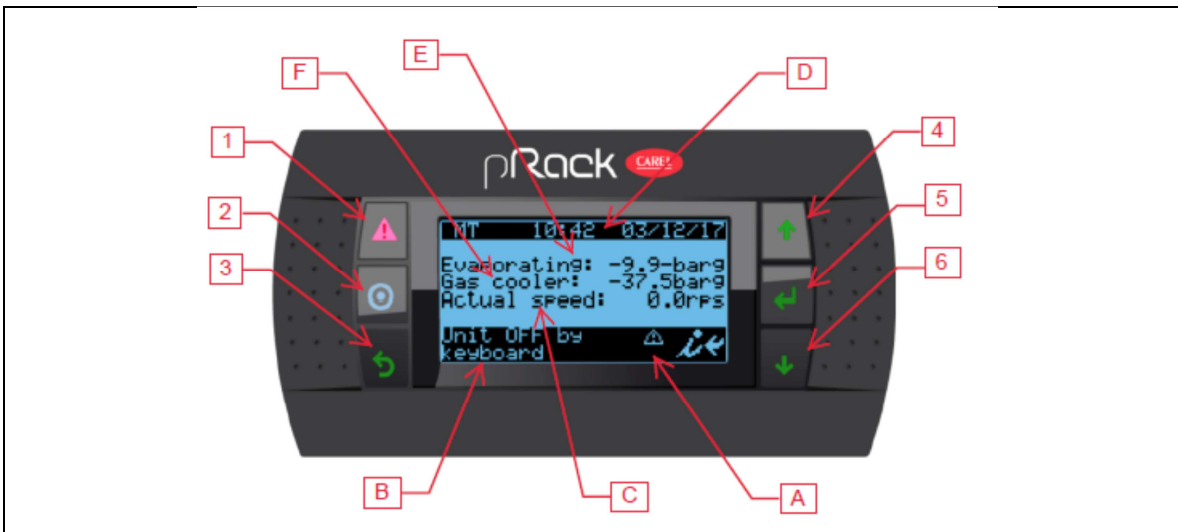
## 8 Controller description



Analog Inputs	Digital Inputs	Analog Output	Digital Output
Suction temperature (U3)	High pressostat alarm (DI2)	Modulating fans (Y1)	By-pass solenoid valve (N06)
Discharge temperature (U4)	ON/OFF remote (DI1)		General alarm (N01)
Ambient temperature (U2)			
Gas Cooler Outlet temperature (U5)			
Suction pressure (U6)			
Gas Cooler Outlet pressure (U7)			
Receivers pressure (U10)			

tab.6

## 9 Display



Button meaning		Display meaning	
	1 Shows active alarms list and accesses to the log alarms. <u>Pressing for more of 5 sec. reset alarm active, if possible.</u>	A	Active alarm preset and manual operation.
	2 Used to enter main mask tree.	B	Unit status.
	3 Return to back mask or higher level.	C	Rotation speed of compressor (rps)
	4 Scrolling a list upwards or increases the value highlighted by the cursor.	D	Time and date current.
	5 Scrolling a list downwards or decreases the value highlighted by the cursor.	E	Operation Suction pressure (bar).
	6 Enters in the selected submenu or confirms the changed set values.	F	Outlet Gas Cooler pressure (bar).
Led color and meaning			
	Red / blinking	Active alarm and not acknowledged	
	Yellow / Fixed	Controller activated	
	Green / Fixed	Controller powered	



## 9.1 Off/On unit

From main menu, press “Enter” button and appear access with password (see A mask).

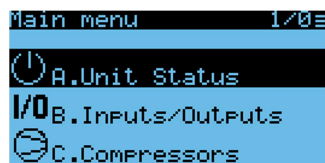
Note.

**1/0** Current mask / total masks. The horizontal rows mean access level

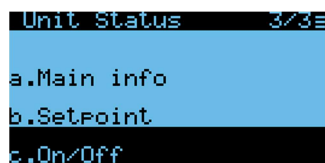
**Hc01** Letters and numbers are the name of mask.



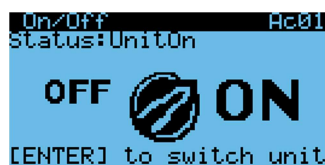
Set password + press “Enter”.



Select “Unit Status” + press “Enter”.



Select “On/off” + press “Enter”

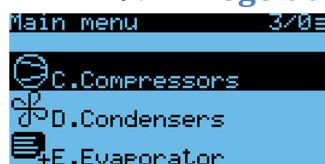


Press “Enter”, to change from off to ON

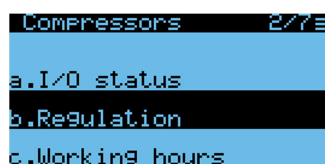


Press “Enter”, to change from on to OFF.

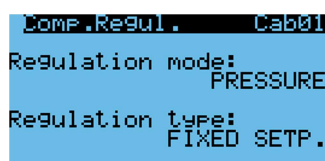
## 9.2 Regulation set point



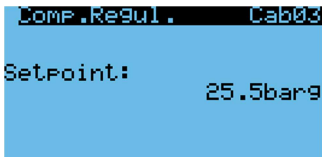
Select “Compressor” + press “Enter”



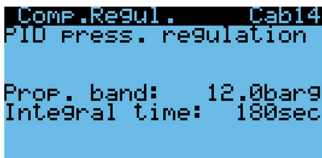
Select “Regulation” + press “Enter”



If remote evaporators are not present, regulation will be as fixed setpoint.

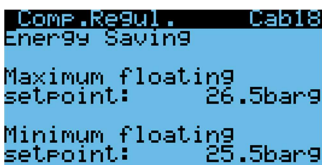
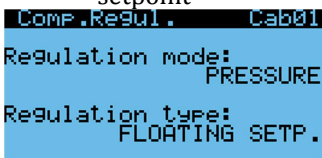


Suction set point request.



P+I regulation mode.

- In case of remote evaporators enabled, regulation type switch automatically from fixed point to floating setpoint



Min. and max. setpoint variation admitted.

- The above values are the factory settings and can be modify only from specialized people.**
- The factory settings doesn't include the evaporator management.**
- With the standard factory setting the unit will work based on a fixed suction set-point.**

## 10 Evaporator electrical connections

UMTT unit (Cubo2Smart) is managed with HECU controller by Carel.  
It is possible to control up to 5 remote evaporators using Carel MPXPRO and/or ULTRACELLA-EVO.  
All remote controllers must be connected with RS485 serial line.

<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> For serial connection, use terminal blocks: Rx-; Rx+; REF (A).</li> <li><input checked="" type="checkbox"/> For on/off remote, use terminal blocks: DI1; GND3 (B)(Remove bridge also present).</li> <li><input checked="" type="checkbox"/> For remote digital alarm, use terminal blocks: NO1; C; NC1 (B).</li> </ul>	
---	--

RS485 connection between MPXPRO / ULTRACELLA-EVO and the unit allows:

- Optimized oil management with “Oil Speed Booster” procedure.
- Optimized regulation by using “Floating Setpoint”.
- Evaporator setup and monitoring by using unit HECU display.

### 10.1 MPXPRO and ULTRACELLA/EVO CAREL configuration.

- ✓ When unit is connected to evaporator controller via RS485, regulation type switch automatically from fixed to floating set-point.

```
Main menu 5/0E
C.Compressors
D.Condensers
+E.Evaporator
```

Select "Evaporator" + press "Enter".

```
Evaporator 2/4E
a.I/O status
b.Configuration
c.Regulation
```

Select "Configuration" + press "Enter".

```
Store Config. Eab00
Ev.1 type:MPX PRO
Ev.2 type:MPX PRO
Ev.3 type:MPX PRO
Ev.4 type:ULTRACELLA
Ev.5 type:ULTRACELLA
```

Type controller present

```
Store Config. Eab01
N. of evaporators:5
Ev.1:not conn. 300W
Ev.2:not conn. 1200W
Ev.3:not conn. 1200W
Ev.4:not conn. 2300W
Ev.5:not conn. 2300W
Set default conf.: NO
```

Number of evap. and capacity of each unit.

- ✓ It is important to fix the right serial address for each evaporator installed, with following sequence: 11 - 12 - 13 - 14 - 15.

- ✓ Differents sequences are not allowed!

- ✓ Set of effective cooling capacity in order to maximize the result of energy savings with floating suction regulation and in case of defrost

```
Store Config. Eab02
Device number: 1
Bus address: 11
Enable device: YES
Description: SKIP
U1
```

Basic information for each evaporator.

"Description": name of plant.

```
Store Config. Eab03
1:U1
On/Off device: OFF
Lights: OFF
```

Start/Stop (On/Off) of evaporating management and light, if present.

```
Store Config. Eab04
1:U1
Real time clock:
sync with CDU
DD: 3 mm:12 YY:17
Day of week: 1
HH:11 MM:42
```

Setting real clock for history alarm list.

```
Evap. Config. Eab26
Device number: 4
Bus address: 14
Enable device: YES
Description:
Cbbiaaaaaaaaaa
```

Connection to ULTRACELLA.

```
Evap. Config. Eab27
4:Cbbiaaaaaaaaaaaa
On/Off device: OFF
```

```
Evap. Config. Eab31
5:Cccaaaaaaaaaaaaa
Real time clock:
      sinc with CDU
DD: 3 mm:12 YY:17
HH:10 MM:52
```

## 10.2 MPXPRO and ULTRACELLA/EVO CAREL regulation

```
Main menu 5/0E
C.Compressors
D.Condensers
+E.Evaporator
```

Select "Evaporator" + press "Enter".

```
Evaporator 3/4E
a.I/O status
b.Configuration
c.Regulation
```

Select "Regulation" + press "Enter".

```
Store Mng Eac01
1:U1
St -Reg.setp.: 2.0°C
rd -Diff.setp.: 0.0°C
PLt: 0.0°C
PHs: 9.0K
```

St	Air outlet setpoint
Rd	Differential
PLt	Offset to syop control below sepoint (Smooth Lines)
PHs	Maximum superheat offset (Smooth Lines)

```
Store Mng Eac02
1:U1
P3 -SH setpoint: 8.0K
P4 -SH Gain: 8.0K
P5 -SH Integral: 350s
P6 -SH Derivat.: 0.0s
P7 -LSH Thresh.: 3.0K
```

P3	Superheat setpoint (D)
P4	Control valve: Proportional gain (D)
P5	Control valve: Integral time (D)
P6	Control valve: Derivative time (D)
P7	

```
Store Mng Eac03
1:U1
Smooth lines: ENABLED
PSP: 5.0K
PSI: 120.0sec
PSD: 0.0sec
```

PSP	Smooth Line: Proportional gain (E)
PSI	Smooth Line: Integral time (E)
PSD	Smooth Line: Derivative time (E)

```
Store Mng Eac04
1:U1
Evaporat.Power : 300W
Initial valve position
at startup : 30%
Time after defr.:10min
```

## 11 List of alarms

Alarm Code	Display description	Reset	Delay	Alarm relay	Action
ALU02	Regulation probe(s) missing	Automatic	Not present	Not present	Shutdown unit
ALA01	Discharge temperature probe broken or disconnected	Automatic	60 s	R2	Related functions disabled
ALA02	Condenser pressure probe broken or disconnected	Automatic	60 s	R1	Related functions disabled
ALA03	External temperature probe broken or disconnected	Automatic	60 s	R2	Related functions disabled
ALA24	Suction pressure probe broken or disconnected	Automatic	60 s	R1	Related functions disabled
ALA25	Suction temperature probe broken or disconnected	Automatic	60 s	R2	Related functions disabled
ALA26	Room temperature probe broken or disconnected	Automatic	60 s	R2	Related functions disabled
ALA31	Condenser pressure backup probe broken or disconnected	Automatic	60 s	R2	Related functions disabled
ALA33	Suction pressure backup probe broken or disconnected	Automatic	60 s	R2	Related functions disabled
ALA46	Vapor injection pressure probe broken or disconnected	Automatic	60 s	R1	Related functions disabled
ALA47	Vapor injection temperature probe broken or disconnected	Automatic	60 s	R1	Related functions disabled
ALB01	Low common suction pressure by pressostat Num.autom.reset: / in min	Semiautomatic	Config.	R1	Shutdown compressors
ALB02	High common condensing pressure by pressostat	Man./Autom.	Config.	R1	Shutdown compressors
ALB03	Low condenser pressure alarm	Automatic	Settable	R1	Fan forcing at 0%
ALB04	High condenser pressure alarm	Automatic	Settable	R1	Fan forcing at 100% (5 min.) and shutdown compressor
ALB07	Fans common overload	Automatic	Config.	Config.	-
ALB15	High suction pressure alarm	Automatic	Config.	R1	-
ALB16	Low suction pressure alarm	Automatic	Config.	R1	-
ALB22	Oil sensor level broken or disconnected	Manual	Config.	R1	Shutdown compressor
ALC01	Alarm 1 compressor 1:	Man./Autom.	Config.	Config.	Shutdown compressor
ALC02	Alarm 2 compressor 1:	Man./Autom.	Config.	Config.	Shutdown compressor
ALC05	Alarm comp. backup	Man./Autom.	Config.	Config.	Shutdown compressor
ALG01	Clock board error	Automatic	-	R2	Related functions disabled
ALG02	Extended memory error	Automatic	-	R2	Related functions disabled
ALT01	Compressors working hours	Manual	-	Not present	-
ALT15	Low superheat alarm	Settable	Settable	R1	Shutdown compressors
ALT19	DSH Low Liquid flowback	Settable	Settable	R1	Shutdown compressors
ALW05	Warning Fans inverter	Automatic	Not present	Not present	-
ALW10	Warning Low superheat	Automatic	Not present	Not present	-
ALW16	Warning Invalid activation of oil level inputs, check the connections	Automatic	-	R2	-
ALW15	Warning An error occurred during auto-configur.	Automatic	Not present	Not present	-
ALW24	Power+ n° Device Offline	Semiautomatic	2 s	R1	Shutdown compressors
ALW25	Power+ n°	Semiautomatic	Not present	R1	Shutdown compressors
ALW26	Compressor start failure (tempt.: / max.: )	Semiautomatic	Not present	R1	-
ALW27	Envelope alarm Zone:	Semiautomatic	Not present	R1	Shutdown compressors
ALW28	High discharge gas temperature	Automatic	10 s	R1	-
ALW29	Low pressure differential (insuff. lubrication)	Automatic	Settable	R1	-
ALW30	Inverter model not compatible (Power+ only allowed)	Automatic	Not present	R1	-
ALW38	Low oil level fault	Manual	Settable	R1	Shutdown compressors

ALW39	High oil level fault	Manual	Settable	R1	Shutdown compressors
ALA04	General function probe A in board 1 broken or disconnected	Automatic	60 s	R2	Related functions disabled
ALA05	General function probe B in board 1 broken or disconnected	Automatic	60 s	R2	Related functions disabled
ALA06	General function probe C in board 1 broken or disconnected	Automatic	60 s	R2	Related functions disabled
ALA07	General function probe D in board 1 broken or disconnected	Automatic	60 s	R2	Related functions disabled
ALA08	General function probe E in board 1 broken or disconnected	Automatic	60 s	R2	Related functions disabled
ALG11	High thermostat alarms Function:1-5	Man./Autom.	Config.	Config.	-
ALG15	Low thermostat alarms Function:1-5	Man./Autom.	Config.	Config.	-
ALG19	High modulating alarms Function:6-7	Man./Autom.	Config.	Config.	-
ALG23	Low modulating alarms Function:6-7	Man./Autom.	Config.	Config.	-
ALG27	Generic normal alarms Function:8-9	Man./Autom.	Config.	Config.	-
ALG28	Generic serious alarms Function:8-9	Man./Autom.	Config.	Config.	-
ALW40-53-66-79-92	Store number: !! OFFLINE !!	-	Not present	R2	2
ALW41-54-67-80-93	Store number: Low temperature alarm [Generic Probe 1]	Display only (refer to +0300055IT MPXPRO manual)			
ALW42-55-68-81-94	Store number: High temperature alarm [Generic Probe 1]	Display only (refer to +0300055IT MPXPRO manual)			
ALW43-56-69-82-95	Store number: Low temperature alarm [Generic Probe 2]	Display only (refer to +0300055IT MPXPRO manual)			
ALW44-57-70-83-96	Store number: High temperature alarm [Generic Probe 2]	Display only (refer to +0300055IT MPXPRO manual)			
ALW45-58-71-84-97	Store number: Defrost timeout	Display only (refer to +0300055IT MPXPRO manual)			
ALW46-59-72-85-98	Store number: Low superheat alarm	Display only (refer to +0300055IT MPXPRO manual)			
ALW47-60-73-86-99	Store number: Low suction temp. alarm	Display only (refer to +0300055IT MPXPRO manual)			
ALW48-61-74-87-ALZ00	Store number: MOP alarm	Display only (refer to +0300055IT MPXPRO manual)			
ALW49-62-75-88-ALZ01	Store number: LOP alarm	Display only (refer to +0300055IT MPXPRO manual)			
ALW50-63-76-89-ALZ02	Store number: Stepper driver communication error	Display only (refer to +0300055IT MPXPRO manual)			
ALW51-64-77-90-ALZ03	Store number: Stepper motor error	Display only (refer to +0300055IT MPXPRO manual)			
ALW52-65-78-91-ALZ04	Store number: Installation or config problems on EEV driver	Display only (refer to +0300055IT MPXPRO manual)			

## 12 Conversion pressure-temperature CO2 (R744)

Temperature		Pressure	
(°C)	(°F)	(Bar-abs)	(psig)
-50.0	-58.0	6.8	84
-49.0	-56.2	7.1	88
-48.0	-54.4	7.4	93
-47.0	-52.6	7.7	97
-46.0	-50.8	8.0	101
-45.0	-49.0	8.3	106
-44.0	-47.2	8.6	111
-43.0	-45.4	9.0	116
-42.0	-43.6	9.3	121
-41.0	-41.8	9.7	126
-40.0	-40.0	10.0	131
-39.0	-38.2	10.4	136
-38.0	-36.4	10.8	142
-37.0	-34.6	11.2	148
-36.0	-32.8	11.6	154
-35.0	-31.0	12.0	160
-34.0	-29.2	12.5	166
-33.0	-27.4	12.9	172
-32.0	-25.6	13.3	179
-31.0	-23.8	13.8	185
-30.0	-22.0	14.3	192
-29.0	-20.2	14.8	199
-28.0	-18.4	15.3	207
-27.0	-16.6	15.8	214
-26.0	-14.8	16.3	222
-25.0	-13.0	16.8	229
-24.0	-11.2	17.4	237
-23.0	-9.4	17.9	245
-22.0	-7.6	18.5	254
-21.0	-5.8	19.1	262
-20.0	-4.0	19.7	271
-19.0	-2.2	20.3	280
-18.0	-0.4	20.9	289
-17.0	1.4	21.6	298
-16.0	3.2	22.2	308
-15.0	5.0	22.9	317
-14.0	6.8	23.6	327
-13.0	8.6	24.3	338
-12.0	10.4	25.0	348
-11.0	12.2	25.7	359
-10.0	14.0	26.5	369

Temperature		Pressure	
(°C)	(°F)	(Bar-abs)	(psig)
-9.0	15.8	27.2	380
-8.0	17.6	28.0	392
-7.0	19.4	28.8	403
-6.0	21.2	29.6	415
-5.0	23.0	30.5	427
-4.0	24.8	31.3	439
-3.0	26.6	32.2	452
-2.0	28.4	33.0	464
-1.0	30.2	33.9	477
0.0	32.0	34.9	491
1.0	33.8	35.8	504
2.0	35.6	36.7	518
3.0	37.4	37.7	532
4.0	39.2	38.7	546
5.0	41.0	39.7	561
6.0	42.8	40.7	576
7.0	44.6	41.8	591
8.0	46.4	42.8	606
9.0	48.2	43.9	622
10.0	50.0	45.0	638
11.0	51.8	46.1	654
12.0	53.6	47.3	671
13.0	55.4	48.5	688
14.0	57.2	49.7	705
15.0	59.0	50.9	723
16.0	60.8	52.1	741
17.0	62.6	53.4	759
18.0	64.4	54.7	778
19.0	66.2	56.0	797
20.0	68.0	57.3	816
21.0	69.8	58.6	836
22.0	71.6	60.0	856
23.0	73.4	61.4	876
24.0	75.2	62.9	897
25.0	77.0	64.3	918
26.0	78.8	65.8	940
27.0	80.6	67.4	962
28.0	82.4	68.9	985
29.0	84.2	70.5	1008
30.0	86.0	72.1	1031
30.9	87.6	73.6	1053







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