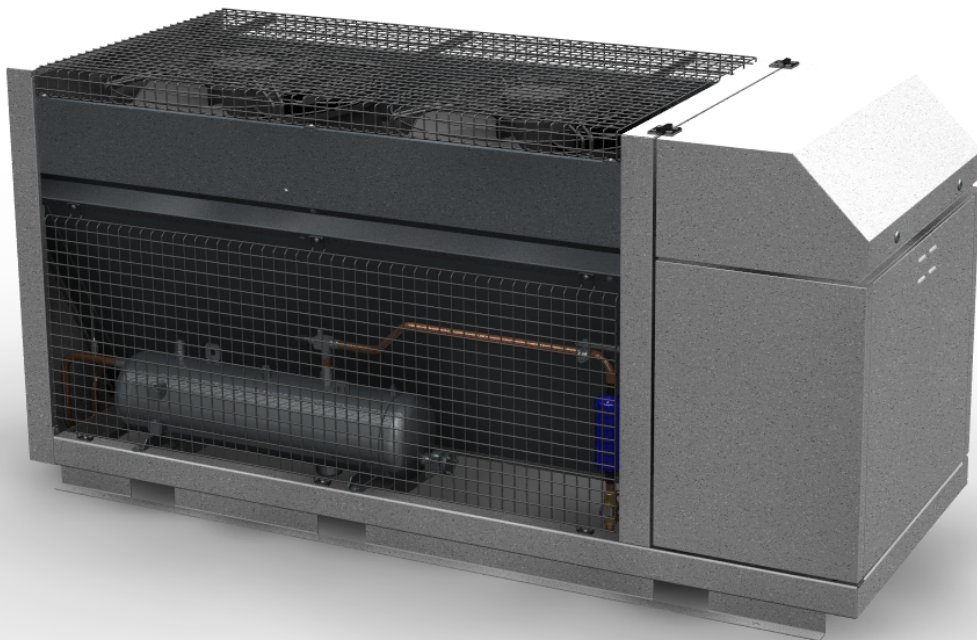


Application Guidelines

Copeland Eazycool™ Large Outdoor Condensing Units OM*-501 & OL*-501

OMTE-152D-TFD-501 & OLTE-82D-TFD-501



Copeland™
EazyCool™


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About these guidelines

The purpose of these application guidelines is to provide guidance in the application of Copeland OM(T)E & OL(T)E large outdoor condensing units. They are intended to answer the questions raised while designing, assembling and operating a system with these products.

Besides the support they provide, the instructions listed herein are also critical for the proper and safe functioning of the condensing units. Emerson will not guarantee the performance and reliability of the product if it is misused in regard of these guidelines.

These application guidelines cover stationary applications only. For mobile applications, contact Application Engineering as other considerations may apply.



1 Safety instructions







Copeland large outdoor refrigeration condensing units are manufactured according to the latest European and US Safety Standards. Particular emphasis has been placed on the user's safety.

These condensing units are intended for installation in machines and systems according to the Machinery directive MD 2006/42/EC. They may be put to service only if they have been installed in these systems according to instructions and conform to the corresponding provisions of legislation. For relevant standards please refer to the Manufacturer's Declaration, available at www.emersonclimate.eu.

These instructions should be retained throughout the lifetime of both the compressor and the condensing unit.

You are strongly advised to follow these safety instructions.

1.1 Icon explanation

 <p>WARNING This icon indicates instructions to avoid personal injury and material damage.</p>	 <p>CAUTION This icon indicates instructions to avoid property damage and possible personal injury.</p>
 <p>High voltage This icon indicates operations with a danger of electric shock.</p>	 <p>IMPORTANT This icon indicates instructions to avoid malfunction of the compressor.</p>
 <p>Danger of burning or frost burn This icon indicates operations with a danger of burning or frost burn.</p>	<p>NOTE This word indicates a recommendation for easier operation.</p>
 <p>Explosion hazard This icon indicates operations with a danger of explosion.</p>	

1.2 Safety statements

- Refrigerant compressors must be used in accordance with their intended use.
- Only qualified and authorized HVAC or refrigeration personnel are permitted to install, commission and maintain this equipment.
- Electrical connections must be made by qualified electrical personnel.
- All valid standards for connecting electrical and refrigeration equipment must be observed.
- The national legislation and regulations regarding personnel protection must be observed.



Use personal safety equipment. Safety goggles, gloves, protective clothing, safety boots and hard hats should be worn where necessary.

1.3 General instructions



WARNING

System breakdown! Personal injuries! Never install a system in the field and leave it unattended when it has no charge, a holding charge, or with the service valves closed without electrically locking out the system.

System breakdown! Personal injuries! Only approved refrigerants and refrigeration oils must be used.



WARNING

High shell temperature! Burning! Do not touch the compressor until it has cooled down. Ensure that other materials in the area of the compressor do not get in touch with it. Lock and mark accessible sections.



CAUTION

Overheating! Bearing damage! Do not operate compressors without refrigerant charge or without being connected to the system.



CAUTION

Contact with POE! Material damage! POE lubricant must be handled carefully and the proper protective equipment (gloves, eye protection, etc.) must be used at all times. POE must not come into contact with any surface or material that it might damage, including without limitation, certain polymers, eg, PVC/CPVC and polycarbonate.



IMPORTANT

Transit damage! Compressor malfunction! Use original packaging. Avoid collisions and tilting.

The contractor is responsible for the installation of the unit and should check the following points:

- Sufficient liquid sub-cooling in the line to the expansion valve(s) to avoid "flash-gas" in the liquid line;
- Sufficient amount of oil in the compressor (in case of long piping additional oil must be charged).

2 Product description

2.1 Common information about Copeland OM(T)E & OL(T)E condensing units

Emerson has developed the Copeland large outdoor condensing unit of second generation to meet primarily the demands of the food retail and food service sectors. It is a refrigeration air-cooled condensing unit that uses the latest Copeland™ brand products patented Scroll technology as the main driver and has electronic protection and diagnostics features built in the compact chassis. The combination of large condensers and low speed fans allows for particularly quiet operation.

2.2 EU Ecodesign Directive 2009/125/EC

The European Directive 2009/125/EC with regard to ecodesign requirements for professional refrigerated storage cabinets, blast cabinets, condensing units and process chillers requires manufacturers to decrease the energy consumption of their products by establishing minimum energy efficiency standards. Copeland™ brand products condensing units are prepared and optimized to meet the requirements of the Ecodesign Directive. The integrated variable speed fan and condenser reduce the noise level and energy consumption significantly. This, combined with Copeland scroll technology, allows for high-efficiency operation.

For the rated cooling capacity, rated power input and rated COP value please refer to Copeland™ brand products Select software at www.emersonclimate.eu.

These guidelines meet the requirements of Regulation 2015/1095, Annex V, section 2(a).

2.3 Product range

Copeland large outdoor condensing units are released for multiple refrigerants. They have two cabinet sizes and are equipped with one or two fans. Depending on the compressors in use they are designed for medium temperature or low temperature refrigeration applications.

	Displacement @ 100% [m³/h]	Cooling Capacity* [kW]	Outer Dimensions Length / Width / Height [mm] (with closed cover)	Net Weight [kg]	Power Supply [-]
OMTE-152D-TFD-501	57.6	39.3	2303 / 900 / 1150	490	3/N/PE~50Hz
OLTE-82D-TFD-501	70.6	15.9		500	400/230V TN-S

* for OM with MT standard conditions: to = -10°C ; tamb = 32°C ; suction gas temp = 20°C, R449A

* for OL with LT standard conditions: to = -35°C ; tamb = 32°C ; suction gas temp = 20°C, R449A

Table 1: Product range overview

2.4 Product nameplate

The condensing unit nameplate shows model designation and serial number, as well as locked rotor amps, maximum operating current, safety pressures and weight.

The compressor has its own nameplate with all electrical characteristics.

REFRIGERATION UNIT	
MODEL	OMTE-152D-TFD-501
SERIAL NUMBER	1234567890112
PRODUCTION DATE	YYYYMMDD
POWER SUPPLY	3N/PE-50Hz 400/230V IN S
NOMINAL VOLTAGE	400V
NOMINAL FREQUENCY	50Hz
NOMINAL CURRENT	55A
REFRIGERANT	R449A
REFRIGERANT CHARGE	22.6 / 32 / 32 bar
PS SUCTION / DISCHARGE / LIQUID	
IP CLASS	IPX4
OIL	32-3MAP
APPLICATION	MT
HOLDING CHARGE	0.5bar OVERPRESSURE
EMERSON CLIMATE TECHNOLOGIES, S.R.O. K VÁPENICE 1633/14, 692 01 MIKULOV, CZECH REPUBLIC	

Figure 1: Unit nameplate

2.5 Nomenclature

The model designation contains the following technical information about the condensing unit:

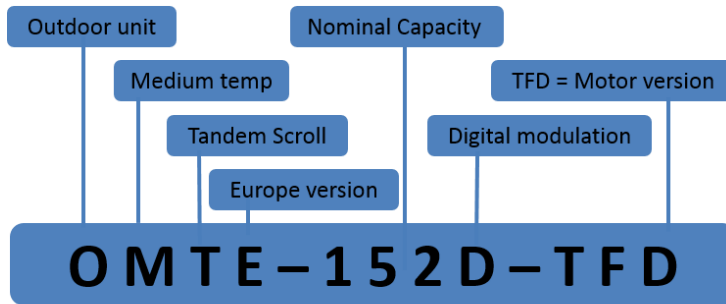


Figure 2: Nomenclature OM & OL units

2.6 Application range

2.6.1 Qualified refrigerants and oils

Qualified refrigerants	R404A, R407A, R407F, R507, R448A, R449A R134a*, R450A*, R513A* (* = Not for OL(T)E)
Qualified servicing oils	Emkarate RL 32 3MAF Mobil EAL Arctic 22CC

Table 2: Qualified refrigerants and oils

Unit name	OMTE-152D-TFD-501		OLTE-82D-TFD-501	
Compressor	ZBD76K5E-TFD-567 & ZB76K5E-TFD-567		ZFD41K5E-TFD-567 & ZF41K5E-TFD-567	
Single compressor oil charge	3.37 liter	3.37 liter	3.37 liter	3.37 liter
Precharge oil separator	3.8 liter		3.8 liter	
Total oil charge of unit	10.54 liter		10.54 liter	

Table 3: Oil charge quantities



WARNING

Use of R450A and R513A refrigerants! Risk of compressor damage!

Migration of R450A or R513A refrigerant into the compressor crankcase could cause low oil viscosity, which could lead to compressor damage. When using R450A or R513A it is critical to meet the following requirements:

- maintain adequate superheat settings with a minimum superheat of 8-10K;
- no liquid refrigerant migration into the compressor at any time, especially during standstill, during or after defrost, or after reverse mode for example in heat pumps;
- pump-down is recommended (not for Digital units);
- the use of a crankcase heater is mandatory;
- retrofit to R450A and R513A is only allowed for compressors which are approved for these refrigerants.

Contact your local Application Engineering representative for any further information.

NOTE: OM(T)E & OL(T)E units are equipped with an oil separator. This separator is pre-charged with 3.8 liter of oil.

2.6.2 Application limits

For application envelopes, please refer to the compressor application envelopes which can be found in Copeland™ brand products Select software, available at www.emersonclimate.eu.

OM(T)E & OL(T)E condensing units can be used with an ambient temperature from -15°C to 45°C. For lower ambient temperatures please contact your local Application Engineering representative.



WARNING

Compressor breakdown! Oil dilution due to low superheat! Low suction superheat leads to oil dilution. Always operate the system with adequate superheat to avoid viscosity decrease of the oil. Additional measures in system design might help to avoid unacceptable lubrication conditions.

2.7 Main component description

2.7.1 Bill of material 501 – general description

OM(T)E & OL(T)E units have the bill of material 501. In general, those kind of units have an air cooled condenser with 2 EC-fans for condensing temperature control.

A Tandem set of 2 Scroll-compressors (ZB** for OM unit, ZF** for OL unit) provides the required cooling capacity. One of this compressor is always a Digital Scroll, which allows modulation to very low part load conditions. Both compressors are equipped with a high efficient sound shell for best sound performance.

An oil management system with oil separator, oil reservoir and oil injection devices secure sufficient compressor oil levels.

Electronic controller XCM-25D is taking care for suction pressure regulation, fan speed control in standard & heat recovery condition, as well as for system safety.

The main safety features provided by the unit: Compressor oil level control, discharge temperature protection, voltage sensing, refrigerant charge level control & high and low pressure safety.

2.7.2 Housing

Large outdoor condensing units OM(T)E & OL(T)E with BOM 501 have additional housing features:

- New designed E-Box, accessible over hinged cover, adjustable in 2 steps (45° & 90°)
- Service friendly accessible compressor chamber
- Service friendly accessible liquid receiver/filter drier/sight glass area
- Easy cleaning of condenser section

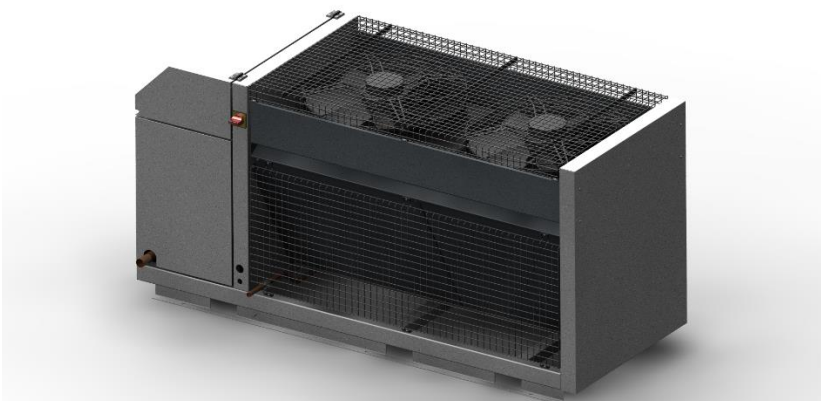


Figure 3: OM(T)E & OL(T)E unit housing

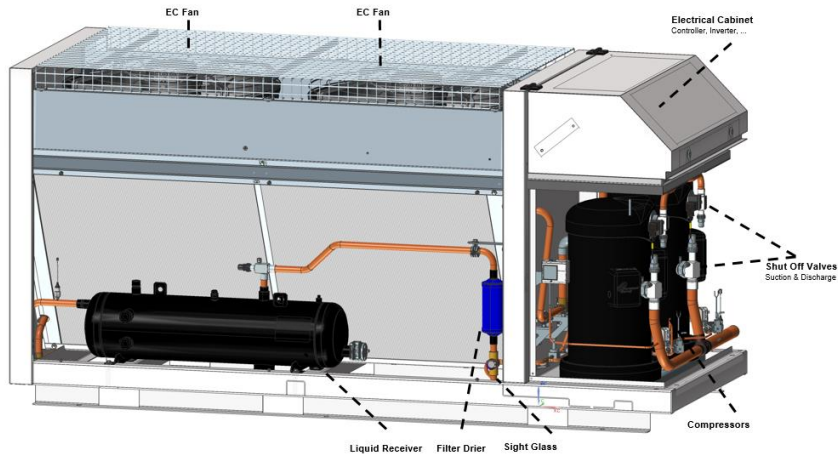


Figure 4: Main components

2.7.2.1 Access inner part of condenser

Side panel can be removed only when the unit is turned off. To remove the side panel unscrew 3 screws below condenser first continue to unscrew all remaining screws from outside then remove the cover by lifting

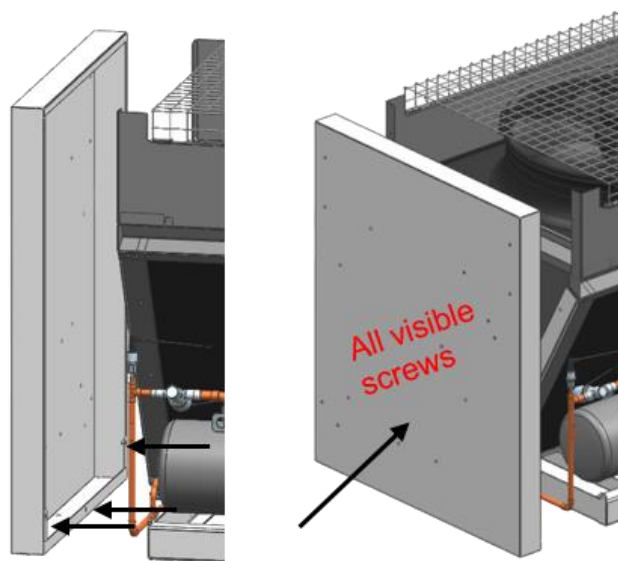


Figure 5 : Open condenser segment

2.7.3 Compressor

Unit	Digital Scroll	Standard Scroll
OMTE-152D-TFD-501	ZBD76K5E-TFD-567	ZB76K5E-TFD-567
OLTE-82D-TFD-501	ZFD41K5E-TFD-567	ZF41K5E-TFD-567

Table 4: Compressor model overview

2.7.3.1 Access compressor compartment

The units allow easy access to all main components:

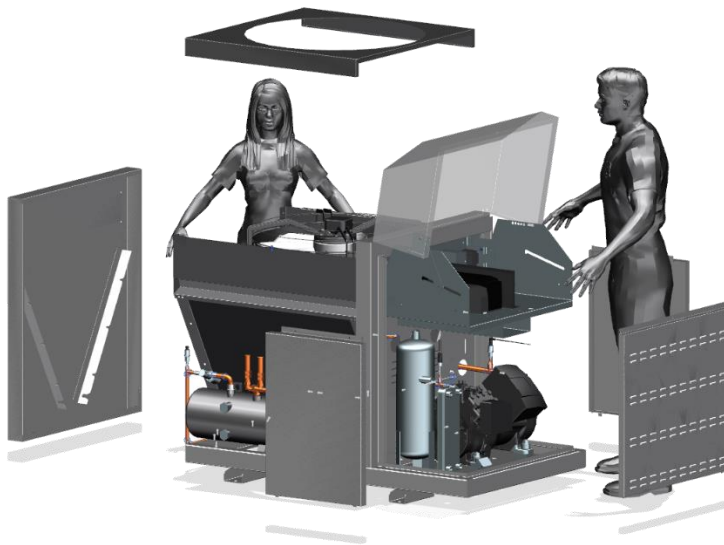


Figure 6: Accessibility main components

Opening of compressor chamber – unscrew two screws located on the top of compressor chamber cover and unplug green/yellow grounding cable by pulling and remove the cover by lifting

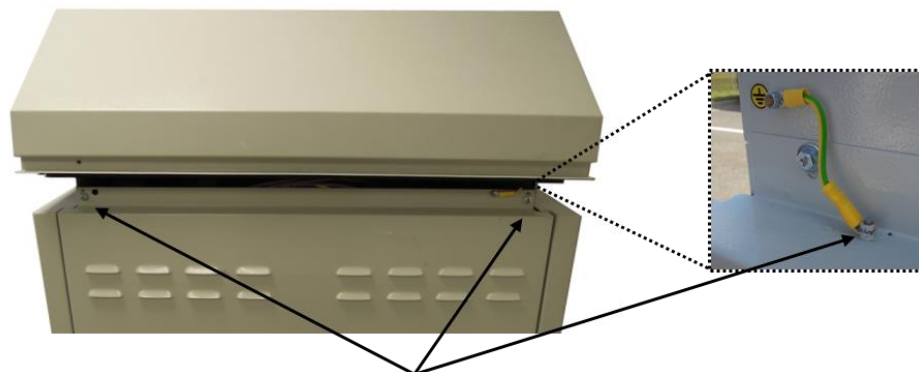


Figure 7 : Open compressor compartment

2.7.4 Condenser fan(s)

The condensers of the OM(T)E & OL(T)E condensing units are equipped with electronically commutated (EC) external rotor motor with integrated EC controller

- Integrated motor contactor, active temperature management
- Interference emissions EN 61000-6-3
- Interference immunity EN 61000-6-2
- Protection rating IP20, IP54
- Approvals: UL
- Satisfies IE4 (IEC60034-31) efficiency class
- Extremely energy efficient as a result of EC technology
- Compact, modular design
- Straightforward installation and commissioning
- Flexible customer interface, easy to expand
- UL approval in the standard

The fan type on OM(T)E & OL(T)E condensing units is FN071-ZIQ.DG.V7P3.

2.7.4.1 Access the fans

Removing safety Grid of fan – Grid can be removed only when the unit is turned off. To remove the grid unscrew 6 screws located on the grid and remove the grid by lifting

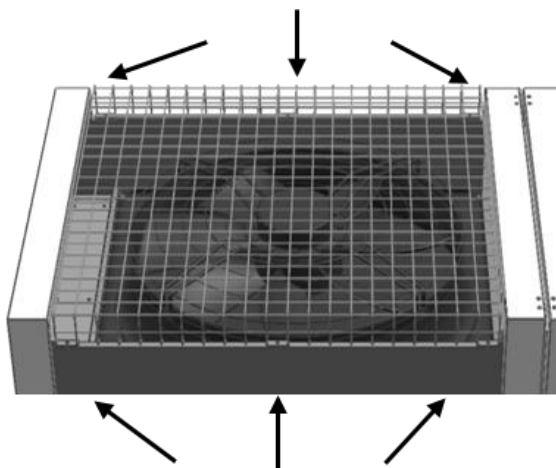


Figure 8 : Open fan safety grid

2.7.5 Electrical cabinet

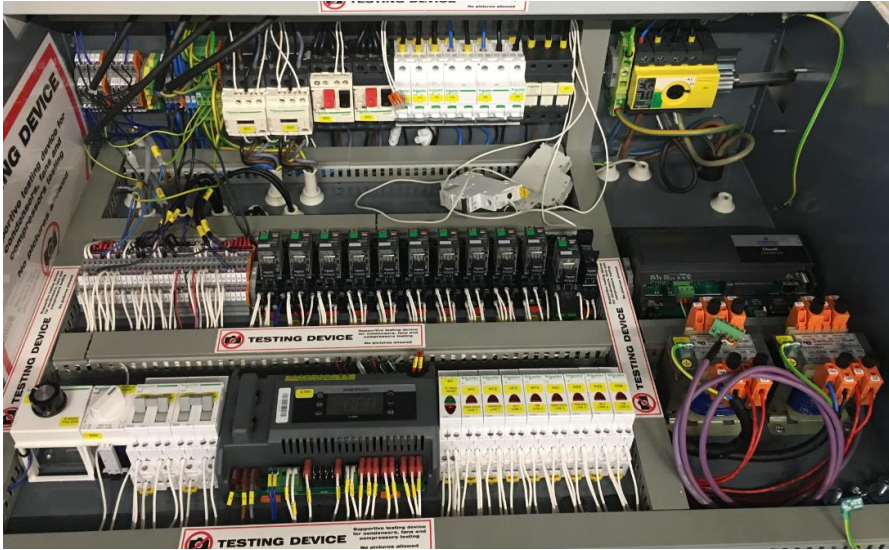


Figure 9: Electrical cabinet

2.7.5.1 Access electrical cabinet

For servicing & maintenance it's necessary to open the unit housing at some time:

Opening of electrical cabinet – release the lock located on both sides of electrical cabinet and open the cover up

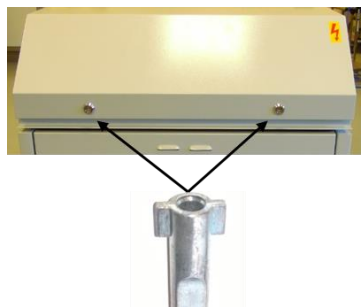


Figure 10 : Open electrical cabinet

2.7.6 P&I diagram for OM(T)Q units

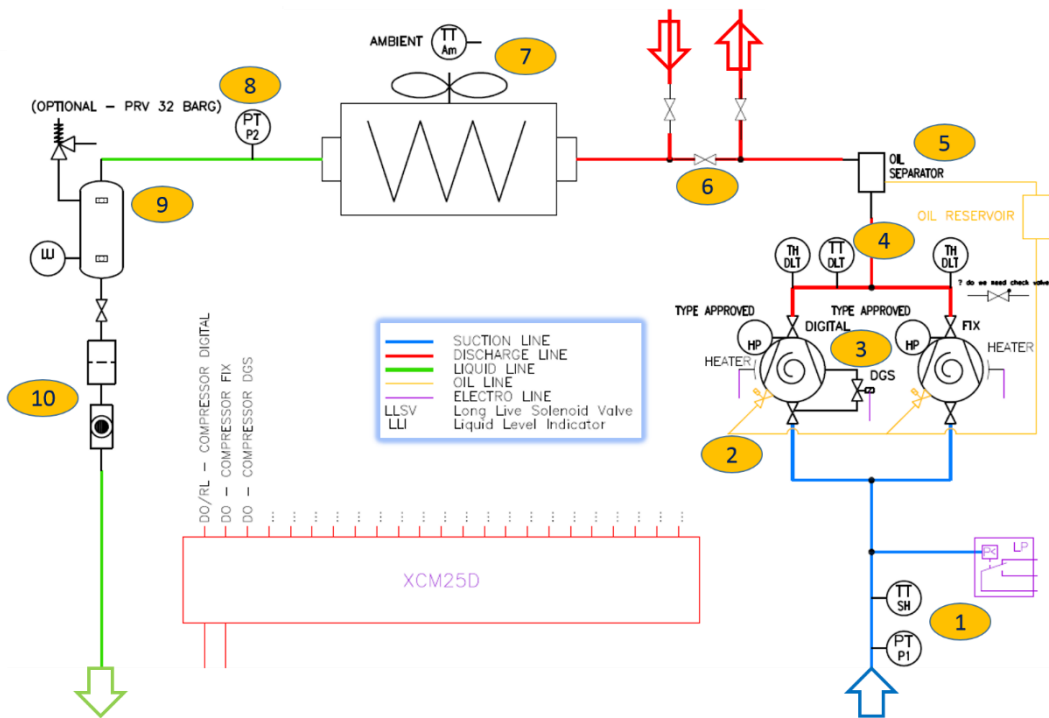


Figure 11: P&I diagram for OM(T)E units

Position	Description	Comments
1	PT P1 Pressure transmitter suction	PPR15
1	TT SH Temperature Sensor suction inlet	
1	LP Mechanical Low Pressure switch PS1 (PSL)	Emergency Mode
2	TraxOil for active oil management	2 x OM30-N30
3	Tandem Set ZBD76 & ZB76, with crankcase heater 230V & type approved HP cut outs (PSH)	2 x PS3-N15
4	TH DLT Discharge line thermostat (2 pieces)	2 x # 8615262
4	TT DLT Discharge line temperature sensor	NTC 86k
5	Oil separator CARLY	R47009S
5	Oil reservoir	
6	Optional connection for Heat recovery	
7	Air cooled condenser with ambient temperature sensor	NTC 10k
8	Liquid Line pressure transmitter	PPR30
9	Liquid receiver with TraxOil Level watch	LW4-L120 Alco
10	Filter drier & sight glass combination	

Table 5: Legend of the P&I diagram for OM(T)E units

2.7.7 P&I diagram for OL(T)Q units

IMPORTANT

Absence of insulation on the liquid line in OL(T)E units! Air moisture condensation and lack of performance! Moisture will condensate on the liquid line and cause water droplets. The liquid line can pick up additional heat from the ambient which will adversely affect the sub-cooling desirable for the liquid refrigerant before it enters the expansion valve. Both the suction and liquid interconnecting piping between the OL(T)E unit and the evaporator should be insulated to avoid condensation.

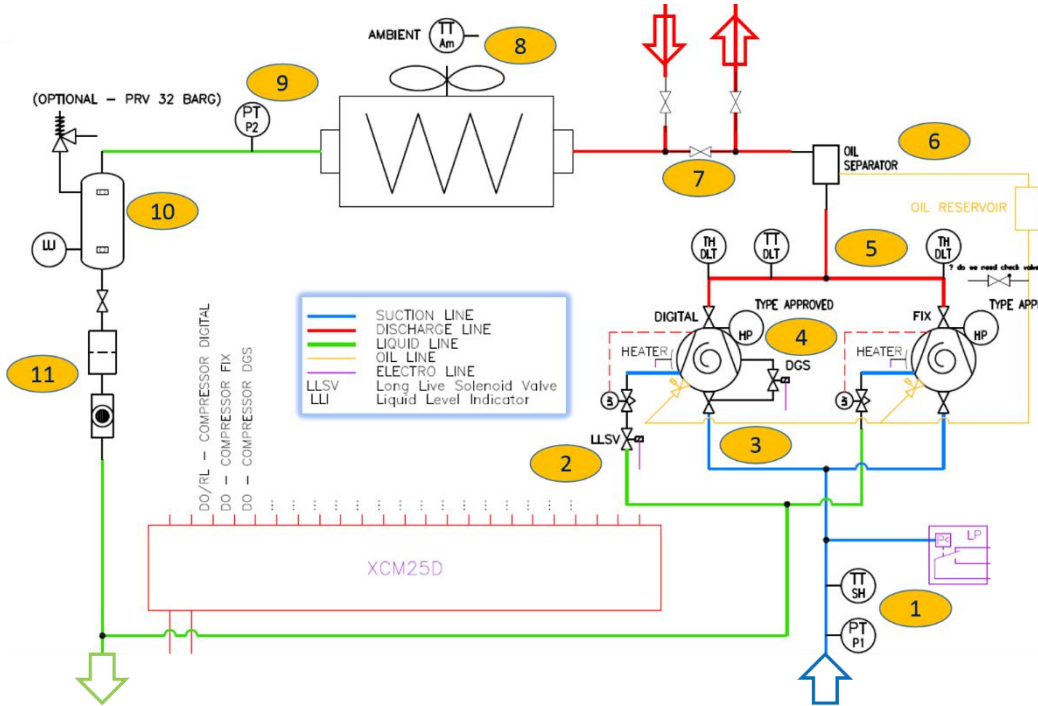


Figure 12: P&I diagram for OL(T)E units

Position	Description	Comments
1	PT P1 Pressure transmitter suction	PPR15
1	TT SH Temperature Sensor suction inlet	
1	LP Low Pressure switch (PSL), also used in rescue mode	PS1-W3U
2	Liquid injection cycle, LLSV = Solenoid valve liquid line (digital)	
2	Liquid injection cycle, LIV = Liquid injection valve	
3	TraxOil for active oil management	2 x OM30-N30
4	Tandem Set ZFD41 & ZF41, with crankcase heater 230V & type approved HP cut outs (PSH)	2 x PS3-W6S
5	TH DLT Discharge line thermostat (2 pieces)	2 x # 8615262
5	TT DLT Discharge line temperature sensor	NTC 86k
6	Oil separator CARLY	R47009S
6	Oil reservoir	
7	Optional connection for Heat recovery	
8	Air cooled condenser with ambient temperature sensor	NTC 10k
9	Liquid Line pressure transmitter	PPR30
10	Liquid receiver with TraxOil Level watch	LW4-L120 Alco
11	Filter drier & sight glass combination	

Table 6: Legend of the P&I diagram for OL(T)E units

2.8 XCM25D Electronic controller – Features

The XCM25D controller is designed to be a powerful, flexible controller for use in multiple applications. It has been developed for condensing units and allows the adjustment of all relevant parameters by the user.

2.8.1 Description



WARNING

Electrical shock hazard! Serious personal injuries! There are unused fast-on pins (C1 & DO2) on the XCM25D which could be under voltage. They are covered by insulated fast-on flags in the factory. Handle carefully when removing insulating flags during service on site.

The controller is designed for usage in an outdoor refrigeration unit. It is rated to be used for the following environment:

- Outdoor controller ambient temperature for operation: -40°C to 60°C
- Ambient temperature for storage: -40°C to 80°C
- Maximum humidity: 90% at 48°C (non-condensing)
- Board power: 24V AC +15%/-20%
- Voltage sensing capabilities - Single phase: 100-120, 200-240V AC \pm 10%
- Voltage sensing capabilities - Three phase: 200-240, 380-460, 575V AC \pm 10%

The units of measure are selectable. The factory default unit is [bar] (always considered relative) for pressure and [°C] for temperature.



Figure 13: Electronic controller

2.8.2 Functionality

The controller allows for easy commissioning by the technician with the factory settings at the highest program level. It also offers the possibility to make substantial changes to the system optimization in further programming levels. Advanced functionality can also be activated.

The following functions are covered by the controller:

- Condensing unit control, including tandem management
- Condenser fan control
- Voltage and current sensing (compressor protection)
- Liquid injection
- Digital compressor control

NOTE: The XCM25D controller on the OM & OL units includes all the functions necessary for unit control. For additional functionalities please contact your local Application Engineering representative.

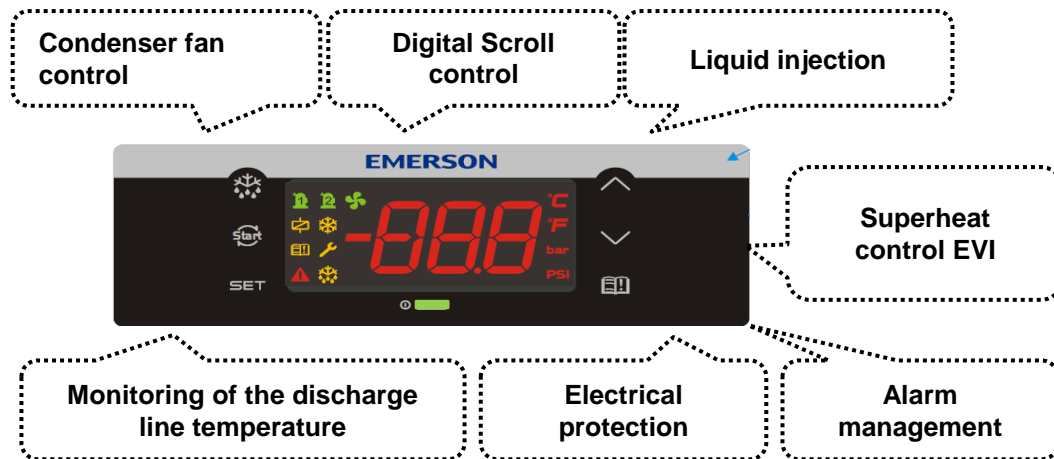


Figure 14: XCM25D controller functionality overview

2.8.3 Main control & safety features

Suction pressure control: Each unit is equipped with a suction pressure transmitter. The XCM25D controls the suction pressure by evaluating the input signal of the pressure transmitter. The suction pressure regulation for OM(T)E or OL(T)E units has to be defined by the setpoint (**C16**) and proportional band (**C17**). The signal of the suction pressure transmitter is also used for additional functionalities, pump-down and keeping the compressor running within the approved envelopes.

Condensing pressure control: Each unit is equipped with a high-pressure transmitter. The XCM25D controls the condensing pressure by regulating the fan speed corresponding to the ambient temperature. The unit controller regulates the condensing pressure with a constant temperature difference to the ambient (“floating HP” ; factory setting **E66** = 8K).

Different control options are available. As soon as fan modulation is enabled (E01 = “2-Modulated fan”) the parameter **E38** allows to choose “floating HP” (factory setting) or control of condensing temperature inside compressor envelope. In this mode, the compressor can run different minimum condensing temperatures based on the suction pressure of the compressor. This is the most energy efficient way to minimize the condensing temperature as much as possible. But it means also that the fan is running full speed more often than in floating HP mode.

Automatic liquid injection on OL(T)E: A mechanical injection valve allows liquid refrigerant to be injected into the scroll set of the compressor to reduce discharge temperatures generated when the unit operates at increasing compression ratios. There is a bulb on each compressor top cap connected to the injection valve which allows individual regulation for each compressor. On Digital models a solenoid valve is energized in parallel to the digital modulation solenoid valve to avoid injection during part load conditions. The discharge line protection is realized by help of discharge line thermostats (S3 / S4 ; Klixon), installed directly on the discharge pipe.

Compressor phase reversal: Ensures that the compressors keep running in one direction only (clockwise = right rotation) – necessary for a compliant Scroll compressor to compress and pump refrigerant. Reset is automatic once the phase rotation is correct for the compressor.

Motor current overload protection: The motor current overload protection is realized by adjustable motor circuit breaker Q02 & Q03

Fixed high-pressure switches: This is a non-adjustable protection device designed to prevent the compressor from operating outside of its safe high pressure range. Reset is automatic.

- OL(T)E & OM(T)E models: 28.8 bar cut-out / 24 bar cut-in.

The high pressure cut out device is in the same safety chain like the discharge line thermostat. The alarm provided by the XCM-25D does not indicate if it is high pressure or high discharge temperature alarm.

Adjustable high pressure limitation: The unit controller provides the possibility to stop the unit at a required discharge pressure which is lower than the cut-out value of the fixed high-pressure switch. High alarm value can be adjusted by parameter **E58**.

Discharge temperature protection: Each unit is equipped with a discharge line thermostats (DLT). The DLT's are in the same safety chain like the high pressure cut out switches and a common alarm. Each compressor has its own safety chain.

Adjustable low pressure alarm: The unit controller features an adjustable low pressure alarm managed by the suction pressure sensor. The factory setting of this alarm is the lowest permitted pressure of the refrigerant with the lowest pressure-vapor properties. If needed the user can modify this value per the required application.

- OM(T)E models: 0.8 bar rel
- OL(T)E models: 0.3 bar rel

Option: Adjustable low-pressure switches PS1: This device protects the system against low pressure operation. It must be adjusted depending on running conditions and potential special requirements. The compressor envelopes published in Select must be respected always. In case of controller breakdown, the low-pressure switch is used for emergency operation (prewired rescue mode components)

A crankcase heater is directly connected to the controller. The crankcase heater will be energized when the ambient sensor is below a given value (10°C) and the compressor has been off for a period of time (5 minutes). The minimum off time does not apply at initial power up.

In addition to the above, the condensing unit has the following features:

- Liquid line assembly (filter drier and sight glass/moisture indicator)
- Anti-corrosion treatment to the condenser fins

2.8.4 Emergency mode

In case of controller malfunction, the unit provides an emergency operation mode. The controller will be completely by-passed and the system will continue to run based on low pressure switch (S7) cycling. The functionality of the high-pressure protection devices (S1 & S2) remain active for safety.

NOTE: The low-pressure switch S7 in standard configuration is used as a safety device. When activating the emergency running mode the cut in & cut out set points need to be adjusted according to application requirement!

2.8.4.1 Functionality:

Rescue mode can be activated by swapping the “rescue mode switch”.

There are 2 circuit breakers (S11 / S12) to activate the compressors (Digital model will perform like fixed speed model (=100% capacity)). In emergency mode, the system operator needs to decide if one or two compressors should be activated to provide sufficient cooling capacity. Switching of one of the 2 compressors by help of S11 or S12 will divide in half the cooling capacity. A time delay can be adjusted by help of relay K42 to avoid compressor cycling in rescue mode (Factory setting = 10 minutes). If 2 compressors are activated in rescue mode (S11 & S12) both compressors are always running in parallel. Also, the time delay is always applied to both compressors in parallel.

The control of the compressors is done by low pressure switch S7. In standard operation mode, the S7-switch is used as a safety device. In rescue mode, the settings must be adjusted to installation needs. The time delay for the compressor starts as soon the cut in value of S7 is reached. After time delay the active compressor (or both) will run with 100% cooling capacity until low pressure cut out value S7 is reached and compressor(s) will stop.

The 2 fans are automatically activated with the rescue mode switch. A potentiometer allows adjustment of fan speed (both in parallel). The fan adjustment must be done in a way that also during high ambient the condensing temperature does not exceed the acceptable limits. Be careful when reducing speed because of sound reasons. Risk of high pressure cut outs when ambient temperature increases.

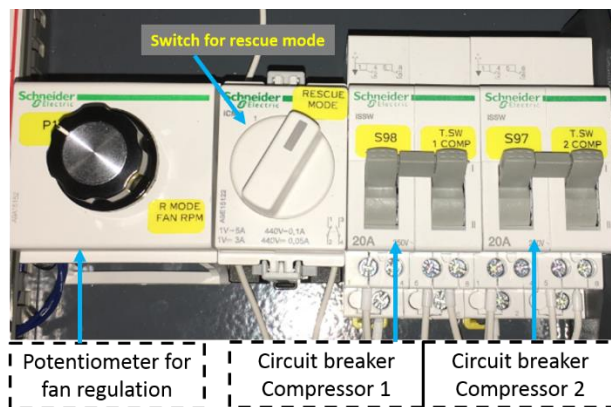


Figure 15: Rescue mode activation

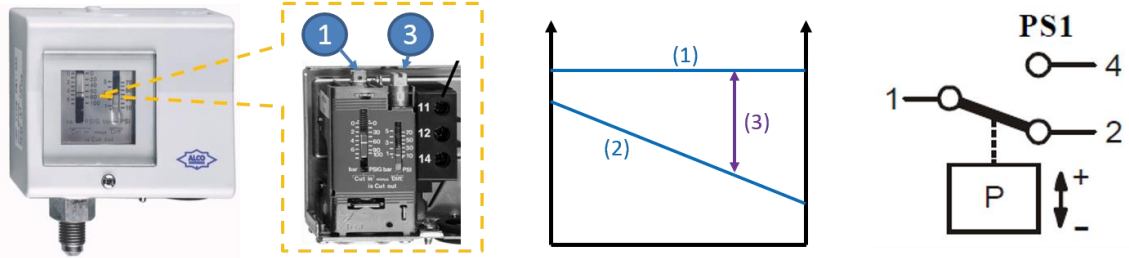
2.8.4.1.1 PS1 – Setpoint adjustment low pressure switch

There is a pressure limiter for low pressure protection installed.

This device is designed per EN12263 and has an automatic reset.

In emergency mode, the PS1 is taking over the control of the suction pressure regulation. It should be adjusted per the application needs from case to case. The factory settings of the low-pressure limiter are defined for safety purposes, not for emergency operating conditions.

Upper setpoint [bar] (1)	-0.5 ... 7
Differential Setpoint (3)	0.5 ... 5
Lowest Setpoint [bar]	-0.9
Factory Setting [bar]	3.5 / 4.5
Leakage Test pressure [bar]	24
Connection port	Solder 6mm



1. Upper Setpoint range spindle
2. Lower Setpoint
3. Differential spindle = variable

- PS1/PS2 pressure switches come with individually adjustable differential
- Use a flat screw driver or a 1/4" refrigeration (square) wrench to adjust setpoints
- Adjust upper setpoint (1) using the range spindle (1).
- Adjust lower setpoint (2) by turning the differential spindle (3).

2.8.5 Heat recovery mode - optional

The OM(T) & OL(T)E units are prepared for heat recovery. There are some preassembled tubes with shut of valves to connect an external heat exchanger for desuperheating. The unit controller is also prepared for heat recovery. A digital input signal (**DI3** / R07) is required to inform the controller about demand. As soon as there is a demand for heating, the controller will swap the logic for fan speed from floating HP to a fix condensing temperature set point. The heat recovery condensing fan set point can be adjusted by parameter **E67**. The control of water cycle must be done by third party controller. This controller must provide the digital input signal to the XCM-25D controller.

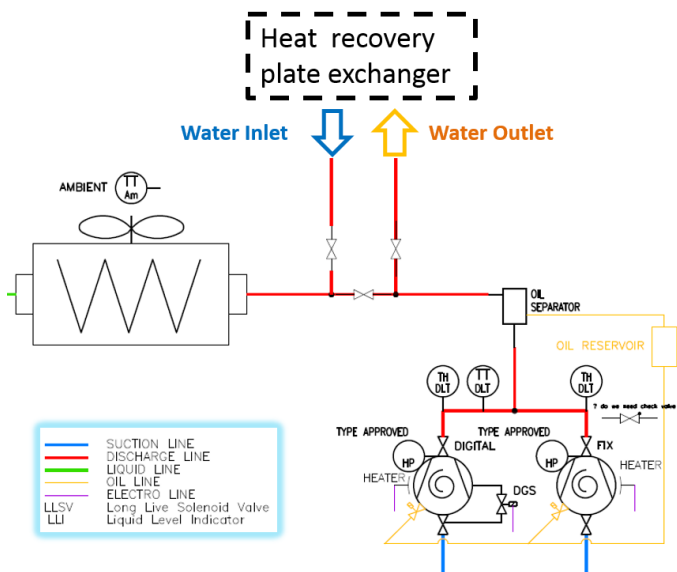


Figure 16: Heat recovery implementation

2.9 XCM25D Electronic controller – Programming



CAUTION

Low refrigerant charge! Compressor damage! Never energize the unit/controller without minimum refrigerant system charge. There is a risk of malfunction of the controller in deep vacuum operation which can cause compressor damage.

2.9.1 Programming the local display

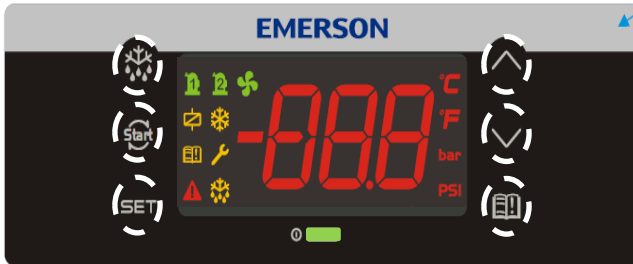


Figure 17: Local display

LED	Mode	Function
	On	Compressor 1 enabled
	Flashing	Anti-short cycle delay enabled
	On	Condensing fans enabled
	On	Bar display
	Flashing	Programming mode
	On	PSI display
	Flashing	Programming mode
	On	When browsing the service menu
	Flashing	In fast access menu
	On	When browsing the alarm menu
	Flashing	A new alarm occurred
	On	An alarm is occurring
	On	Digital unloader solenoid On
	On	In defrost
	On	Evaporator fans - Liquid line solenoid valve On

Table 7: LED functions description

NOTE: By default, the local display will show the value of the suction pressure during operation. This can be changed by choosing another value for parameter B03 (Remote Display visualization).

Setting for B03	Value shown on the display	Comments
0	P1 value = Suction pressure	
1	P2 value = Mid-coil temperature (condenser)	
2	P3 value = Discharge line temperature	
3	P4 value = Vapour inlet EVI	Not available
4	P5 value = Vapour outlet EVI	Not available
5	P6 value = Ambient temperature	
6	P7 value = Not used in factory setting	
7	PEr value = Probe error	
8	Aou value = Analogue output	

Table 8: Display visualisation

2.9.2 Remote display CCM60

This device allows for remote monitoring and control of the XCM25D controller via cable. The CCM60 has the same interface as the unit controller therefore the commands and symbols are identical to those of the XCM25D controller. The remote display shall be mounted on a vertical panel, in a 29 x 71 mm hole, and secured using the special bracket supplied (see **Figure 11**).

The temperature range allowed for correct operation is 0°C to +60°C.

Avoid places subject to strong vibrations, corrosive gases, excessive dirt or humidity. Allow for air to circulate through the cooling holes.

When front mounted the remote display is IP65 rated.

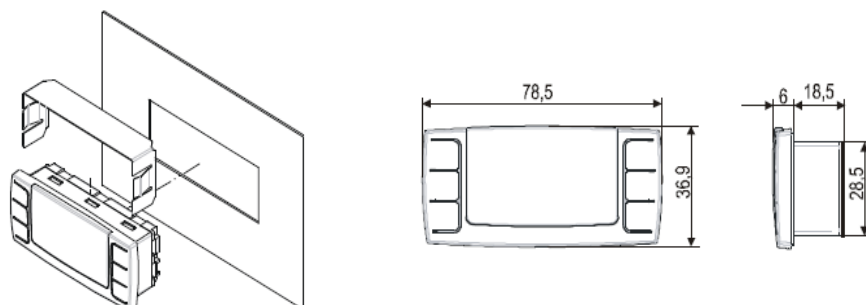


Figure 18: Remote display front panel mounting

The remote display is a proprietary bus of communication for Dixell HMI (x-rep, CCM60) interfaces. There are two connection terminals on the back of the remote display (+ and -).

NOTE: Emerson recommends to use a shielded cable twisted pair 2 x 0.5mm².

The device must be connected to the VNR-terminal on the unit controller according to the polarity. **Figure 12** shows the VNR terminal on the unit controller.

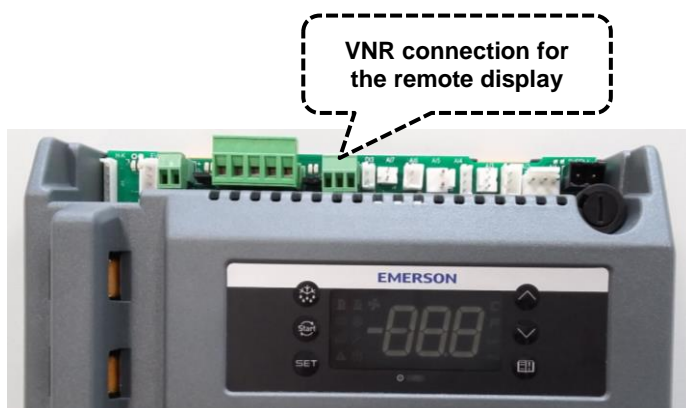


Figure 19: VNR connection for the remote display

Before connecting cables make sure the power supply complies with the hardware requirements. Separate the terminal cables from the power supply cables, the outputs and the power connections.

2.9.3 Single commands







	Press the SET button to display the target setpoint. In programming mode, this allows to select a parameter or to confirm an operation.
	Press the RESET button and hold for 5 seconds to reset any lockouts if the current state of the controller allows for it to be reset.
	(UP) To view the fast access menu. In programming mode, this browses the parameter codes or increases the displayed value.
	(DOWN) In programming mode, this browses the parameter codes or decreases the displayed value.
	(SERVICE) To enter the service and alarm menu.
	Hold for 3 seconds to start a manual defrost or terminate an active defrost.

Table 9: Single commands

2.9.4 Double commands – Entering programming level 1 "Pr1"




	Press simultaneously for about 3 seconds to lock (PoF) or unlock (Pon) the keyboard.
	Press simultaneously to leave the programming mode or menu. On submenus rtC and EEV this combination allows to go back to the previous level.
	Press simultaneously for about 3 seconds to access the first level of programming mode.

Table 10: Double commands

The device provides 2 programming levels:

- **Pr1** with direct access
- **Pr2** protected with a password (intended for experts)

2.9.5 How to program the parameters (Pr1 and Pr2)
















Access pre-program level		Press simultaneously for about 3 seconds to access the pre-programming level. The message rtC (real time clock) appears.
Access program level	 or 	Press the Up or Down key until the message Par appears.
Access Pr1		Press the SET button to enter the program level. First parameter C01 appears.
Select item	 or 	Select the parameter or submenu using the arrows.
Show value		Press the SET button.
Modify	 or 	Use the arrows to modify the value.
Confirm and store		Press the SET button: the value will blink for 3 seconds, then the display will show the next parameter.
EXIT		Press simultaneously to exit the programming mode, or wait for 30 seconds (MTO) without pressing any key.





Table 11: Programming level 1 parameters

When entering the programming level for the first time the display will show the **rtC** (real time clock) label.

- Press  to access parameters N01/02/03/04/05 to adjust time & date. For further details, see Chapter 2.12, "Parameters level 1 – Required settings".
- Press  or  to change from the **rtC** label to the **Par** label, in order to access the programming level 1.
- Press : the parameters of programming level 1 can be changed.

2.9.6 Entering programming level 2 "Pr2"

To enter the Pr2 programming menu:

- Press **SET** +  simultaneously for 3 seconds. The first parameter label will be displayed.
- Press  till the **T18** label is displayed, then press the **SET** key;
- The blinking **PaS** label will be displayed; wait for a few seconds;
- The display will show "**0 - -**" with blinking 0: insert the password [**321**] using the  and  keys and confirming with the **SET** key.

2.9.7 Fast access menu

This menu contains the list of probes and some values that are automatically evaluated by the board such as the superheat and the percentage of valve opening. **nP** or **noP** stands for "probe not present" or "value not evaluated", **Err** means "value out of range", "probe damaged, not connected or incorrectly configured".







Entering fast access menu		Press and release the UP arrow. The duration of the menu in case of inactivity is 3 minutes. The values that will be displayed depend on the configuration of the board.
Use the  or  arrow to select an entry, then press SET to see the value or to go on with another value.		<ul style="list-style-type: none"> ▪ P1P: Pressure value of the P1 probe (suction pressure) ▪ P2t: Temperature value of the P2 probe (not valid) ▪ P2P: Pressure value of the P2 probe (discharge pressure) ▪ P3t: Temperature value of the P3 probe (discharge line temperature) ▪ P4t: Temperature value of the P4 probe (vapour in only for OL(T)E) ▪ P5t: Temperature value of the P5 probe (vapour out only for OL(T)E) ▪ P6t: Temperature value of the P6 probe (ambient temperature) ▪ P7t: Temperature value of the P7 probe (free) ▪ SH: Value of superheat. nA = not available ▪ oPP: Percentage of step valve opening. ▪ LInJ: Status of the liquid line solenoid ("On" – "Off"). This information is available only if one relay is set as "Liquid Line Solenoid". ▪ SEtd: Value of the dynamic setpoint (condenser fan SET). This information is available only if the dynamic setpoint function is enabled. ▪ AOO: Percentage of the analogue output (0-10V or TRIAC PWM Mod.). This information is available only if the 0-10V or TRIAC PWM Mod. is enabled. ▪ dStO: Percentage of the PWM output driving the valve of the Digital Scroll compressor. ▪ L°t: Minimum room temperature. ▪ H°t: Maximum room temperature. ▪ HM: Menu.
Exit	SET + 	Press simultaneously or wait for the timeout of about 60 sec.



Table 12: Fast access menu

2.10 Controller keyboard

2.10.1 How to lock the keyboard

Keep the  and  keys pressed simultaneously for more than 3 seconds. The "PoF" message will be displayed and the keyboard will be locked. At this point it is only possible to see the setpoint or the maximum or minimum temperatures stored. If a key is pressed for more than 3 seconds, the "PoF" message will be displayed.

2.10.2 How to unlock the keyboard

Keep the  and  keys pressed simultaneously for more than 3 seconds, till the "Pon" message is displayed.

2.11 Parameters level 1 – Required settings

The XCM25D is preconfigured to reduce the required settings on job-site to a minimum. In most cases it will not be necessary to enter programming level 2 "Pr2". **Table 20** gives an overview of the parameters available in programming level 1 "Pr1".

Code	Description	Range	MT	LT
C07	refrigerant Selection for Regulation	R404A(0-404) - R507(1-507) - R134A(2-134) - R22(3-R22) - R407C(4-07C) - R407A(5-07A) - R407F(6-07F) - R448A(48A) - R449A(8-49A) - R410A(9-410)	8-R449A	8-R449A
C16	Digital compressor set point	C03 to C04	2.8	0.3
C17	Proportional band for compressor regulation	0.1 to 9.9 bar; 0.1 to 99.9 PSI; 1 to 999KPA; 0.1°C to 25.5°C; 1°F to 45°F	2.0	1.0
C21	Cycle time for digital compressor	10 to 40 sec	10	10
C24	Minimum capacity for digital compressor	0 to C25	20	10
E62	Maximum fan motor speed	30 to 100%	100	80
E66	Delta temperature condenser Floating set point	0.0 to 25.5°C; 0 to 45°F	14	8
T18	Enter into PR2 level	[0÷999]	3 2 1	3 2 1

Table 13: Parameters in programming level Pr1

NOTE: The full list of parameters in programming level "Pr2" can be found in Appendix 3.

2.12 Pump-down – General



CAUTION

System pressure below atmospheric pressure! Compressor damage!

Never operate the system below atmospheric pressure. There is a risk of malfunction of the controller in deep vacuum operation which can cause compressor damage.

Pump-down functionality is not provided by the XCM25D controller for condensing unit models OM(T)E & OL(T)E only.

2.12.1 Digital operation

A Digital unit is able to operate in a part-load mode. Part-load operation is achieved by loading and unloading of the Digital scroll compressor for certain periods of time (time cycles). The cycle of time can be chosen between 10 and 30 seconds. Example: if the time cycle is 20 seconds at 50% of capacity request, the compressor will run for 10 seconds loaded and 10 seconds unloaded. For proper commissioning of the Digital unit the following diagram must be considered:

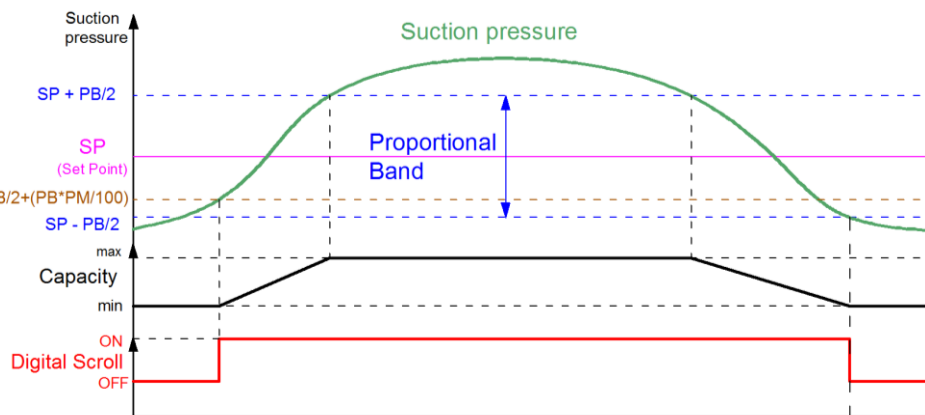


Figure 20: Digital operation

The regulation starts when the suction pressure (**AI1**) increases and reaches the value $(SP - PB/2 + (PB \cdot PM)/100)$ or $(C16 - C17/2 + (C17 \cdot C24)/100)$. Within the adjustment range $(SP - PB/2 \sim SP + PB/2)$ or $(C16 - C17/2 \sim C16 + C17/2)$ the Digital scroll compressor is activated in PWM mode in accordance with the value of the control variable.

When the pressure is higher than $(SP + PB/2)$ or $(C16 + C17/2)$ then the TRIAC output is at maximum capacity. When the pressure is lower than $(SP + PB/2)$ or $(C16 + C17/2)$ but higher than $(SP - PB/2)$ the Digital Scroll compressor modulates the capacity according to the proportional band. If the pressure is lower than $(SP - PB/2)$ or $(C16 - C17/2)$ the Digital Scroll compressor switches off.

NOTE: When the digital valve on the compressor is deenergized the compressor is loaded.

NOTE: At start-up the valve is energized for C20 start-up time, i.e., time interval with the digital valve energized before regulation starts. It ranges from 0 to 10 seconds (factory setting = 5 seconds).

2.13 Reset to factory settings – Emerson "Hot Key"

2.13.1 How to save factory settings or user settings

There is no way to reset the XCM25D controller to factory settings other than with additional equipment. Emerson recommends to use the Emerson "Hot Key" (not part of the standard delivery) to save the factory settings at initial power up. The same hot key can also be used to save user settings.

By means of a special programming software (Emerson Wizmate) and corresponding hardware (Emerson Prog-Tool), the user can:

- preprogram hot keys
- copy hot keys
- change parameter levels
- compare parameter lists

For further information please visit our website at www.emersonclimate.eu or contact your local Application Engineering representative.

2.13.2 Applicable hot key for OM & OL units with XCM25D controller

The Emerson "Hot Key" **DK00000300** can be used for uploading and downloading of parameter lists. Copeland ident number 3226456.



Figure 21: Emerson "Hot Key"

2.13.3 Location of the "Hot Key" plug connection on the XCM25D controller

The "Hot Key" plug connection is located on the upper left corner of the XCM25D.

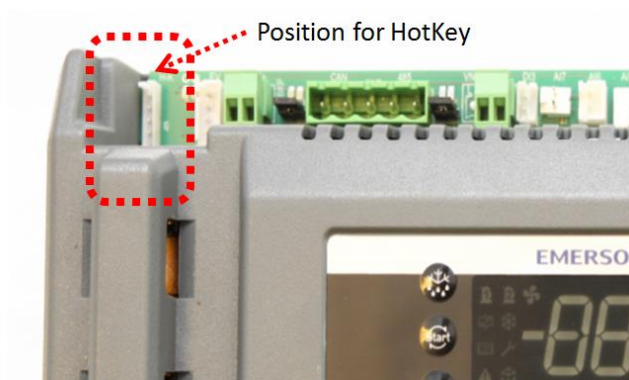


Figure 22: Location of "Hot Key" plug connection

2.13.4 How to program a "Hot Key" from the controller (upload)

- Program one controller with the front keypad.
- When the controller is on, insert the "Hot Key" and press the **UP** key; the "uPL" message appears followed a by a flashing "End" label.
- Press the **SET** key and the "End" label will stop flashing.
- Turn the controller off, remove the "Hot Key" and then turn it on again.

NOTE: The "Err" message appears in case of a failed programming operation. In this case push the key again if you want to restart the upload or remove the "Hot Key" to abort the operation.

2.13.5 How to program a controller using an Emerson "Hot Key" (download)

- Turn the controller off.
- Insert a pre-programmed "Hot Key" into the 5-pin receptacle and turn the controller on.
- The parameter list of the hot key will be automatically downloaded into the controller memory. The "doL" message will blink followed a by a flashing "End" label.
- After 10 seconds the controller will restart working with the new parameters.
- Remove the "Hot Key".

NOTE: The message "Err" is displayed in case of a failed programming operation. In this case turn the unit off, then on again if you want to restart the download, or remove the "Hot Key" to abort the operation.

2.14 Troubleshooting – Alarm history

The controller records the total number of alarm activations (max 50) in the alarm menu (see **Appendix 4**).























Action	Key or display	Notes
Enter menu		Push and release the ALR key.
Waiting for action	SEC	The menu to change the section will be entered. The alarm list section is active.
Enter section list		Press SET to confirm. The following list will be available to select the proper network function.
Select active alarm code from list	 or 	Scroll the list of active alarms by alarm number (letter + number, A01-A50). Press  to see the alarm name or code. Press  to see the next active alarm.
Select the alarm to see the detailed rtC information		Enter the sub menu with alarm time details.
Select detailed information from active alarm list	 or 	<p><u>With the rtC activated:</u> The Hur (hour) parameter is displayed. Press  to see the alarm hour. Press : Min is displayed. Press  to see the alarm minute. Press : dAy is displayed. Press  to see the alarm day. Press : MOn is displayed. Press  to see the alarm month. Press : YEA is displayed. Press  to see the alarm year.</p> <p><u>Note:</u> The clock info indicates the START time of the alarm.</p> <p><u>Without the rtC activated:</u> The COn (hours) parameter is displayed. Press  to see the compressor working hours.</p> <p>To exit: press  or wait for 15 seconds without pressing any key.</p>
Exit menu		Press  simultaneously or wait for about 10 seconds without pressing any key.

Table 14: How to check the alarm list

2.15 Compressor motor protection

The electronic controller protects the compressor motor against the following:

- phase loss
- incorrect phase rotation
- voltage imbalance

2.16 System pressure protection

2.16.1 High-pressure safety switch

A non-adjustable high pressure switch is protecting the system against too high pressures. The device will open in the event of an abnormally high discharge pressure (above 28.8 bar).

- The unit will stop then and restart automatically after a 5-minute delay and after unit pressure has decreased to 24 bar.

2.16.2 High pressure: pressure relief valve

There is a connection port sideways on the top of the unit liquid receiver for a pressure relief valve. It is a thread with 3/8"-NPT connection. The pressure relief valve is not factory-assembled.

2.16.3 Low-pressure safety switch

In a way similar to the high-pressure sensor, the electronic controller registers the switching action of the adjustable low-pressure switch, which will open in the event of an abnormally low suction pressure:

- The unit will stop then restart automatically after a 3-minute delay (**D28**) and when the unit reaches the cut-in pressure level.

The unit is always equipped with a suction pressure transmitter which also takes care for protection against vacuum operation. In rare instances of controller breakdown the low-pressure switch would allow to run the unit in emergency mode (rescue mode).

2.17 Other inputs of the XCM25D controller

2.17.1 Customer-supplied control – Heat recovery / On/Off / Room Thermostat

The electronic controller is equipped with a digital input (**DI3**) open/close signal (such as the switching action of a normal commercial thermostat) and relays a similar action as an output to the compressor contactor in the case of a thermostat-controlled (parameter "**C05**") system (see wiring diagrams in **Appendices 2 and 3**). If the system is controlled by low-pressure cut-out for a multiple evaporator system and/or pump-down system, the controller XCM25D accepts signals directly from an adjustable low-pressure switch (optional).

2.17.2 Ambient temperature sensor

An ambient temperature sensor supplied by Emerson is connected to the electronic controller. This temperature sensor has several functionalities like emergency mode control, lower fan speed limitation and crankcase heater control. The sensor is located at the housing on the backside of the compressor compartment.

2.18 Output of the XCM25D controller – Alarm output (DO5)

The digital output **DO5** is pre-configured as an alarm contact. The relay (max. 5A, 250V AC) is activated in case of alarms and lockouts. Warnings will be shown only on the controller display.

By help of parameter **S01** this setting can be adjusted.

3 Installation



WARNING

High pressure! Injury to skin and eyes possible! Be careful when opening connections on a pressurized item.

Copeland large outdoor OM(T)E & OL(T)E condensing units are delivered with a holding charge of neutral gas.

The condensing unit should be in such a place to prevent any dirt, dust, plastic bag, leaves or papers from covering the condenser and its fins.

The unit must be installed without restricting the airflow.

A clogged condenser will increase the condensing temperature, thus reduce the cooling capacity, and lead to a high-pressure switch tripping. Clean the condenser fins on a regular basis.

3.1 Dimensions in mm

The figures hereafter show the overall physical dimensions of the large outdoor OM(T)E & OL(T)E condensing units:

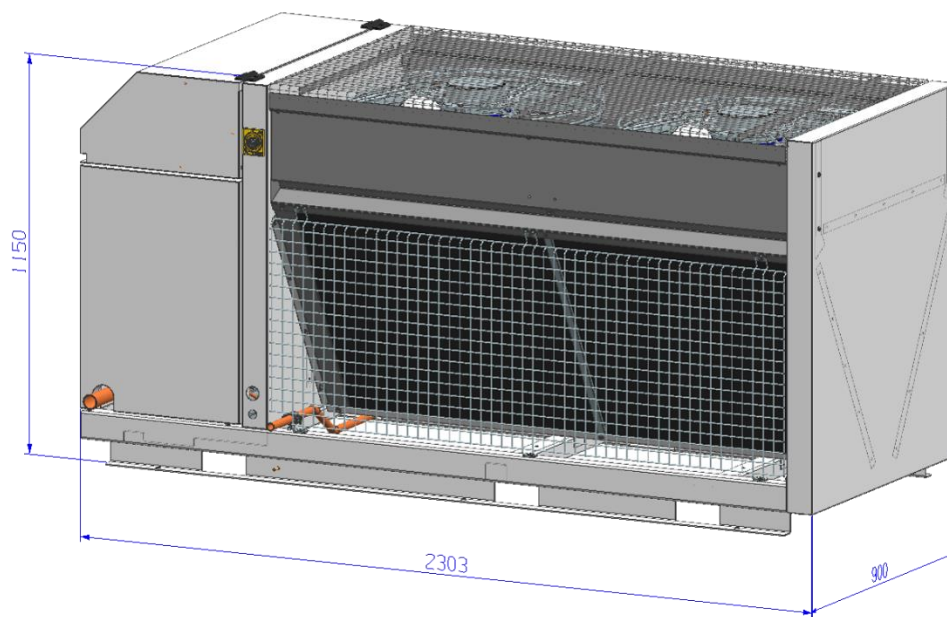


Figure 23: Outer dimensions

	Outer Dimensions Length / Width / Height [mm] (with closed cover)
OMTE-152D-TFD-501	2303 / 900 / 1150
OLTE-82D-TFD-501	

Table 15: Outer dimensions

3.2 Condensing unit handling

3.2.1 Transport and storage



WARNING

Risk of collapse! Personal injuries! Move refrigeration unit only with appropriate mechanical or handling equipment according to weight. Keep in the upright position. Don't stack other pallets on top of the unit packaging. Keep the packaging dry at all times.

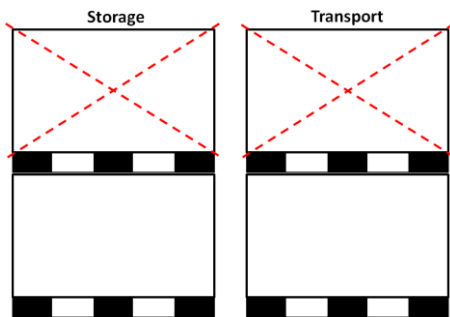


Figure 24: Transport and storage

3.2.1 Lifting

Always lift by point marked with red arrows on pictures below.

Attention: No lifting with slings around the unit !

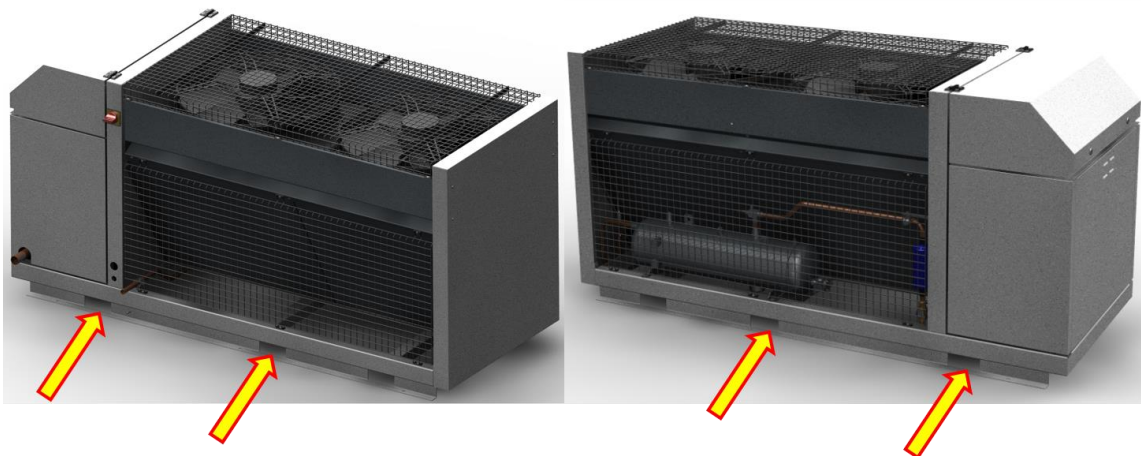


Figure 25 : Lifting 1 OM(T)E & OL(T)E



WARNING

Attention during transport! Personal injuries! Never stay in the surrounding area when the unit is lifted.
Unit damage! Personal injuries! Use only adequate tools and fastening material / fixtures to secure the unit during transport.

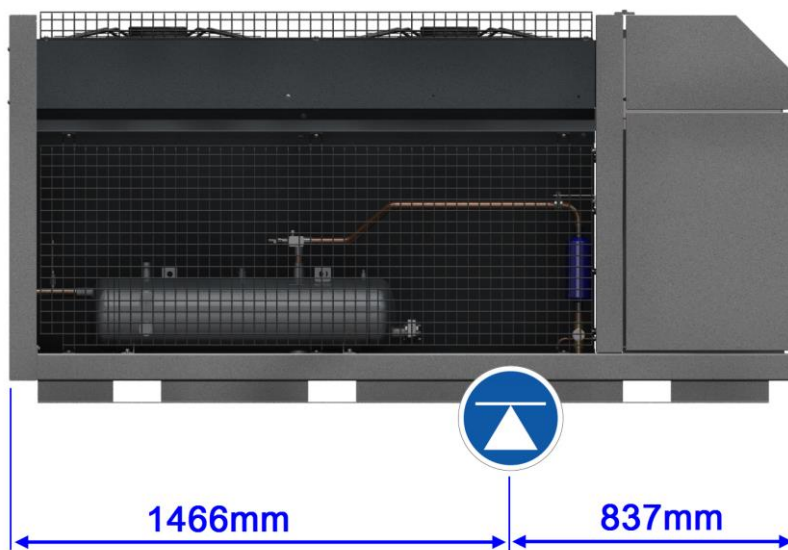


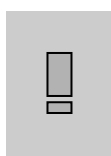
Figure 26: Center of gravity

3.2.2 Weights

	Outer Dimensions Length / Width / Height [mm] (with closed cover)	Net Weight [kg]	Gross Weight [kg]
OMTE-152D-TFD-501	2303 / 900 / 1150	490	540
OLTE-82D-TFD-501		500	550

Table 16: Weights

3.2.3 Location & fixings



IMPORTANT

Dust and dirt contamination! Unit life reduction! The unit should always be installed in a location that ensures clean air flow. External fouling of the condenser fins also leads to high condensing temperatures or pressures, and will reduce the lifetime of the unit.

It is recommended to follow a clearance (dimensions below) on X. Both service access and airflow have been considered in making these recommendations.

Where multiple units are to be installed in the same location, the contractor needs to consider each individual case carefully. There can be many variations of unit quantities and available space and it is not the intention of this manual to go over these. However, in general terms, air by-pass around each condenser and between the units should be avoided always.

Ideally, the unit should be mounted level on a solid concrete slab with anti-vibration pads between unit feet and concrete. However, the OM(T)E & OL(T)E large outdoor condensing unit has also been designed for wall mounting on suitable brackets. In this case it is equally important that the dimensional guidelines given in Chapter 1.18 Required distances are followed and that additional consideration is given for possible air recycling if units are stacked above and below each other. Wall mounting brackets are not included.

Another factor to consider in finding a good installation site is the direction of the prevailing wind. For example, if the air leaving the condenser faces the prevailing wind, the air flow through the condenser can be impeded, causing high refrigeration temperatures and ultimately resulting in reducing the life of the unit. A baffle is a remedy for this situation.

3.2.4 Required distances

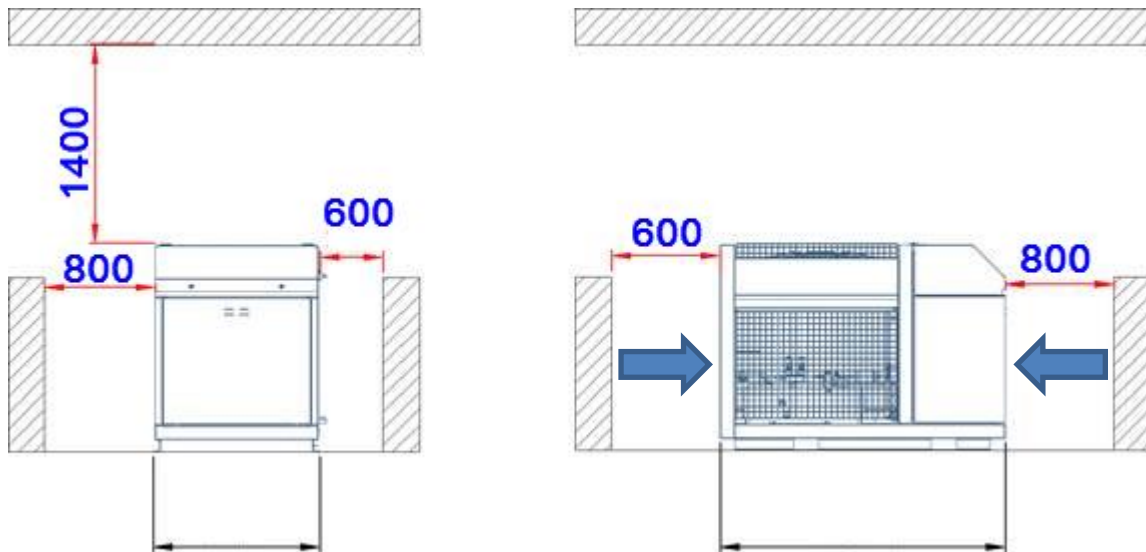


Figure 27: Fixing dimensions and distances are in mm

3.3 Refrigeration piping connections

3.3.1 Refrigeration piping installation



WARNING

High pressure! Risk of personal injury! The units are pressurized with dry air. Be careful when opening connections on a pressurized item.



WARNING

Low surface temperature! Danger of frostbite! The liquid line should be insulated with 19 mm insulation thickness. Temperature could be as low as -15°C .

IMPORTANT

Tube quality! Installation contamination! All interconnecting piping should be of refrigeration grade, clean, dehydrated and must remain capped at both ends until installation. Even during installation, if the system is left for any reasonable period (say 2 hours), pipes should be re-capped to prevent moisture and contaminant from entering the system.

Connection sizes! Unsuitable refrigerant flow rate! Do not assume that the service connection sizes on the unit (at the service valves) are in fact the correct size to run your interconnecting refrigeration pipes. The service valve sizes have been selected for convenience of installation and in some cases (larger units) these may be considered too small. However, for the very short pipe run within our units these service connection sizes are adequate. All interconnecting piping should be sized to satisfy the duty required.

IMPORTANT

Absence of insulation on the liquid line in OL(T)Q units! Air moisture condensation and lack of performance! Moisture will condensate on the liquid line and cause water droplets. The liquid line can pick up additional heat from the ambient which will adversely affect the sub-cooling desirable for the liquid refrigerant before it enters the expansion valve. Insulate both the suction and liquid interconnecting piping between the OL unit and the evaporator.

The pipe should be sized to ensure optimum performance and good oil return. The sizing must also consider the full capacity range through which this unit will need to operate.

Pipe runs should be kept as short as possible, using the minimum number of directional changes. Use large radius bends and avoid trapping of oil and refrigerant. This is particularly important for the suction line. The suction line should ideally slope gently towards the unit. Recommendation slope is 1/200 to 1/250. Upper and lower oil traps, double risers and reduced pipe diameters may be required for suction lines where long vertical risers cannot be avoided.

All pipes should be adequately supported to prevent sagging which can create oil traps. The recommended pipe clamp support distance is shown in **Table 29** below:

Tube size	Max distance between 2 clamp supports
12.7 mm (1/2 inch)	1.20 m
16.0 mm (5/8 inch)	1.50 m
22.0 mm (7/8 inch)	1.85 m
28.5 mm (1 1/8 inch)	2.20 m

Table 17: Maximum distance between 2 clamp supports

NOTE: It is strongly recommended to insulate both the suction and liquid interconnecting piping between the OL unit and the evaporator.

3.3.2 Connection sizes

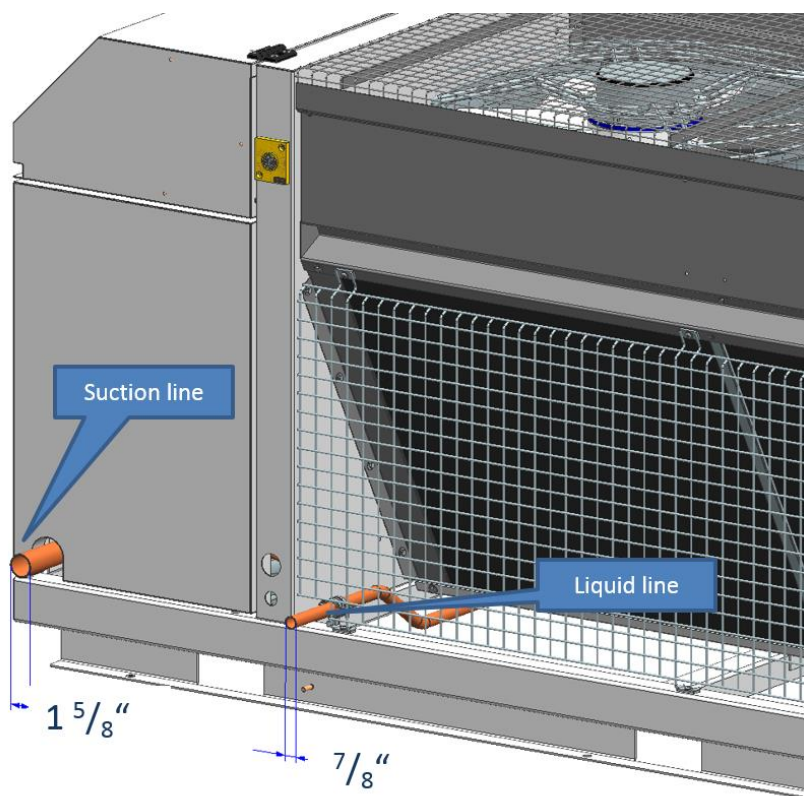


Figure 28: Connection ports Suction & Liquid

Suction line	Liquid line
1 5/8"	7/8"

Table 18: Suction- & Liquid line diameter

3.3.3 Brazing recommendations

IMPORTANT

Blockage! Compressor breakdown! Maintain a flow of oxygen-free nitrogen through the system at very low pressure during brazing. Nitrogen displaces the air and prevents the formation of copper oxides in the system. If allowed to form, the copper oxide material can later be swept through the system and block screens such as those protecting capillary tubes, thermal expansion valves, and accumulator oil return holes.

Contamination or moisture! Bearing failure! Do not remove the plugs until the compressor is set into the unit. This minimises any entry of contaminants and moisture.

- Remove the discharge connection cap.
- Remove the suction connection cap.
- Open both valves mid-way. Care should be taken to avoid the holding charge releasing too quickly.
- Be sure tube fitting inner surface and tube outer surface are clean prior to assembly.
- Both tubes are extended from the condensing unit housing, therefore we recommend to isolate the housing by using a wet cloth on the copper tubing.
- Recommended brazing materials: a copper/phosphorous or copper/phosphorous/silver alloy rod should be used for joining copper to copper whereas to join dissimilar or ferric metals a silver alloy rod either flux coated or with a separate flux would be used.
- Use a double-tipped torch.

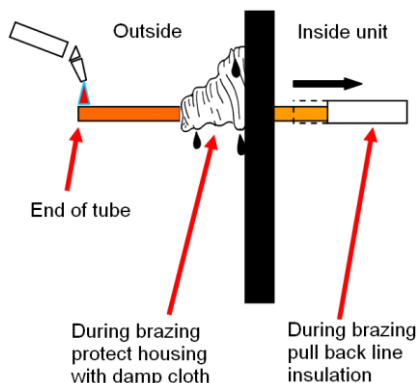


Figure 29: Brazing - Sectional view

3.3.4 Brazing procedure

For brazing of the tubes, please refer to **Figure 22** and procedure hereunder:

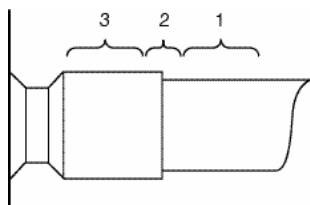


Figure 30: Suction tube brazing areas

- Fit the copper tube into the unit tube.
- Heat area 1. As the tube approaches brazing temperature,
- Heat area 2 until braze temperature is attained. It is necessary to heat the tube evenly. Move the torch up and down and rotating around the tube.
- Add braze material to the joint while moving the torch around the joint to flow braze material around the circumference.

- Then heat area 3. This will draw the brazing material down into the joint.

NOTE: The time spent heating area 3 should be minimal. As with any brazed joint, overheating may be detrimental to the final result.

To disconnect:

- Heat joint areas 2 and 3 slowly and uniformly until solder softens and tube can be pulled out of the fitting.

To reconnect:

- See procedure above.

3.4 Electrical connection

3.4.1 Power supply connections

The electrical connection of the condensing unit to the power supply must be made by qualified technicians per the valid electrical directives, for instance DIN EN 60204-1. Also the voltage drop and temperatures on line must be considered for cable selection.

Copeland large outdoor OM(T)E & OL(T)E condensing units are designed for a 380-420V / 3Ph / 50 Hz power supply. A voltage tolerance of $\pm 10\%$ is acceptable.

The circuit breaker must be switched off before opening the front door.



WARNING

Electrical shock hazard! Serious personal injuries! There are unused fast-on pins on the XCM25D which could be under voltage. They are covered by insulated fast-on flags in the factory. Handle carefully when removing insulating flags during service on site.

3.4.2 Maximum operating currents for cable selection

	Maximum Operating current [A]	Max. power consumption			E-Box Max. power [VA]
		single compressor [kW]	single fan [kW]	single heater	
OMTE-152D-TFD-501	55	22.4	0.66	0.66	210
OLTE-82D-TFD-501	65	20.5	0.66	0.66	210

Table 19: Maximum electrical values

3.4.3 Electrical wiring

Before commissioning, ensure that the neutral "N" and ground protection "PE" wires are connected to the main switch.

3.4.4 Electrical protection standard (protection class)

- Units: IP class IPX4.
- Scroll compressors: IP21 according to IEC 34.
- Fan: IP44 according to IEC 34.
- Solenoid valve coils: IP65 according to DIN 43650.

4 Starting up & operation

Before commissioning, ensure that all valves on the refrigeration unit are fully opened. Only qualified personal and certified company are allowed to do installation, commissioning, service & maintenance work.

4.1 Evacuation



CAUTION

System pressure below atmospheric pressure! Compressor damage!

Never energize the unit/controller without minimum refrigerant system charge. There is a risk of malfunction of the controller in deep vacuum operation which can cause compressor damage.



IMPORTANT

The evacuation procedure is based upon achieving an actual system vacuum standard and is NOT TIME DEPENDENT! The installation has to be evacuated with a vacuum pump before commissioning. Proper evacuation reduces residual moisture to 50 ppm. The installation of adequately sized access valves at the furthest point from the compressor in the suction and liquid lines is advisable. The system must be evacuated down to less than 3 mbar. If required break the vacuum with dry nitrogen. Pressure must be measured using a vacuum pressure gauge on the access valves and not on the vacuum pump. This serves to avoid incorrect measurements resulting from the pressure gradient along the connecting lines to the pump.

4.2 Charging procedure

4.2.1 Refrigerant charging procedure



IMPORTANT

Inadequate charge! Overheating! The Scroll compressor design requires system charging as quickly as possible with liquid refrigerant into the liquid line. This will avoid running the compressor under conditions whereby insufficient suction gas is available to cool not only the motor but also the scrolls. Temperature builds up very quickly in the scrolls if this is not done.

Service valve closed! Compressor damage! Do not charge the unit with vapour (gas). The suction service valve must not be fully closed at any time when the compressor is running. To do so would cause damage to the compressor in the same manner as explained above. This valve is provided for ease of connection and for the fitting of service gauges without removing the unit panel.



IMPORTANT

Absence of insulation on the liquid line in OL(T)E units! Air moisture condensation and lack of performance! Moisture will condensate on the liquid line and cause water droplets. The liquid line can pick up additional heat from the ambient which will adversely affect the sub-cooling desirable for the liquid refrigerant before it enters the expansion valve. Both the suction and liquid interconnecting piping between the OM & OL unit and the evaporator should be insulated to avoid condensation.

Before a system runs for the first time, the following should be checked:

- ✓ Visual inspection
- ✓ Documentation for the system and its marking, especially pressure equipment
- ✓ Installation of safety devices
- ✓ Control tests to ensure all controls function correctly, including any manual backup system
- ✓ Set pressure of all safety devices and other pressure cut-outs
- ✓ Compressor and oil reservoir oil levels
- ✓ Cores fitted in filter dryers

- ✓ Pressure test records
- ✓ All valves open/closed as required for operation

During initial operation, the following should also be checked:

- ✓ Phase rotation of scroll compressors
- ✓ Fan rotation; check before starting compressors — turn fans on manually
- ✓ Refrigerant level
- ✓ Oil level in compressors and reservoir
- ✓ Expansion valve superheat

Pre-charging must be carried out with liquid refrigerant through the service valve on the liquid line. It is advisable to pre-fill the suction side with a partial charge to avoid vacuum operation. Further charging can be carried out by carefully filling refrigerant through the suction line while simultaneously checking the sight glass.

NOTE: In order to meet the requirements of the Ecodesign Directive 2009/125/EC with regard to efficient system operation, ensure the refrigerant charge is sufficient.

4.2.2 Oil charging procedure

Copeland large outdoor OM(T)E & OL(T)E condensing units are pre-charged with oil. After commissioning, the oil level should be checked and topped up if necessary.

NOTE: The oil level in the oil separator sight glass should be always up to top end.

Emerson recommends charging the oil with one of the following oil types:

- Emkarate RL 32 3MAF
- Mobil EAL Arctic 22 CC

Charging on system in operation can be done through the Schrader valve located on the suction valve.

For an empty system the service connection port on the oil reservoir outlet can be used.



Figure 31: Oil charging service ports

The compressors are equipped with TraxOil OM4 oil management devices. Compressors will be switched off in case of insufficient oil level. TraxOil is injecting adequate amount of oil if required. It's important to have a sufficient total oil amount in the system to ensure proper functionality of oil management system.

4.2.3 Oil separator

OM(T)E & OL(T)E units are equipped with an oil separator.

This separator is pre-charged with 3.8 liter of oil.

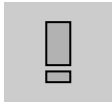
4.3 Rotation direction of Scroll compressors

Scroll compressors, like several other types of compressors, will only compress in one rotational direction. Three-phase compressors are protected against wrong rotation field by the unit controller.

4.4 Maximum compressor cycle

Maximum permitted starts per hour: 10. The factory setting of the XCM25D system controller already considers the maximum permitted starts and stops of the compressor and controls running time and minimal downtime. It is recommended to change these settings only in exceptional cases.

4.5 Checks before starting & during operation



IMPORTANT

Liquid valves not fully opened! Liquid trap! Both valves should be fully opened on the liquid line, to prevent liquid trapping.

- Check that all valves are fully opened.
- Set the essential parameters of the electronic controller in the programming level 1 (refrigerant type, compressor cut-out/in settings, condensing temperature set point....) per the required application.

5 Maintenance & repair

5.1 Replacing a compressor



CAUTION

Inadequate lubrication! Bearing destruction! Exchange the accumulator after replacing a compressor with a burned-out motor. The accumulator oil return orifice or screen may be plugged with debris or may become plugged. This will result in starvation of oil to the new compressor and a second failure.

In the case of a motor burnout, most contaminated oil will be removed with the compressor. The rest of the oil is cleaned using suction and liquid line filter driers. A 100% activated alumina suction line filter drier is recommended but must be removed after 72 hours. **It is highly recommended to replace the suction accumulator, if the system contains one.** This is because the accumulator oil return orifice or screen may be plugged with debris or may become plugged shortly after a compressor failure. This will result in starvation of oil to the replacement compressor and a second failure. When a compressor is exchanged in the field, it is possible that a major portion of the oil may still be in the system. While this may not affect the reliability of the replacement compressor, the extra oil will add to rotor drag and increase power usage.

- De-energize the condensing unit before any intervention.
- Close valves to isolate the unit from the system.
- Recover the refrigerant from the unit and make sure that the compressor is not under pressure.
- Release the compressor mounting parts then lift it to replace with a new compressor.

NOTE: For more detailed instructions, please refer to the compressor application guidelines.

5.2 Condenser fins



CAUTION

Acid cleaning! Corrosion of condenser fins! Do not use acidic solutions to clean the coil. After cleaning, the fins should be brushed lightly with a proper fin comb.

NOTE: To meet the requirements of the Eco-design Directive 2009/125/EC regarding efficient system operation, ensure the heat exchangers remain clean always.

Condenser fins become dirty over time as ambient air is induced to the condenser. Dirty coil surfaces result in high condensing temperatures and poor unit performance. Regular cleaning is recommended, the frequency of doing so being dependent on the installation and the surrounding environment. As a general guide, it is advisable to do this at least once every two months.

As a rule, and for a clean environment we recommend the fins be cleaned with liquid detergent diluted with clean water. The large outdoor condensing unit has a well-designed chassis, any cleaning solution should be able to drain away. A light brush downward (in the direction of the fins) should be done before washing to remove heavy deposits.

5.3 Electrical connections



WARNING

Isolating switch "On"! Danger of electric shock! Before undertaking any task on electrical equipment, turn off the main power supply to de-energise the unit.

All condensing units will generate some degree of vibration. Copeland large outdoor OM(T)E & OL(T)E condensing units are no exception.

Nevertheless, over time, due to these slight vibrations and to temperature fluctuations within the unit housing, electrical terminations might become loose. The components most likely to be affected are the main terminal strip and the compressor contactor. It is suggested to check the main electrical terminations for tightness and to carry out a visual inspection of the low voltage crimped terminals at least once every 6 months.

In all cases when any sheet metal covers (with grounding connection) are removed for maintenance when placed back all grounding connection has to be connected back before unit operation.

5.4 Routine leak testing

NOTE: To meet the requirements of the Eco-design Directive 2009/125/EC with regard to efficient system operation, ensure the refrigerant and oil charges are sufficient.

All joints inside the system should be leak-tested as part of a regular maintenance schedule.

5.5 Condenser fan(s) & motor(s)

A yearly inspection of these items is recommended. Fastenings can become loose; bearings may wear and fans may require cleaning of solid deposits that can cause rotational imbalance. Motors come with lifelong lubrication bearings that do not require lubricating on a routine basis, but just need to be checked for wear.

6 Certification & approval

- The piping is following the Pressure Equipment Directive PED 97/23/EC (Art.3 §3 - Sound Engineering Practice).
- The components of the condensing units carry a CE mark as far as required and thereby establish conformity with the relevant directives.
- Conformity Declarations for components are available as far as required.
- The units are in conformity with the low voltage directive. The applied harmonised standard is EN 60335-2-891 (Safety Household and Similar Electrical Appliance, Part 2: Requirements for commercial refrigerating appliances with an incorporated or remote refrigerant condensing unit or compressor).
- To incorporate these products into a machine the Manufacturer's Declaration of Incorporation must be respected.

7 Dismantling & disposal



Removing oil and refrigerant:

- **Do not disperse in the environment.**
- **Use the correct equipment and method of removal.**
- **Dispose of oil and refrigerant according to national legislation and regulations.**
- **Dispose of compressor and/or unit according to national legislation and regulations.**

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Appendix 1: Wiring diagram (Status 08.06.2017) – OM(T)E / OL(T)E units (380-420V / 3Ph / 50 Hz)

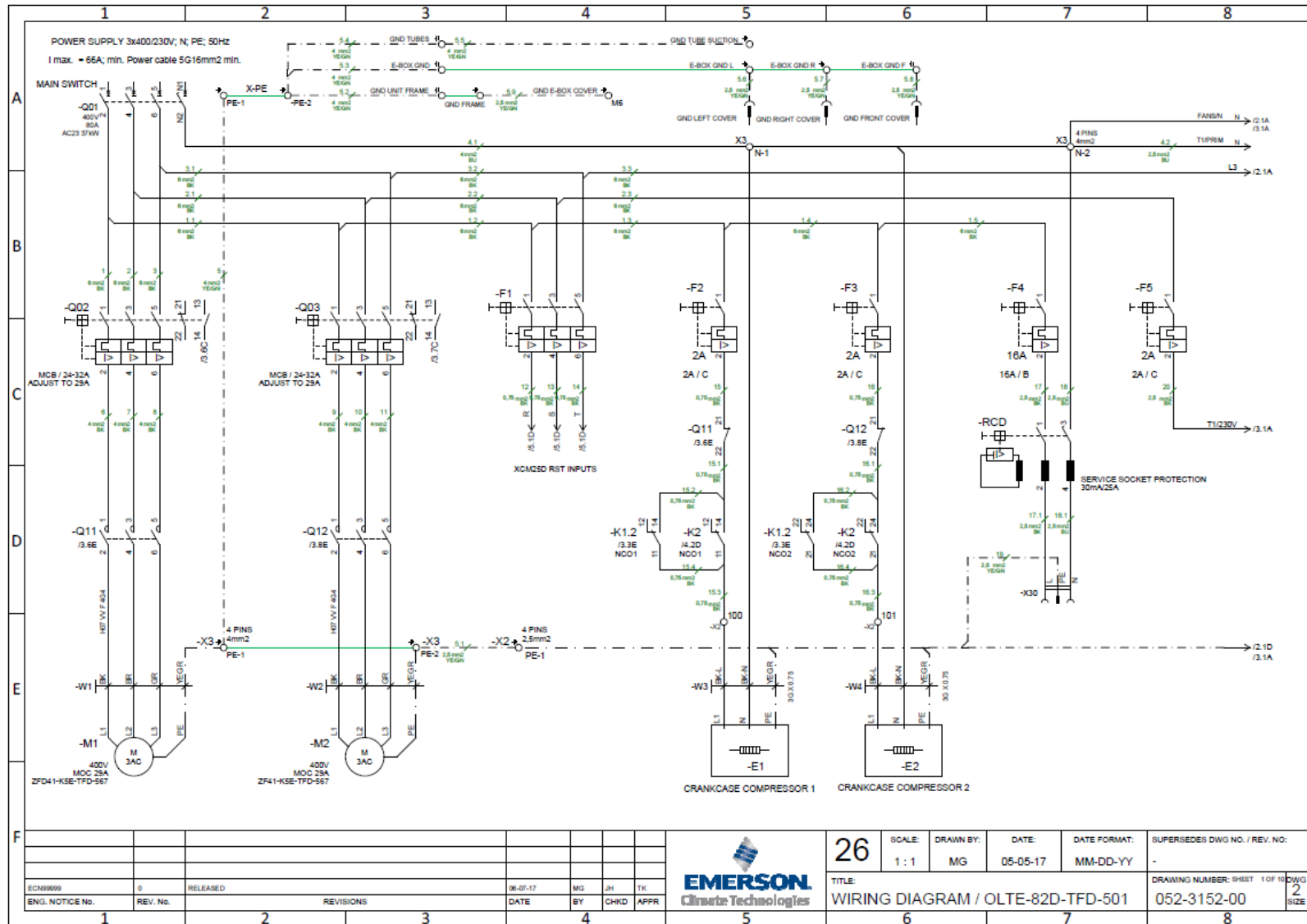


Figure 32: Wiring Diagram page 1

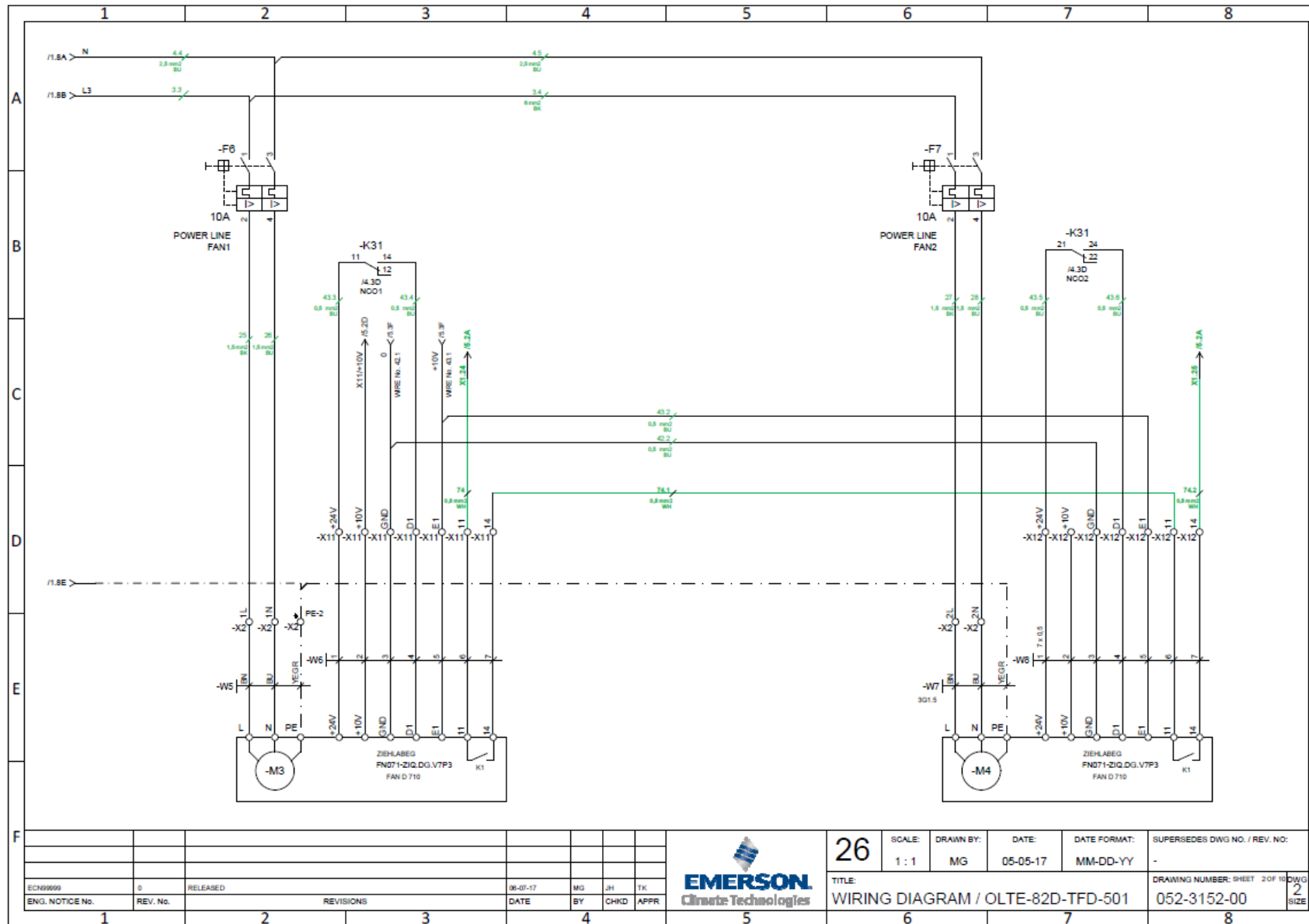


Figure 33: Wiring Diagram page 2

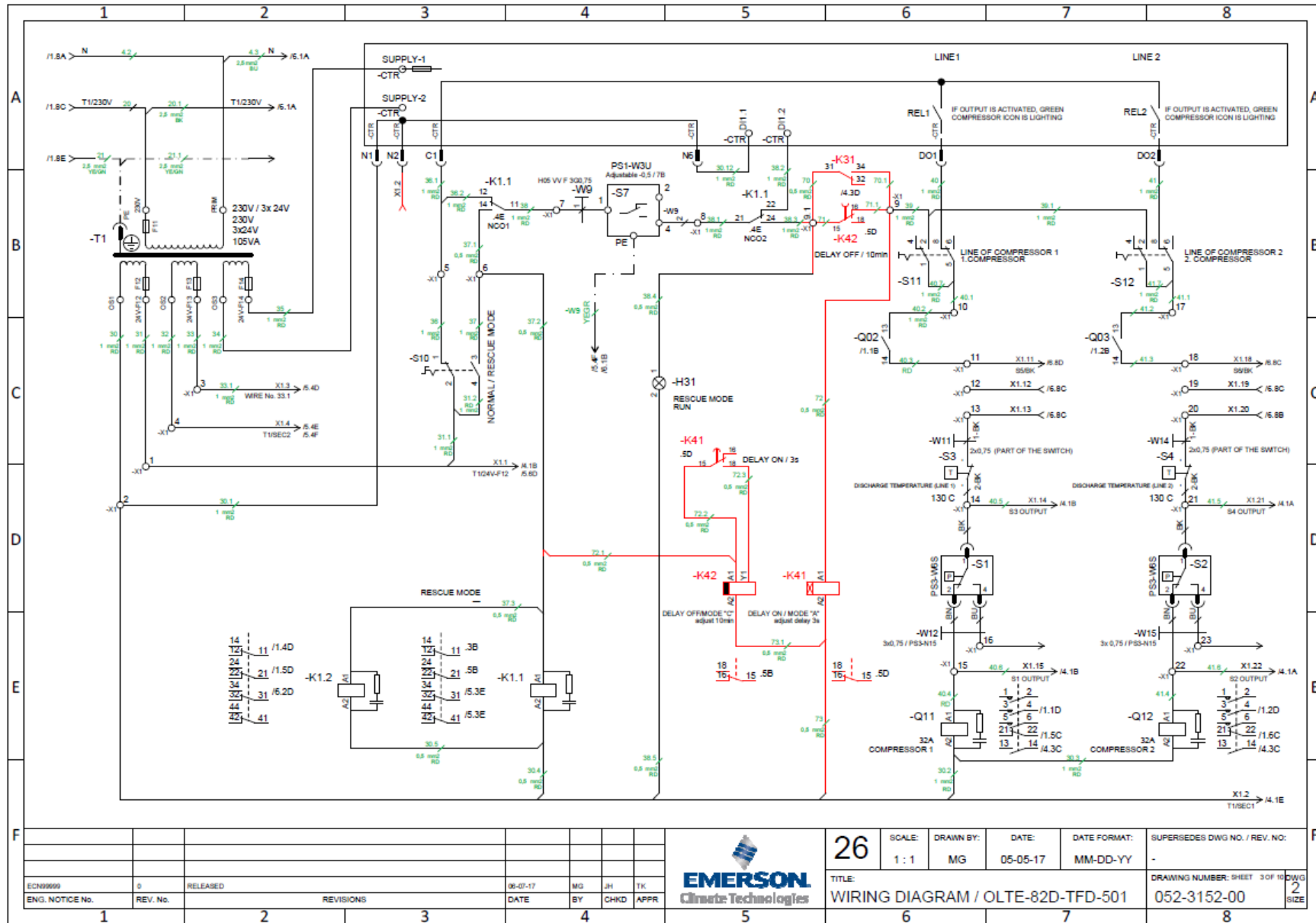


Figure 34: Wiring Diagram page 3

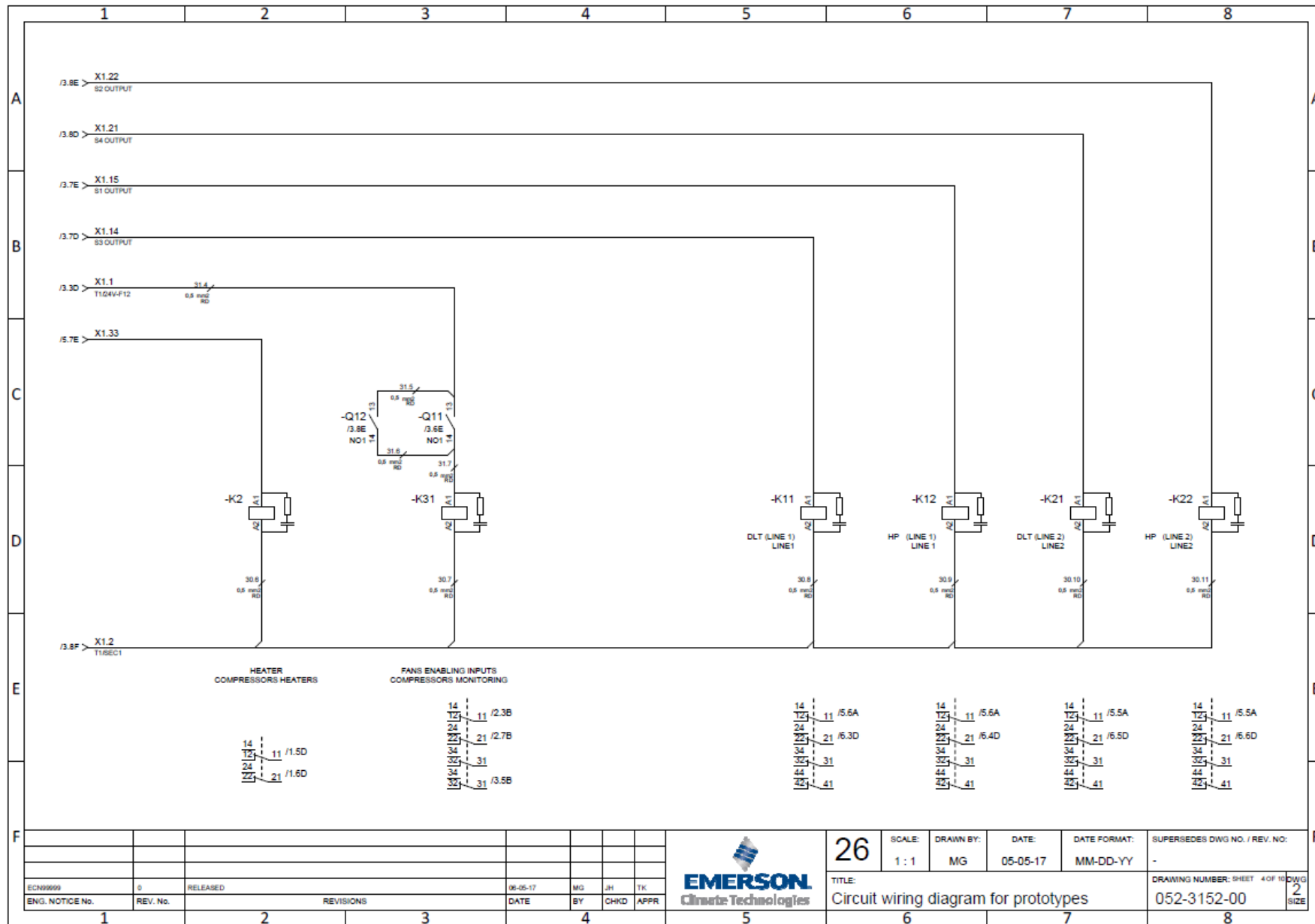


Figure 35: Wiring Diagram page 4

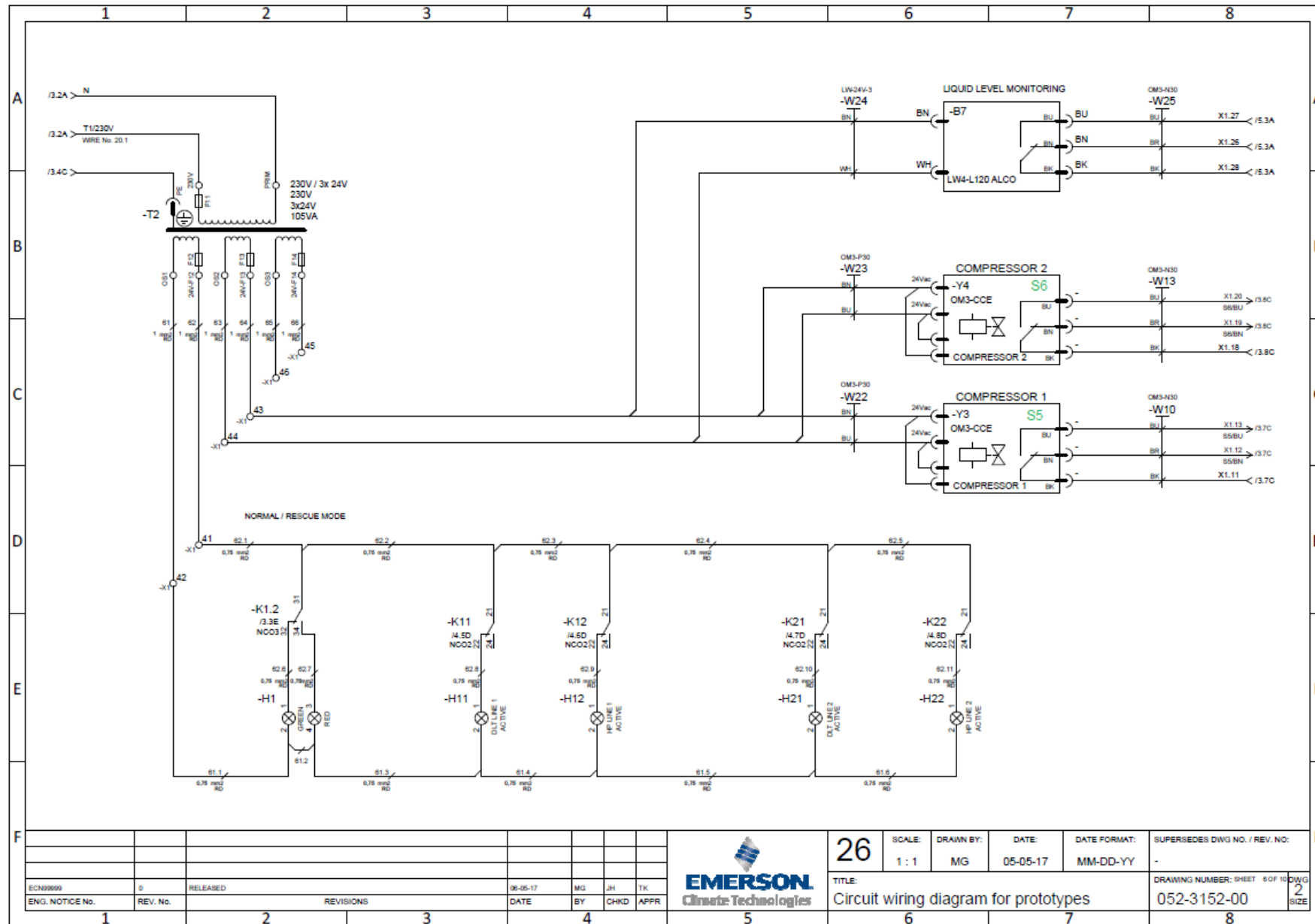


Figure 37: Wiring Diagram page 6

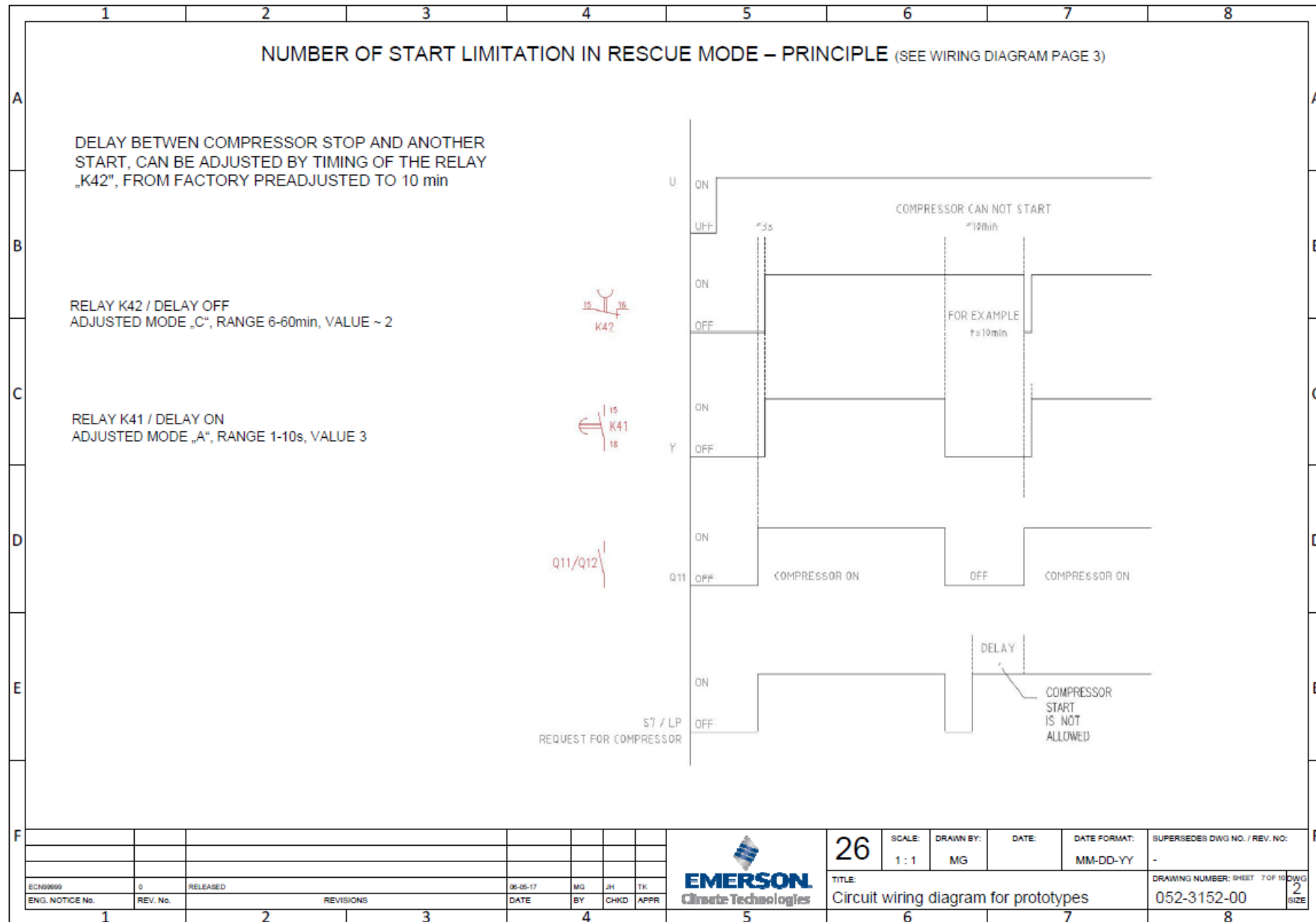


Figure 38: Wiring Diagram page 7


	1	2	3	4	5	6	7	8															
	Row	SYMBOL	Description	Comment	Manufacturer	Type Designation	Catalog Number	WD REFERENCE															
A	1	-B1	PRESSURE TRANSDUCER	SUCTION PRESSURE (0-15 B)	DIXELL	PPR 15	ECT 085-0269-00	052-3152-00 5.8A															
	2	-B2	PRESSURE TRANSDUCER	CONDENSER PRESSURE (0-35B)	DIXELL	PPR 35	ECT 085-0270-00	052-3152-00 5.7A															
	3	-B3	TEMPERATURE PROBE	DLT	DIXELL	NTC 86k	ECT 043-0200-01	052-3152-00 5.6A															
	4	-B6	TEMPERATURE PROBE	AMB	DIXELL	NTC 10k	ECT 043-0198-00	052-3152-00 5.4A															
	5	-B7	LIQUID LEVEL MONITORING DEVICE	LIQUID LEVEL MONITORING	ALCO	LW4-L120 ALCO	#805490	052-3152-00 6.6A															
B	6	-CTR	CONTROLLER	XCM25D - 2C661E - 0-10V/TK2 24V + RTC	DIXELL	AO 0-10V, DI4, DI5	ECT 085-0302-00																
	7	-E1	HEATER	CRANKCASE COMPRESSOR 1	ECT	66W/230V DIA232	018-0091-00	052-3152-00 1.5E															
	8	-E2	HEATER	CRANKCASE COMPRESSOR 2	ECT	66W/230V DIA232	018-0091-00	052-3152-00 1.6E															
	9	-F1	CIRCUIT BREAKER	XCM25D RST INPUTS	SCHNEIDER ELECTRIC	ACTI9	A9F84302	052-3152-00 1.4B															
	10	-F2	CIRCUIT BREAKER	HEATER 1	SCHNEIDER ELECTRIC	ACTI9	A9F84102	052-3152-00 1.5B															
C	11	-F3	CIRCUIT BREAKER	HEATER 2	SCHNEIDER ELECTRIC	ACTI9	A9F84102	052-3152-00 1.6B															
	12	-F4	CIRCUIT BREAKER	SERVICE SOCKET	SCHNEIDER ELECTRIC	ACTI9	A9F83116	052-3152-00 1.7B															
	13	-F5	CIRCUIT BREAKER	CONTROL TRANSFORMER	SCHNEIDER ELECTRIC	ACTI9	A9F84102	052-3152-00 1.8B															
	14	-F6	CIRCUIT BREAKER	FAN1	SCHNEIDER ELECTRIC	ACTI9	A9F84610	052-3152-00 2.2A															
	15	-F7	CIRCUIT BREAKER	FAN2	SCHNEIDER ELECTRIC	ACTI9	A9F84610	052-3152-00 2.6A															
D	16	-H1	SIGNAL LAMP (GREEN/RED)	NORMAL / RESCUE MODE	SCHNEIDER ELECTRIC	iIL	A9E18335	052-3152-00 6.2E															
	17	-H11	SIGNAL LAMP (RED)	DLT LINE 1	SCHNEIDER ELECTRIC	iIL	A9E18330	052-3152-00 6.3E															
	18	-H12	SIGNAL LAMP (RED)	HP LINE 1	SCHNEIDER ELECTRIC	iIL	A9E18330	052-3152-00 6.4E															
	19	-H21	SIGNAL LAMP (RED)	DLT LINE 2	SCHNEIDER ELECTRIC	iIL	A9E18330	052-3152-00 6.5E															
	20	-H22	SIGNAL LAMP (RED)	HP LINE 2	SCHNEIDER ELECTRIC	iIL	A9E18330	052-3152-00 6.6E															
E	21	-H31	SIGNAL LAMP	RESCUE MODE	SCHNEIDER ELECTRIC	iIL	A9E18331	052-3152-00 3.4C															
	22	-K1.1	RELAY	RESCUE MODE	SCHNEIDER ELECTRIC	ZELIO RXM	RXM4AB2B7	052-3152-00 3.4E															
	23	-K1.2	RELAY	RESCUE MODE	SCHNEIDER ELECTRIC	ZELIO RXM	RXM4AB2B7	052-3152-00 3.3E															
	24	-K2	RELAY	HEATER	SCHNEIDER ELECTRIC	ZELIO RXM	RXM2AB2B7	052-3152-00 4.2D															
	25	-K11	RELAY	DLT (LINE 1)	SCHNEIDER ELECTRIC	ZELIO RXM	RXM4AB2B7	052-3152-00 4.5D															
F	26	-K12	RELAY	HP (LINE 1)	SCHNEIDER ELECTRIC	ZELIO RXM	RXM4AB2B7	052-3152-00 4.6D															
	27	-K21	RELAY	DLT (LINE 2)	SCHNEIDER ELECTRIC	ZELIO RXM	RXM4AB2B7	052-3152-00 4.7D															
	28	-K22	RELAY	HP (LINE 2)	SCHNEIDER ELECTRIC	ZELIO RXM	RXM4AB2B7	052-3152-00 4.8D															
	29	-K31	RELAY	FANS ENABLING INPUTS	SCHNEIDER ELECTRIC	ZELIO RXM	RXM4AB2B7	052-3152-00 4.3D															
	30	-K41	MULTIFUNCTIONAL RELAY	DELAY ON / MODE "A"	SCHNEIDER ELECTRIC	ZELIO	RE17RMMU	052-3152-00 3.5D															
	31	-K42	MULTIFUNCTIONAL RELAY	DELAY OFF/MODE "C"	SCHNEIDER ELECTRIC	ZELIO	RE17RMMU	052-3152-00 3.5D															
	32	-M1	COMPRESSOR 1 MOTOR	DIGITAL COMPRESSOR MOTOR	ECT	ZBD-76KCE-TFD	ZBD-76KCE-TFD	052-3152-00 1.1E															
	33	-M2	COMPRESSOR 2 MOTOR	COMPRESSOR MOTOR	ECT	ZB-76K5E-TFD	ZB-76K5E-TFD	052-3152-00 1.2E															
	34	-M3	FAN 1 MOTOR	FAN1	ZIEHLABEG	FAN D 710	FN071-ZIQ.DG.V...	052-3152-00 2.2E															
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ECN9999	0	RELEASED	30-05-17	MG	JH	TK																	
ENG. NOTICE No.	REV. No.	REVISIONS	DATE	BY	CHKD	APPR																	

Figure 40: Wiring Diagram page Legend 2

1	2	3	4	5	6	7	8
Row	SYMBOL	Description	Comment	Manufacturer	Type Designation	Catalog Number	WD REFERENCE
35	-M4	FAN 2 MOTOR	FAN2	ZIEHLABEG	FAN D 710	FN071-ZIQ.DG.V...	052-3152-00 2.6E
36	-Q01	MAIN SWITCH	MAIN SWITCH	SCHNEIDER ELECTRIC	INS63 - 4P (WITH ...	28919	052-3152-00 1.1A
37	-Q02	MOTOR CIRCUIT BREAKER	COMPRESSOR 1 MOTOR PROTECTION	SCHNEIDER ELECTRIC	SCREW TERMINALS	GV2 ME22	052-3152-00 1.1B
38	-Q03	MOTOR CIRCUIT BREAKER	COMPRESSOR 2 MOTOR PROTECTION	SCHNEIDER ELECTRIC	SCREW TERMINALS	GV2 ME22	052-3152-00 1.2B
39	-Q11	CONTACTOR	COMPRESSOR 1	SCHNEIDER ELECTRIC	LC1 D*	LC1 D25B7	052-3152-00 3.6E
40	-Q12	CONTACTOR	COMPRESSOR 2	SCHNEIDER ELECTRIC	LC1 D*	LC1 D25B7	052-3152-00 3.8E
41	-R1	POTENCIOMETER	FAN REGULATION IN RESCUE MODE	VISHAY / TME	10kΩ; 1W; ±10%	14910F0GJSX1...	052-3152-00 5.2D
42	-R1.1	RESISTOR	FAN REGULATION IN RESCUE MODE		3k9		052-3152-00 5.2E
43	-RCD	RESIDUAL CURRENT DEVICE	SERVICE SOCKET PROTECTION	SCHNEIDER ELECTRIC	IID 2P 25A	A9Z11225	052-3152-00 1.7C
44	-S1	PRESSURE SWITCH	HIGH PRESSURE (LINE 1)	ALCO	PS3-W6S	#715696	052-3152-00 3.6D
45	-S2	PRESSURE SWITCH	HIGH PRESSURE (LINE 2)	ALCO	PS3-W6S	#715696	052-3152-00 3.8D
46	-S3	THERMOCONTACT	DISCHARGE TEMPERATURE (LINE 1)	EMERSON	PART OF THE CO...		052-3152-00 3.6C
47	-S4	THERMOCONTACT	DISCHARGE TEMPERATURE (LINE 2)	EMERSON	PART OF THE CO...		052-3152-00 3.8C
48	-S5	OIL LEVEL MONITORING DEVICE	TRAXOIL 1 OUTPUT	ALCO	OM3-N30	#805141	
49	-S6	OIL LEVEL MONITORING DEVICE	TRAXOIL 2 OUTPUT	ALCO	OM3-N30	#805141	
50	-S7	PRESSURE SWITCH	LOW PRESSURE SWITCH	ALCO	PS1-W3U	ALCO# 4713437	052-3152-00 3.4B
51	-S10	ROTARY SWITCH	NORMAL / RESCUE MODE	SCHNEIDER ELECTRIC	2 x NCO	A9E15122	052-3152-00 3.3C
52	-S11	TOGGLE SWITCH	LINE OF COMPRESSOR 1	SCHNEIDER ELECTRIC	2 x NCO	A9E18071	052-3152-00 3.6B
53	-S12	TOGGLE SWITCH	LINE OF COMPRESSOR 2	SCHNEIDER ELECTRIC		A9E18071	052-3152-00 3.7B
54	-T1	TRANSFORMER	230V / 3x 24V	ELEKTROKOV ZNOJMO	JOC E2838-0063	JOC E2838-0063	052-3152-00 3.1B
55	-T2	TRANSFORMER	230V / 3x 24V	ELEKTROKOV ZNOJMO	JOC E2838-0063	JOC E2838-0063	052-3152-00 6.2B
56	-X1	TERMINAL BLOCK	TERMINAL BLOCK / CONTROL CIRCUITS	WAGO	870-5*		
57	-X2	TERMINAL BLOCK	TERMINAL BLOCK FAN POWER	WAGO	870-5*		
58	-X3	TERMINAL BLOCK	TERMINAL BLOCK PE + N 4mm2	WAGO	281-6*		
59	-X11	TERMINAL BLOCK	TERMINAL BLOCK FAN1 CONTROL CIRCUI...	WAGO	870-5*		
60	-X12	TERMINAL BLOCK	TERMINAL BLOCK FAN2 CONTROL CIRCUI...	WAGO	870-5*		
61	-X30	SOCKET 230V/16A	SOCKET FOR SERVICE	SCHNEIDER ELECTRIC	ACTI9	A9A15306	052-3152-00 1.7D
62	-Y1	SOLENOID VALVE	NC (OPENED IF COMP. IS MODULATED)	ECT FLOW CONTROL...	NC; 24Vac	XXX	052-3152-00 5.4E
63	-Y2	SOLENOID VALVE	NO (CLOSED IF COMP. IS MODULATED)	OFFENWANGER	NO; 24Vac	VBJ533	052-3152-00 5.5E
64	-Y3	OIL MONITORING DEVICE	COMPRESSOR 1	ALCO	OM3-CCE	#805029	052-3152-00 6.6C
65	-Y4	OIL MONITORING DEVICE	COMPRESSOR 2	ALCO	OM3-CCE	#805029	052-3152-00 6.6B
66	GND						
67	X-PE						


				26	SCALE: 1:1	DRAWN BY: MG	DATE:	DATE FORMAT: MM-DD-YY	SUPERSEDES DWG NO. / REV. NO: -
ICN0000 ENG. NOTICE No.				06-05-17 DATE	MG BY	JH CHKD	TK APPR	TITLE: Circuit wiring diagram for prototypes	DRAWING NUMBER: SHEET 9 OF 10 052-3152-00 2 SIZE

Figure 41: Wiring Diagram Legend 3

Appendix 2: Parameter list level 1 (Pr1)

Code	Description	Range	MT	LT
C07	refrigerant Selection for Regulation	R404A(0-404) - R507(1-507) - R134A(2-134) - R22(3-R22) - R407C(4-07C) - R407A(5-07A) - R407F(6-07F) - R448A(48A) - R449A(8-49A) - R410A(9-410)	8-R449A	8-R449A
C16	Digital compressor set point	C03 to C04	3.0	1.0
C17	Proportional band for compressor regulation	0.1 to 9.9 bar; 0.1 to 99.9 PSI; 1 to 999KPA; 0.1°C to 25.5°C; 1°F to 45°F	2.0	1.0
C21	Cycle time for digital compressor	10 to 40 sec	10	10
C24	Minimum capacity for digital compressor	0 to C25	10	10
C27	Time with DGS at PMi before switching off another load	0 to 255 sec	10	5
D29	Low pressure alarm value	A02 to A03	0.8	0.3
E66	Delta temperature condenser Floating set point	0.0 to 25.5°C; 0 to 45°F	8.0	8.0
N01	Current minute	0 to 59		
N02	Current hour	0 to 23		
N03	day of month	1 to 31		
N04	month	1 to 12		
N05	year	0 to 99		
T18	Enter into PR2 level	[0÷999]	3 2 1	3 2 1

Table 20: Parameters level 1

Appendix 3: Parameter list Level 1 & 2 (Pr1 & Pr2)

Code	Description	Range	MT Factory Settings	LT Factory Settings
A01	Probe P1 configuration	Not used(0-NU) - Suction pressure (0-5V)(1-SUP)	1-Suction pressure (0-5V)	1-Suction pressure (0-5V)
A02	Start of scaling for probe 1 (0-5V)	0-5V: -1.5 bar to A03; -21 PSI to A03; -150 KPA to A03	0.0	0.0
A03	End of scaling for probe 1 (0-5V)	0-5V: A02 to 99.9 bar; A02 to 999 PSI; A02 to 999 KPA	15.0	15.0
A04	Probe P1 calibration	0-5V: -12.0 bar to 12.0 bar; -12.0 PSI to 12.0 PSI; -120 KPA to 120 KPA	0.0	0.0
A05	Probe P1 reading error delay (P1C=0-5V)	0-255 min	0	0
A06	Probe P2 configuration	Not used(0-NU) - Mid coil temperature (NTC10K)(1-MCT) - Mid coil pressure (0-5V)(2-MCP)	2-Mid coil pressure (0-5V)	2-Mid coil pressure (0-5V)
A07	Start of scaling for probe 2	0-5V: -1.5 bar to A08; -21 PSI to A08; -150 KPA to A08 NTC10K: -40°C to A08; -40°F to A08	0.0	0.0
A08	End of scaling for probe 2	0-5V: A07 to 99.9 bar; A07 to 999 PSI; A07 to 999 KPA NTC10K: A07 to 110°C; A07 to 230 °F	35.0	35.0
A09	Probe P2 calibration	0-5V: -12.0 bar to 12.0 bar; -12 PSI to 12 PSI; -120 KPA to 120 KPA NTC10K : -12°C to 12°C; -21°F to 21 °F	0.0	0.0
A10	Probe P2 reading error delay (P2C=0-5V)	0-255 min	0	0
A11	Probe P3 configuration	Not used(0-NU) - Discharge Line Temperature(1-DLT)	1-Discharge Line Temperature	1-Discharge Line Temperature
A12	Probe P3 calibration	-12°C to 12°C; -21°F to 21 °F	0.0	0.0
A13	Probe P4 configuration	Not used(0-NU) - Ambient Temp(NTC10K)(1-AMT) - Thermostat Temp(NTC10K)(2-TMT) - Vapor inlet Temp(NTC10K)(3-UIT) - Vapor outlet Temp(NTC10K)(4-UOT) - Evaporator Temp(NTC10K)(5-EPT) - Liquid Temp(NTC10K)(6-LLT)-Suction line Temp(7-SLT)-Coil Temp(8-COT) - Suction pressure switch(9-SUS) - Defrost thermostat input(10-DEF) - High pressure input(11-HP) - Low pressure input(12-LP) - Door switch(13-DOR)- Energy saving Enable(14-ES)-ON/OFF(15-ONF) - Oil feedback signal 1(16-oF1) - Oil feedback signal 2(17-oF2) - Heat recovery(18-Htr) - Liquid switch(19-LiS) - CRO(20-CrO) - Dig Down(21-Cdd) - Fix Down(22-CFd)	21-COM DIG down	21-COM DIG down

Code	Description	Range	MT Factory Settings	LT Factory Settings
A14	Probe P4 calibration	-12°C to 12°C; -21°F to 21 °F	0.0	0.0
A15	Probe P5 configuration	Not used(0-NU) - Ambient Temp(NTC10K)(1-AMT) - Thermostat Temp(NTC10K)(2-TMT) - Vapor inlet Temp(NTC10K)(3-UIT) - Vapor outlet Temp(NTC10K)(4-UOT) - Evaporator Temp(NTC10K)(5-EPT) - Liquid Temp(NTC10K)(6-LLT)-Suction line Temp(7-SLT)-Coil Temp(8-COT) - Suction pressure switch(9-SUS) - Defrost thermostat input(10-DEF) - High pressure input(11-HP) - Low pressure input(12-LP) - Door switch(13-DOR)- Energy saving Enable(14-ES)-ON/OFF(15-ONF) - Oil feedback signal 1(16-oF1) - Oil feedback signal 2(17-oF2) - Heat recovery(18-Htr) - Liquid switch(19-LiS) - CRO(20-CrO) - Dig Down(21-Cdd) - Fix Down(22-CFd)	22-COM FIX down	22-COM FIX down
A16	Probe P5 calibration	-12°C to 12°C; -21°F to 21 °F	0.0	0.0
A17	Probe P6 configuration	Not used(0-NU) - Ambient Temp(NTC10K)(1-AMT) - Thermostat Temp(NTC10K)(2-TMT) - Vapor inlet Temp(NTC10K)(3-UIT) - Vapor outlet Temp(NTC10K)(4-UOT) - Evaporator Temp(NTC10K)(5-EPT) - Liquid Temp(NTC10K)(6-LLT)-Suction line Temp(7-SLT)-Coil Temp(8-COT) - Suction pressure switch(9-SUS) - Defrost thermostat input(10-DEF) - High pressure input(11-HP) - Low pressure input(12-LP) - Door switch(13-DOR)- Energy saving Enable(14-ES)-ON/OFF(15-ONF) - Oil feedback signal 1(16-oF1) - Oil feedback signal 2(17-oF2) - Heat recovery(18-Htr) - Liquid switch(19-LiS) - CRO(20-CrO) - Dig Down(21-Cdd) - Fix Down(22-CFd)	1-Ambient Temp(NTC10K)	1-Ambient Temp(NTC10K)
A18	Probe P6 calibration	-12°C to 12°C; -21°F to 21 °F	0.0	0.0
A19	Probe P7 configuration	Not used(0-NU) - Ambient Temp(NTC10K)(1-AMT) - Thermostat Temp(NTC10K)(2-TMT) - Vapor inlet Temp(NTC10K)(3-UIT) - Vapor outlet Temp(NTC10K)(4-UOT) - Evaporator Temp(NTC10K)(5-EPT) - Liquid Temp(NTC10K)(6-LLT)-Suction line Temp(7-SLT)-Coil Temp(8-COT) - Suction pressure switch(9-SUS) - Defrost thermostat input(10-DEF) - High pressure input(11-HP) - Low pressure input(12-LP) - Door switch(13-DOR)- Energy saving Enable(14-ES)-ON/OFF(15-ONF) - Oil feedback signal 1(16-oF1) - Oil feedback signal 2(17-oF2) - Heat recovery(18-Htr) - Liquid switch(19-LiS) - CRO(20-CrO) - Dig Down(21-Cdd) - Fix Down(22-CFd)	19-Liquid switch active	19-Liquid switch active

Code	Description	Range	MT Factory Settings	LT Factory Settings
A20	Probe P7 calibration	-12°C to 12°C; -21°F to 21 °F	0.0	0.0
A21	delay before activating probe error	0-255 sec	0	0
B01	Measurement unit for pressure	bar(0-BAR) - PSI(1-PSI) - KPA(2-TPA)	0-bar	0-bar
B02	Measurement unit for temperature	°C(0-C) - °F(1-F)	0-°C	0-°C
B03	Remote Display visualization	P1(0-P1) - P2(1-P2) - P3(2-P3) - P4(3-P4) - P5(4-P5) - P6(5-P6) - P7(6-P7) - PEr(7-PER) - Aou(8-AOU)	0-P1	0-P1
C01	Compressor cut in pressure set point	C02 to C04	4.0	4.0
C02	Compressor cut out pressure set point	C03 to C01	1.0	1.0
C03	Minimum set point for suction pressure	A02 to C04; -50.0°C to C04; -58 °F to C04;	0.2	0.2
C04	Maximum set point for suction pressure	C03 to A03; C03 to 60.0°C; C03 to 140°F;	7.2	7.2
C05	Compressor regulation probe selection	nu(0-NU) - suction pressure probe(1-SUP) - case temperature(2-CST) - suction pressure switch(3-SUS)	1-suction pressure probe	1-suction pressure probe
C06	EXV closing time before compressor off	0 to 999 sec	0	0
C07	refrigerant Selection for Regulation	R404A(0-404) - R507(1-507) - R134A(2-134) - R22(3-R22) - R407C(4-07C) - R407A(5-07A) - R407F(6-07F) - R448A(48A) - R449A(8-49A) - R410A(9-410)	8-R449A	8-R449A
C08	Set point offset	NV(0-NU) - Small offset(1-SOF) - Medium offset(2-MOF) - Large offset(3-LOF) - LAO(4-FOF)	0-NV	0-NV
C09	Ambient temperature operation set point	-40°C to 110°C; -40 to 230°F	-20.0	-20.0
C10	pressure/temperature operation for ambient differential	0.0Bar to 9.9Bar; 0.0PSI to 99.9PSI; 0KPA to 999KPA; 0.0°C to 25.5 °C; 0 °F to 45 °F	1.0	1.0
C11	Ambient temperature Recover differential	0.1°C to 25.5 °C; 1 °F to 45 °F	5.0	5.0
C12	Ambient temperature threshold for low ambient operation	-40°C to 110°C; -40 to 230°F	-10.0	-10.0
C13	Temperature/Pressure to end low ambient timer and resume normal operation	-40°C to 110°C; -40 to 230°F -1.5 to 99.9 bar; -21 to 999 PSI; -150 to 999KPA	10.0	10.0
C14	compressor minimum on time in low ambient operation	0 to 255 sec	1	1
C15	Pressure to end low ambient timer and shut off the compressor	-1.5 to 99.9 bar; -21.0 to 999 PSI; -150 to 999KPA	0.0	0.0
C16	Digital compressor set point	C03 to C04	2.8	0.3
C17	Proportional band for compressor regulation	0.1 to 9.9 bar; 0.1 to 99.9 PSI; 1 to 999KPA; 0.1°C to 25.5°C; 1°F to 45°F	2.0	1.0
C18	Band offset for compressor regulation	0 to 9.9 bar; 0 to 99.9 PSI; 0 to 999KPA; 0.0°C to 25.5°C; 0°F to 45°F	0.0	0.0
C19	Integral time	0.0 – 999 sec	250	250
C20	Start up time: interval with digital valve before start regulation	0.0 to 10.0 sec	5.0	5.0

Code	Description	Range	MT Factory Settings	LT Factory Settings
C21	Cycle time for digital compressor	10 to 40 sec	10	10
C22	Safety value for PI regulator (in case of probe error)	0 to 100%	50	50
C23	Number of active compressor when probe error	0(0) - 1(1) - 2(2)	0	0
C24	Minimum capacity for digital compressor	0 to C25	10	10
C25	Maximum capacity for digital compressor	C24 to 100	100	100
C26	Time with DGS at PMA before starting another load	0 to 255 sec	30	30
C27	Time with DGS at PMi before switching off another load	0 to 255 sec	10	5
C38	Compressor regulation control signal	Pressure(0-PRS) - temperature(1-TMP)	0-Pressure	0-Pressure
C39	Supervisor set point enable/disable	no(0-NU) - YES(1-YES)	1-YES	1-YES
D01	Output delay at start up	0 to 255 sec	5	5
D02	Compressor On time with faulty probe	0 to 255 min	5	5
D03	Compressor OFF time with faulty probe	0 to 255 min	3	3
D04	Minimum time between two starts (same compressor)	0 to 15 min	4	4
D05	Delay between compressor switch-off and start-up (same compressor)	1 to 900 sec	120	120
D06	Delay between two different loads startup	[0-99.5] min res.10sec	10.0	10.0
D07	Delay between two different loads switch-off	[0-99.5] min res.10sec	10.0	10.0
D08	Minimum time a stage stays switched ON	[0-99.5] min res.10sec	1.0	1.0
D11	doF delay enable also for the first switching off	no(0-NU) - YES(1-YES)	0-NO	0-NO
D12	Pressure/temperature alarm delay	0 to 999 sec	0	0
D13	Low suction pressure error signal enabling	no(0-NU) - YES(1-YSE)	1-YES	1-YES
D14	Compressor minimum off time for high pressure switch protection	0 - 15 min	5	5
D15	Number of high pressure switch activation before compressor lock	0 - 15	7	7
D22	DLT alarm temperature to stop compressor	-40 to 180°C; -40 to 356°F;	140.0	140.0
D23	DLT alarm recover temperature to turn on compressor	-40 to 180°C; -40 to 356°F;	120.0	120.0
D24	DLT alarm activation delay	0 to 255 sec	30	30
D25	Compressor minimum off time for DLT Alarm	0 to 255 min	5	5
D26	Number of DLT alarm activation before compressor lock	0 to 15	10	10
D27	Time to ignore Low DLT sensor error at startup	0 to 255 min	1	1
D28	Compressor minimum off time for low pressure switch protection	0 - 15 min	3	3
D29	Low pressure alarm value	A02 to A03	0.8	0.3
E01	Condenser Fan Motor Modulation Type	Not Used(0-NU) - Fan cycling(1-CYC) - Modulated fan(2-MOD)	2-Modulated fan	2-Modulated fan
E37	High suction pressure point for condenser fan map 9(For R410A)	E35 to 99.9 Bar; E35 to 999 PSI; E35 to 999 KPA	7.2	7.2

Code	Description	Range	MT Factory Settings	LT Factory Settings
E37	High suction pressure point for condenser fan map 9(For R410A)	E35 to 99.9 Bar; E35 to 999 PSI; E35 to 999 KPA	7.2	7.2
E38	Modulation fan setpoint calculation selection	Not Used(0-NU) - Envelope(1-Enu) - Floating HP(2-FHP)	2-Floating HP	2-Floating HP
E39	Condenser temperature set point when Fan set point modulation is disable	-40°C to 110°C; -40°F to 230°F	35.0	35.0
E40	Minimum Condenser temperature set point	-40°C to 110°C; -40°F to 230°F	10.0	10.0
E41	High Ambient Fan motor override enabled	no(0-NO) - YES(1-YES)	0-NO	0-NO
E42	High Ambient Fan motor override differential	0.1°C to 25.5 °C; 1 °F to 45 °F	20.0	20.0
E43	High DLT Fan motor override enabled	no(0-NO) - YES(1-YES)	1-YES	1-YES
E44	High DLT Fan motor override point for fan	-40°C to 180°C; -40 to 356°F	120.0	120.0
E45	Minimum fan motor speed	0 to 100%	30	30
E46	regulation band of variable fan	0.1°C to 25.5 °C; 1 °F to 45 °F	20.0	20.0
E47	integration time for Fan	0 to 999 sec	500	500
E48	Fan Full speed duration at fan startup	0 to 255 sec	3	3
E49	Fan minimum on time	0 to 255 sec	5	5
E50	Fan minimum off time	0 to 255 sec	5	5
E55	Fan control with ambient sensor - Min ambient	-40°C to E56; -40 °F to E56	0.0	0.0
E56	Fan control with ambient sensor - Max ambient	E55 to 110°C ; E55 to 230°F	40.0	40.0
E57	Fan speed control with ambient sensor	0 to 100%	66	66
E58	Condenser Temperature/Pressure threshold for high alarm	-40°C to 110°C; -40°F to 230°F -1.5 to 99.9 Bar; -21 to 999 PSI; -150 to 999 KPA	99.0	99.0
E59	High condenser temperature alarm delay	0 - 255 min	0	0
E60	High condenser temperature alarm with compressor off	no(0-NO) - YES(1-YES)	1-YES	1-YES
E61	Condenser temperature/Pressure threshold for alarm recovery	-40°C to E58°C; -40 to E58°F -1.5 to E58 Bar; -21 to E58 PSI; -150 to E58 KPA	99.0	99.0
E62	Maximum fan motor speed	MSF to 100%	80	80
E63	Maximum fan motor speed limit return condenser temperature offset	0.0 to 25.5°C; 0 to 45°F	20.0	20.0
E64	Maximum fan motor speed limit return DLT offset	0.0 – 25.5°C	5.0	5.0
E65	Maximum Condenser set point	-40°C – 110°C	55.0	50.0
E66	Delta temperature condenser Floating set point	0.0 to 25.5°C; 0 to 45°F	8.0	8.0
H01	Current sensing 1 Enabled	no;yes	0-NO	0-NO
H02	Current sensing 2 Enabled	no;yes	0-NO	0-NO
H03	Voltage sensing 1 Enabled	no;yes	0-NO	0-NO
H04	Voltage sensing 2 Enabled	no;yes	0-NO	0-NO
H05	Voltage sensing 3 Enabled	no;yes	0-NO	0-NO

Code	Description	Range	MT Factory Settings	LT Factory Settings
H06	Voltage and Current protection enabled	no;yes	0-NO	0-NO
H07	Maximum Continuous Current limit	H25=0: 0.0 to 70.0 A; H25=1: 0.0 to 35.0 A.	17.0	17.0
H08	Voltage/Current sensing trip minimum off time	0 to 255 mim	5	5
H09	Adjustable current limit before trip	0.0 to H07 Ampere	15.4	15.4
H10	Ignore current sensing duration at startup duration	0 to 255 second	3	3
H11	Over Current Trips before lock	0 to 15	5	5
H12	loss of phase trips before lock	0 to 15	5	5
H13	Minimum voltage to trip compressor	0 to 400 V	360	360
H14	Maximum voltage to trip compressor	0 to 800 V	480	480
H15	over or under voltage minimum time	0 to 255 second	60	60
H16	compressor minimum off time because of voltage error	0 to 255 minutes	3	3
H17	Number of compressor trips before lockout because of voltage	0 to 15	5	5
H18	Adjustable under average voltage percentage	0 to 100%	90	90
H19	Generate warning or shut down compressor when phase imbalance	0: Generate Warning(0-ARN) - 1: off the unit(1-OFF)	1-off the unit	1-off the unit
H20	Missing current duration before warning	0 to 255 sec	10	10
H21	Minimum High Side Superheat	0.1 to 25.5 °C; 1 to 45°F	10.0	10.0
N01	Current minute	0 to 59		
N02	Current hour	0 to 23		
N03	day of month	1 to 31		
N04	month	1 to 12		
N05	year	0 to 99		
P01	compressor set point hysteresis in energy saving mode	0.0Bar to 9.9 Bar; 0.0PSI to 99.9 PSI; 0KPA to 999KPA; 0.0°C to 25.5 °C; 0 °F to 45 °F	0.0	0.0
P02	Condenser set point hysteresis in energy saving mode	0.0°C to 25.5 °C; 0 °F to 45 °F	0.0	0.0
R01	Digital input 1 function	not used(0-NU) - Suction pressure switch(1-SUS) - Thermostat input(2-DEF) - High pressure input(3-HP) - Low pressure input(4-LP) - Door switch(5-DOR)-Energy saving Enable(6-ES)-ON/OFF(7-ONF)	4-Low pressure safety input	4-Low pressure safety input
R02	Digital input 1 polarity	oP(0) - CL(1)	0-oP	0-oP
R03	Activation delay for digital input 1	0 to 255 min	0	0
R04	Digital input 2 function	not used(0-NU) - Suction pressure switch(1-SUS) - Thermostat input(2-DEF) - High pressure input(3-HP) - Low pressure input(4-LP) - Door switch(5-DOR)-Energy saving Enable(6-ES)-ON/OFF(7-ONF)	0-Not used	0-Not used

Code	Description	Range	MT Factory Settings	LT Factory Settings
R05	Digital input 2 polarity	oP(0) - CL(1)	0-oP	0-oP
R06	Activation delay for digital input 2	0 to 255 min	0	0
R07	Digital input 3 function	not used(0-NU) - Suction pressure switch(1-SUS) - Thermostat input(2-DEF) - High pressure input(3-HP) - Low pressure input(4-LP) - Door switch(5-DOR)-Energy saving Enable(6-ES)-ON/OFF(7-ONF)	0-Not used	0-Not used
R08	Digital input 3 polarity	oP(0-OP) - CL(1-CL)	1-CL	1-CL
R09	Activation delay for digital input 3	0 to 255 min	0	0
S01	Alarm contact activation in a warning, alarm, lockout	Warning(0-ARN) - Alarm(1-ALM) - Lockout(2-LOC)	1-Alarm	1-Alarm
S02	Alarm relay deactivation	no(0-NO) - yes(1-YES)	1-YES	1-YES
S03	Buzzer enabled	no(0-NO) - yes(1-YES)	0-NO	0-NO
S04	Relay output 1 configuration	not used(0-NU) - DGS Compressor(1-DGS) - ON-OFF Compressor(2-CPR) - Condenser Fan 1(3-CF1) - Condenser Fan 2(4-CF2) - Evaporator Fan (5-EPF) - Defrost (6-DEF) - Liquid Line solenoid(7-LLS) - Crankcase Heater(8-HTR) - Alarm(9-ALM) - Light(10-LIG)	1-DGS Compressor	1-DGS Compressor
S05	Relay output 2 configuration	not used(0-NU) - DGS Compressor(1-DGS) - ON-OFF Compressor(2-CPR) - Condenser Fan 1(3-CF1) - Condenser Fan 2(4-CF2) - Evaporator Fan (5-EPF) - Defrost (6-DEF) - Liquid Line solenoid(7-LLS) - Crankcase Heater(8-HTR) - Alarm(9-ALM) - Light(10-LIG)	2-ON-OFF Compressor	2-ON-OFF Compressor
S06	Relay output 3 configuration	not used(0-NU) - DGS Compressor(1-DGS) - ON-OFF Compressor(2-CPR) - Condenser Fan 1(3-CF1) - Condenser Fan 2(4-CF2) - Evaporator Fan (5-EPF) - Defrost (6-DEF) - Liquid Line solenoid(7-LLS) - Crankcase Heater(8-HTR) - Alarm(9-ALM) - Light(10-LIG)	8-Crankcase Heater	8-Crankcase Heater
S07	Relay output 4 configuration	not used(0-NU) - DGS Compressor(1-DGS) - ON-OFF Compressor(2-CPR) - Condenser Fan 1(3-CF1) - Condenser Fan 2(4-CF2) - Evaporator Fan (5-EPF) - Defrost (6-DEF) - Liquid Line solenoid(7-LLS) - Crankcase Heater(8-HTR) - Alarm(9-ALM) - Light(10-LIG)	0-Not used	0-Not used
S12	Output 1 Polarity	CL(0-CL) - oP(1-OP)	0-CL	0-CL
S13	Output 2 polarity	CL(0-CL) - oP(1-OP)	0-CL	0-CL
T01	Serial address	1 to 247	1	1
T02	Reset key configuration	nP(0-NU) - rSt(1-RST)	1-rSt	1-rSt
T03	Period time of menu exit without key press	10 to 120 sec	30	30
T04	Time for showing firmware version at startup	0 to 60 sec	3	3

Code	Description	Range	MT Factory Settings	LT Factory Settings
T05	Time for showing program name at startup	0 to 60 sec	3	3
T06	P1 visualization	0~999		
T07	P2 visualization	0~999		
T08	P3 visualization	0~999		
T09	P4 visualization	0~999		
T10	P5 visualization	0~999		
T11	P6 visualization	0~999		
T12	P7 visualization	0~999		
T18	Enter into PR2 level	[0÷999]		

Table 21: Parameter list Level 1 & Level 2 (Pr1 & Pr2)

Appendix 4: Alarm menu

Code	Description	Cause	Action	Reset
E01	AI1 error(Probe 1/Suction pressure transducer failure alarm)	Probe failure or out of range	Only in digital unit - compressor is activated according to C23, and compressor on & off time is according to D02 & D03	Automatically as soon as the probe restarts working
E02	AI2 error(Probe 2/mid_coil temperature sensor failure alarm)	Probe failure or out of range	The fans speed control is disable	Automatically as soon as the probe restarts working
E03	AI3 error(Probe 3/discharge line temperature sensor failure alarm)	Probe failure or out of range	Discharge temperature control is disable	Automatically as soon as the probe restarts working
E04	AI4 error(Probe 4/PHE vapor inlet temperature sensor failure alarm)	Probe failure or out of range	PHE super heat control is disable(OM & OLL/OM & OLB unit)	Automatically as soon as the probe restarts working
E05	AI5 error(Probe 5/PHE vapor outlet temperature sensor failure alarm)	Probe failure or out of range	PHE super heat control is disable(OM & OLL/OM & OLB unit)	Automatically as soon as the probe restarts working
E06	AI6 error(Probe 6/ambient temperature sensor failure alarm)	Probe failure or out of range	The functions related to Probe 6(ambient sensor) is disable	Automatically as soon as the probe restarts working
E07	AI7 error(Not used in Asia)	Probe failure or out of range(not used in Asia application)	The functions related to Probe 7 is disable	Automatically as soon as the probe restarts working
E08	Battery error	The internal back up battery is not working properly	Disable the clock function, to restart the unit	No reset required.
E09	Current sensor 1 error	Probe out of range	The functions related to current sensor is disable	Automatically as soon as the probe restarts working
E10	Current sensor 2 error	Probe out of range	The functions related to current sensor is disable	Automatically as soon as the probe restarts working
E11	Voltage sensor 1 error	Probe out of range	The functions related to voltage sensor is disable	Automatically as soon as the probe restarts working
E12	Voltage sensor 2 error	Probe out of range	The functions related to voltage sensor is disable	Automatically: as soon as the probe restarts working
E13	Voltage sensor 3 error	Probe out of range	The functions related to voltage sensor is disable	Automatically as soon as the probe restarts working
E14-E19	Reserved			

Code	Description	Cause	Action	Reset
E20	Lost phase error	Power supply phase loss(3 phases unit)	The compressor will be tripped	Automatically: Lost phase recover and H08 delay time out
L20	Lost phase lockout	Power supply phase loss happened for H12 time within one hour(3 phases unit)	The compressor will be locked	Hold "start" button for 5s or manual power on and off
L21	Phase sequence lockout	Incorrect phase sequence(3 phases unit)	The compressor will be locked	Manual power on and power off
E22	Phase Imbalance	One phase voltage lower than H18 percentage of 3 phases average voltage(3 phases unit)	The compressor is activated according to H19	Automatically: Voltage recover and H16 setting delay time out
L22	PHASE IMBALANCE LOCKOUT	One phase voltage lower than H18 percentage of 3 phases average voltage(3 phases unit)	The compressor is activated according to H19 = 1: OFF the unit.	MANUAL RESET Voltage recover and H16 setting delay time out
E23	Over current	Electrical current larger than H09 setting	The compressor will be tripped	Automatically: H08 delay time out
L23	Over current lockout	Over current happened for H11 times within one hour	The compressor will be locked(if H11 equal to 0, compressor no lockout)	Hold "start" button for 5s or manual power on and off(if H11 equal to 0, compressor automatically start after H08 delay time out)
E24	Open run circuit error	Motor running winding open(single phase)	The compressor will be tripped	Automatically: H08 delay time out
L24	Open run circuit lockout	Motor running winding open error happened for H12 times within one hour(single phase)	The compressor will be locked(if H12 equal to 0, compressor no lockout)	Hold "start" button for 5s or manual power on and off(if H12 equal to 0, compressor automatically start after H08 delay time out)
E25	Open start circuit error	Motor start winding open(single phase)	The compressor will be tripped	Automatically: H08 delay time out

Code	Description	Cause	Action	Reset
L25	Open start circuit lockout	Motor start winding open error happened for H12 times within one hour(single phase)	The compressor will be locked(if H12 equal to 0, compressor no lockout)	Hold "start" button for 5s or manual power on and off(if H12 equal to 0, compressor automatically start after H08 delay time out)
E26	Under voltage alarm	Voltage lower than H13 setting for H15 seconds	The compressor will be tripped	Automatically: Voltage is back within acceptable range and H16 delay time out
L26	Under voltage lockout	Under voltage happened for H17 times within one hour	The compressor will be locked(if H17 equal to 0, compressor no lockout)	Hold "start" button for 5s or manual power on and off(if H17 equal to 0, compressor automatically start when Voltage is back within acceptable range and H16 delay time out)
E27	Over voltage alarm	Voltage larger than H13 setting for H15 seconds	The compressor will be tripped	Automatically: Voltage is back within acceptable range and H16 delay time out
L27	Over voltage lockout	Over voltage happened for H17 times within one hour	The compressor will be locked(if H17 equal to 0, compressor no lockout)	Hold "start" button for 5s or manual power on and off(if H17 equal to 0, compressor automatically start when Voltage is back within acceptable range and H16 delay time out)
E28	Compressor Build-in protector trip	Compressor build-in thermal protector trips	Warning signal only	Automatically: as soon as electrical current detected
L29	FREQUENCY DETECT ERROR	Detection of frequency current alarm	The compressor will be tripped and lockout	Manual power on and power off
E30	Main power lost	Controller power supply lost	Warning signal only	Restore power supply
E40	High pressure switch	High pressure switch open	The compressor will be tripped	Automatically: High pressure switch closed and D14 delay time out
L40	High pressure switch lockout	High pressure switch open error happened for D15 times within one hour	The compressor will be locked (if D15 equal to 0, compressor no lockout)	Hold "start" button for 5s or manual power on and off (if D15 equal to 0, compressor automatically start when high pressure switch closed and D14 delay time out)
E41	Low pressure switch	Low pressure switch open	The compressor will be tripped	Automatically: Low pressure switch closed and D28 delay time out

Code	Description	Cause	Action	Reset
E43	Low pressure alarm	Only ON/OFF configuration: suction pressure is lower than Cut out value and lower than parameter D29 for D12 time DGT compressor main configuration: suction pressure is lower than D29 for D12 time	Warning signal only	Suction pressure increase than parameter D29 or Cut out value
E44	Discharge line temperature alarm	Discharge line temperature higher than D22 for D24 seconds	The compressor will be tripped	Automatically: discharge line temperature lower than D23 setting and D25 delay time out
L44	Discharge line temperature lockout	Discharge line temperature over-heat happened for D26 times within one hour	The compressor will be locked(if D26 equal to 0, compressor no lockout)	Hold "start" button for 5s or manual power on and off(if D26 equal to 0, compressor automatically start when discharge line temperature lower than D23 setting and D25 delay time out)
E45	High condenser pressure alarm	Condenser pressure larger than E58 for E59 minutes	The compressor is activated according to E60	Automatically: as soon as condenser pressure lower than E61
E46	High condenser temperature alarm	Condenser temperature larger than E58 for E59 minutes	The compressor is activated according to E60	Automatically: as soon as condenser temperature lower than E61
E47	EXV full open in EVI	EXV full open for F40 minutes	Warning signal only	Automatically: as soon as EXV is not at maximum steps
E48	Refrigerant shortage error in EVI	EXV full open and PHE super heat is larger than (F28/F29.../F37 + F39) (F28/F29.../F37 depends on refrigerant type)	Warning signal only	Automatically: as soon as PHE super heat is lower than (F28/F29.../F37 + F39)

Code	Description	Cause	Action	Reset
E49	Pump down alarm	When liquid line solenoid is off, and time out MPd/G11 time is over after the time MPd/G11, compressor is still on	Warning signal only	Automatically
E50	High side flood back alarm	The differential temperature between discharge and mid-coil is lower than H21 for accumulated H22 minutes in H23 minutes	Warning signal only	Automatically: as soon as differential temperature between discharge and mid-coil is larger than H21 for H24 minutes
E51	Cold start alarm	Discharge line temperature is high than parameter D31 setting or suction pressure is lower than parameter D32 setting	It is used for DGT compressor, during alarm time, the DGT compressor output is 50%	Automatically: Condenser probe temperature is high than C13
L51	Cold start lockout alarm	Cold start alarm times due to suction pressure is more than parameter D34 setting or cold start alarm times due to discharge line temperature is more than parameter D33 setting	DGT compressor turns off and is lockout	Hold "start" button for 5s or manual power on and off
E52	liquid watch	Digital input for Liquid receiver level open	Warning signal only	Verify the gas charge ; Check for Leaks
E53	com dig down	Digital input for digital compressor open and DGT compressor active	Warning signal only	Verify the compressor protection
E54	com fix down	Digital input for fixed compressor open and compressor active	Warning signal only	Verify the compressor protection

Code	Description	Cause	Action	Reset
E55	Fan failure	Fan alarm contact open	Warning signal only	Verify fans protection
E60	Max pressure alarm of superheating	When the temperature which converts from suction pressure rises above the set threshold (MoP/L08) for the time dMP/L10	See Paragraph	The MOP control ends when the superheat is lower than the set point of superheating
E61	Min pressure alarm of superheating	When the temperature which converts from suction pressure falls below the set threshold (LoP/L09) for the time dLP/L11	0	The LOP control ends when the temperature rises to 4 °C over the threshold of LoP/L09 or in case of superheating under the SET low superheat when the temperature is in [LOP,LOP+4°C]
E62	High superheating alarm	If the superheat remains > HSH/L04 for HSd/L06	Valve is opened at (HSt/M01).	Automatically with the SH . condition
E63	Low superheating alarm	If superheat < LSH/L03	Valve will slowly close to the LSt/M02	Automatically with the SH. condition
E64	High room temperature alarm	If (temperature > (ALU/G48	Warning signal only	If (temperature <= (ALU/G48-AHY/G50)) Reset
E65	Low room temperature alarm	If (temperature < (ALL/G49	Warning signal only	If (temperature >= (ALL/G49+AHY/G50))
E66	Door open alarm	If the door is open longer than dSA/G53	Warning signal only if rrd/G09 is no Alarm with compressor will be tripped if rrd/G09 is yes	Manual or automatic – see beside
E80	RTC warning, date not correct	HW problem in the board	Disable the RTC, or change the board	0
E81	RTF warning, communication error	HW problem in the board	Disable the RTC, or change the board	0

Code	Description	Cause	Action	Reset
E82	Probe configuration error	Same probe configuration present in Probe Configuration List (P3, P4, P5, P6, P7). For example, A13 = Ambient Temp(NTC10K), A15 = Ambient Temp(NTC10K);	Correct the wrong configuration	Board need to be reset
E83	DI configuration error	Same digital input configuration present in DI Input Configuration List(DI1, DI2, DI3). For example, R04 = Door switch, R07 = Door switch	Correct the wrong configuration	Board need to be reset
E84	Compressor configuration error	Case 1 0: DGS compressor relay is configured, no digital solenoid configuration; Case 1: DGS compressor relay is configured, no digital solenoid configuration; Case 2: no DGS compressor relay configuration, digital solenoid is configured; Case 3: C05 = 3, DGS compressor relay and digital solenoid are configured;	Correct the wrong configuration	Board need to be reset
E85	Injection probe configuration error	Injection EXV output mode is selected, but no relevant sensors	Injection EXV will not work	Automatically: as soon as the injection EXV is configured exactly
L86	EEPROM R/W error (manual)	HW problem in the board	Change the board	0

Table 22: Alarm code overview

Appendix 5: Temperature / resistance curve for B7 Sensor (customer option)

R25 = 10kΩ B25/85=3435K

Temp. [°C]	Resistance [kΩ]	Temp. [°C]	Resistance [kΩ]	Temp. [°C]	Resistance [kΩ]	Temp. [°C]	Resistance [kΩ]	Temp. [°C]	Resistance [kΩ]	Temp. [°C]	Resistance [kΩ]
-50	329.2	-21	71.07	8	19.48	37	6.468	66	2.512	95	1.108
-49	310.7	-20	67.74	9	18.70	38	6.246	67	2.437	96	1.080
-48	293.3	-19	64.54	10	17.96	39	6.033	68	2.365	97	1.052
-47	277.0	-18	61.52	11	17.24	40	5.829	69	2.296	98	1.025
-46	261.3	-17	58.65	12	16.55	41	5.630	70	2.229	99	0.999
-45	247.5	-16	55.95	13	15.90	42	5.439	71	2.163	100	0.974
-44	234.1	-15	53.39	14	15.28	43	5.256	72	2.101	101	0.949
-43	221.6	-14	50.95	15	14.68	44	5.080	73	2.040	102	0.925
-42	209.8	-13	48.66	16	14.12	45	4.912	74	1.981	103	0.902
-41	198.7	-12	46.48	17	13.57	46	7.749	75	1.924	104	0.879
-40	188.4	-11	44.44	18	13.06	47	4.594	76	1.870	105	0.858
-39	178.3	-10	42.45	19	12.56	48	4.444	77	1.817	106	0.836
-38	168.9	-9	40.56	20	12.09	49	4.300	78	1.766	107	0.816
-37	160.1	-8	38.76	21	11.63	50	4.161	79	1.716	108	0.796
-36	151.8	-7	37.05	22	11.20	51	4.026	80	1.669	109	0.777
-35	144.0	-6	35.43	23	10.78	52	3.897	81	1.622	110	0.758
-34	136.6	-5	33.89	24	10.38	53	3.772	82	1.577	111	0.740
-33	129.7	-4	32.43	25	10.00	54	3.652	83	1.534	112	0.722
-32	123.2	-3	31.04	26	9.632	55	3.537	84	1.492	113	0.705
-31	117.1	-2	29.72	27	9.281	56	3.426	85	1.451	114	0.688
-30	111.3	-1	28.47	28	8.944	57	3.319	86	1.412	115	0.672
-29	105.7	0	27.28	29	8.622	58	3.216	87	1.374	116	0.656
-28	100.4	1	26.13	30	8.313	59	3.116	88	1.337	117	0.641
-27	95.47	2	25.03	31	8.015	60	3.021	89	1.301	118	0.626
-26	90.80	3	23.99	32	7.725	61	2.928	90	1.266	119	0.611
-25	86.39	4	22.99	33	7.455	62	2.838	91	1.233	120	0.597
-24	82.22	5	22.05	34	7.192	63	2.752	92	1.200		
-23	78.29	6	21.15	35	6.941	64	2.669	93	1.169		
-22	74.58	7	20.30	36	6.699	65	2.589	94	1.138		

Table 23: B7 A17 optional sensor >> Temperature / resistance curve

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