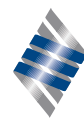
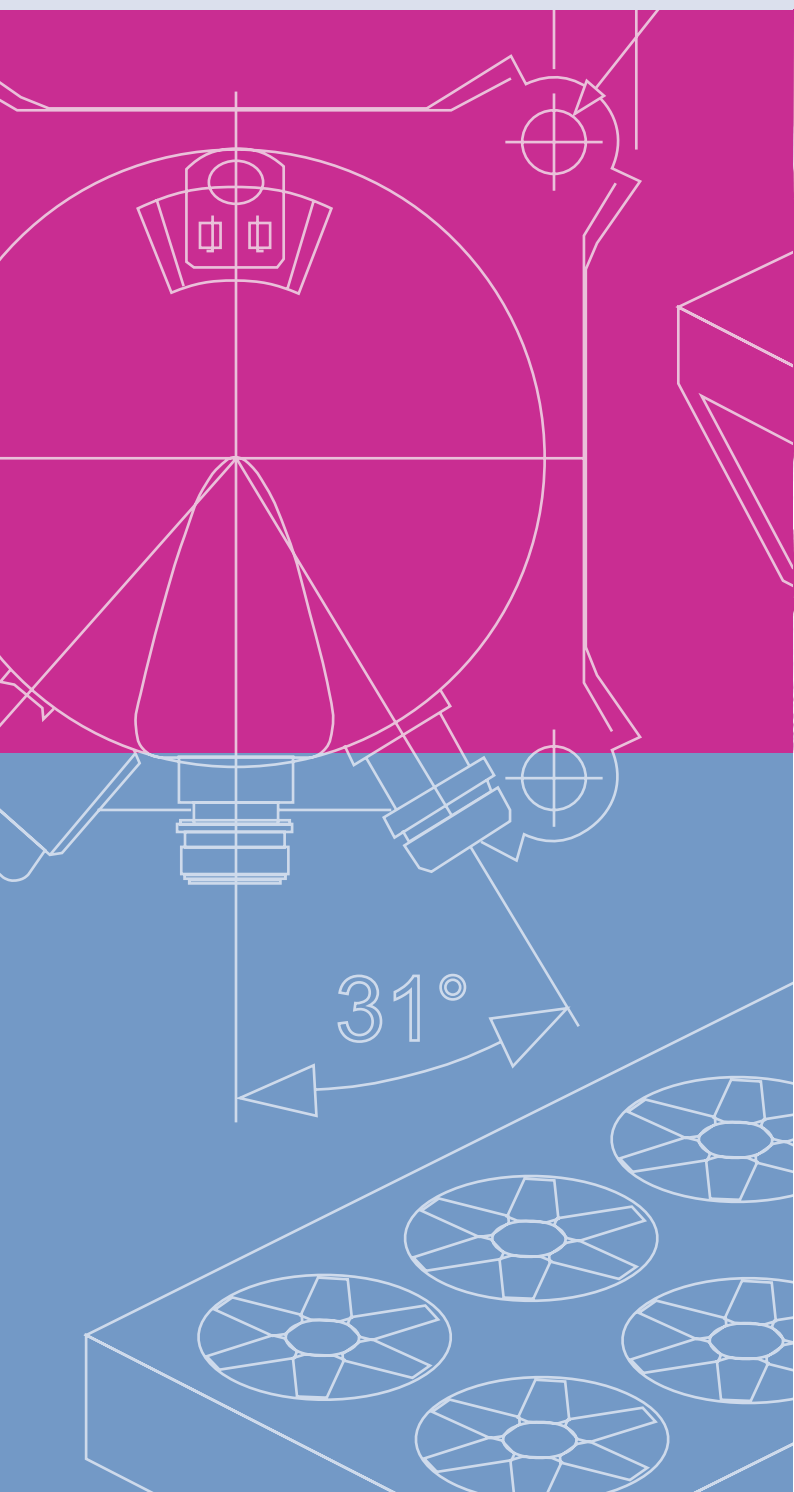


Copeland®
EasyCool™

Outdoor Condensing Units ZX Range



EMERSON™
Climate Technologies

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1 Safety instructions







Copeland EazyCool™ ZX 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 EC Machines directive. 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 Manufacturers Declaration, available on request.

These instructions should be retained throughout the lifetime of the compressor as well as 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 employed only for 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.



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.



IMPORTANT

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

The contractor is responsible for the installation of the unit and should ensure sufficient liquid sub-cooling in the line to the expansion valve(s) to avoid “flash-gas” in the liquid line.

2 Product description

2.1 Common information about Copeland EazyCool™ ZX condensing units

Emerson Climate Technologies has developed the Copeland EazyCool™ ZX outdoor condensing unit of second generation to meet primarily the demands of the food retail services and logistics 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. With a large condenser, low-speed fan design coupled with built-in fan speed control, the new Copeland EazyCool™ ZX product offers a refrigeration condensing unit especially designed for quiet operation.

2.2 About this guideline

This guideline is intended to enable users to ensure the safe installation, starting, operation and maintenance of Copeland EazyCool™ ZX condensing units.

This guideline is not intended to replace the system expertise available from system manufacturers.

For additional information, please refer to the Product Catalogue or to the Copeland® brand products Selection Software available on www.emersonclimate.eu.

2.3 Product range

Copeland EazyCool™ ZX outdoor condensing units are released for R404A / R507 only. They have two cabinet sizes and are equipped with one or two fans. Depending on the compressor in use they are designed for medium temperature or low temperature refrigeration applications.

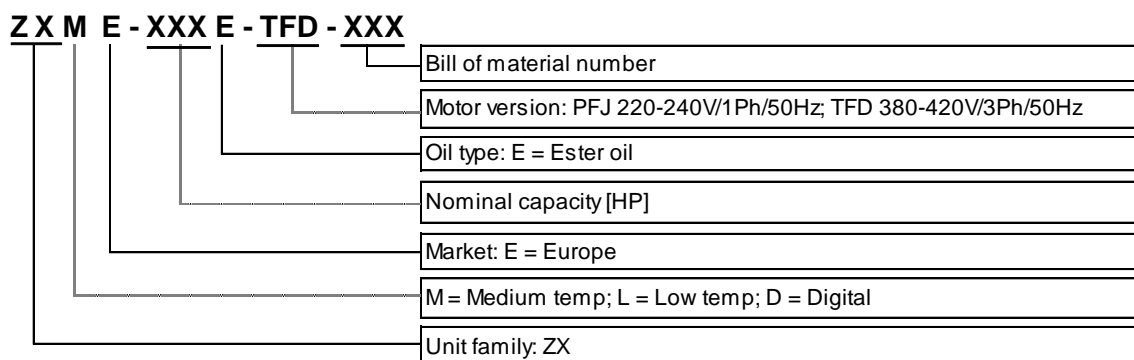
2.4 Product nameplate

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

The compressor has its own nameplate with all electrical characteristics.

2.5 Nomenclature

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



2.6 Application range

2.6.1 Qualified refrigerants and oils

Qualified refrigerants	R404A/R507					
Qualified servicing oils	Emkarate RL 32 3MAF					
	Mobil EAL Arctic 22 CC					
Oil charge medium temp (litre)	ZXME020E/025E	ZXME030E	ZXME040E	ZXME050E	ZXME060E	ZXME075E
	1	1.1	1.85	1.85	1.85	1.85
Oil charge low temp (litre)	ZXLE020E	ZXLE030E	ZXLE040E	ZXLE050E	ZXLE060E	
	1.1	1.1	1.75	1.75	2.3	
Oil charge Digital (litre)			ZXDE040E	ZXDE050E	ZXDE060E	ZXDE075E
			1.24	1.77	1.77	1.77

Table 1: Qualified refrigerants and oils

2.6.2 Application limits

For application envelopes, please refer to the compressor application envelopes available in Copeland® brand products Selection Software.

ZX Units can be used with a surrounding temperature from -30°C to 48°C.

Medium temperature range (ZXME/ZXDE)

Evaporating temperature from -20°C to 7°C. Ambient temperature range dependant on model. Refer to Copeland® brand products Selection Software or literature for further information.

Low temperature range (ZXLE)

Evaporating temperature from -40°C to 0°C. Ambient temperature range dependant on model. Refer to Copeland® brand products Selection Software or literature for further information.

2.7 Main component description

2.7.1 Compressor

Medium temperature		Low temperature	
Unit model	Compressor model	Unit model	Compressor model
R404A/R507		R404A/R507	
Standard			
ZXME020E	ZX15KCE-TFD/PFJ	ZXLE020E	ZXI06KCE-TFD
ZXME025E	ZX19KCE-TFD/PFJ	ZXLE025E	ZXI08KCE-TFD
ZXME030E	ZX21KCE-TFD/PFJ	ZXLE030E	ZXI09KCE-TFD
ZXME040E	ZX29KCE-TFD/PFJ	ZXLE040E	ZXI14KCE-TFD
ZXME050E	ZX38KCE-TFD	ZXLE050E	ZXI15KCE-TFD
ZXME060E	ZX45KCE-TFD	ZXLE060E	ZXI18KCE-TFD
ZXME075E	ZX51KCE-TFD		
Digital			
ZXDE040E	ZBD29KQE-TFD		
ZXDE050E	ZBD38KQE-TFD		
ZXDE060E	ZBD45KQE-TFD		
ZXDE075E	ZBD48KQE-TFD		

Table 2: Compressor types used in ZX condensing units

2.7.2 Condenser fan(s)

The condensers of the ZX condensing units are equipped with single-phase fans.

Condensing units			Nr of fans pcs	Fan speed (rpm)	Diameter (mm)	Voltage V/ph/Hz	Power input (W)
Medium temperature		Low temperature					
Standard	Digital						
ZXME020E		ZXLE020E	1	830	450	220-240 / 1 / 50	116
ZXME025E		ZXLE025E					
ZXME030E		ZXLE030E					
ZXME040E		ZXLE040E					
	ZXDE040E		2				246
ZXME050E	ZXDE050E	ZXLE050E					
ZXME060E	ZXDE060E	ZXLE060E					
ZXME075E	ZXDE075E						

Table 3: Condenser fans technical data

2.7.3 P & I Diagram for ZX** & ZXD** units

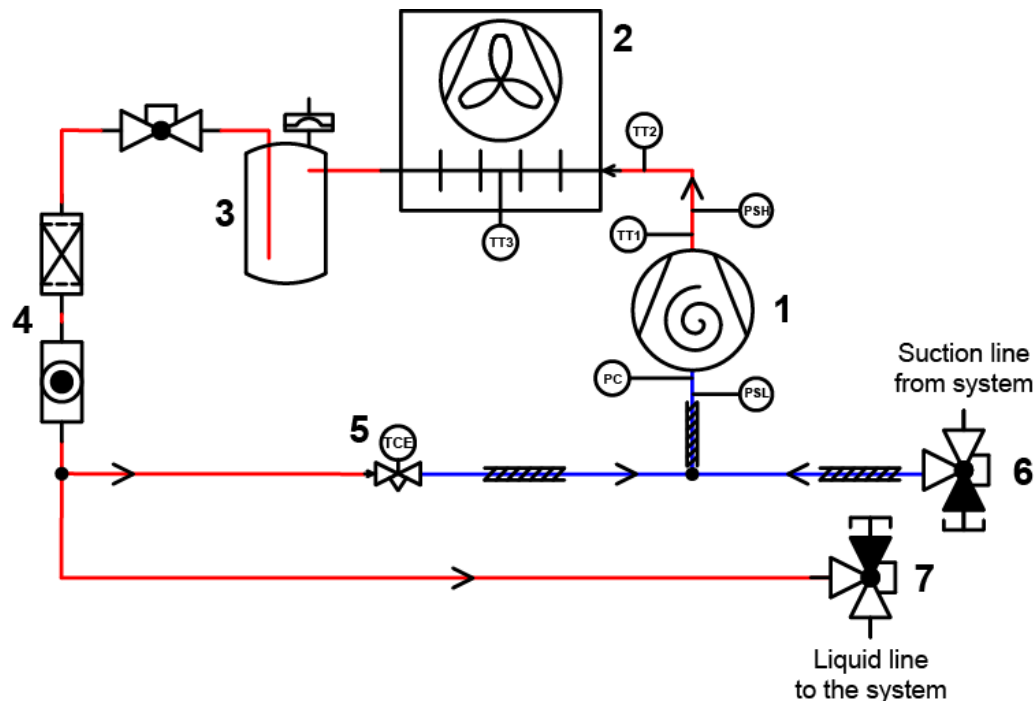


Figure 1

Legend

- 1.....High efficient Copeland Scroll ZX (ZBD for Digital)
- 2.....Condenser with 1 or 2 fans
- 3.....Liquid receiver with burst disk & service valve
- 4.....Filter drier / sight glass combination
- 5.....Expansion device for suction line injection
- 6.....Suction line service valve
- 7.....Liquid line service valve

PSL.....Pressure safety switch, not adjustable, low pressure

PSH ...Pressure safety switch, not adjustable, high pressure

PC.....Pressure switch, adjustable, low pressure

TT1Discharge temperature sensor

TT2Condenser inlet temperature sensor

TT3Condenser coil temperature sensor

2.7.4 P & I Diagram for ZXL** units

IMPORTANT
No insulation on liquid line! Air moisture condensation and lack of performance! Moisture from air will condensate on the liquid line and water will rain from the tube. 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 ZX unit and the evaporator.

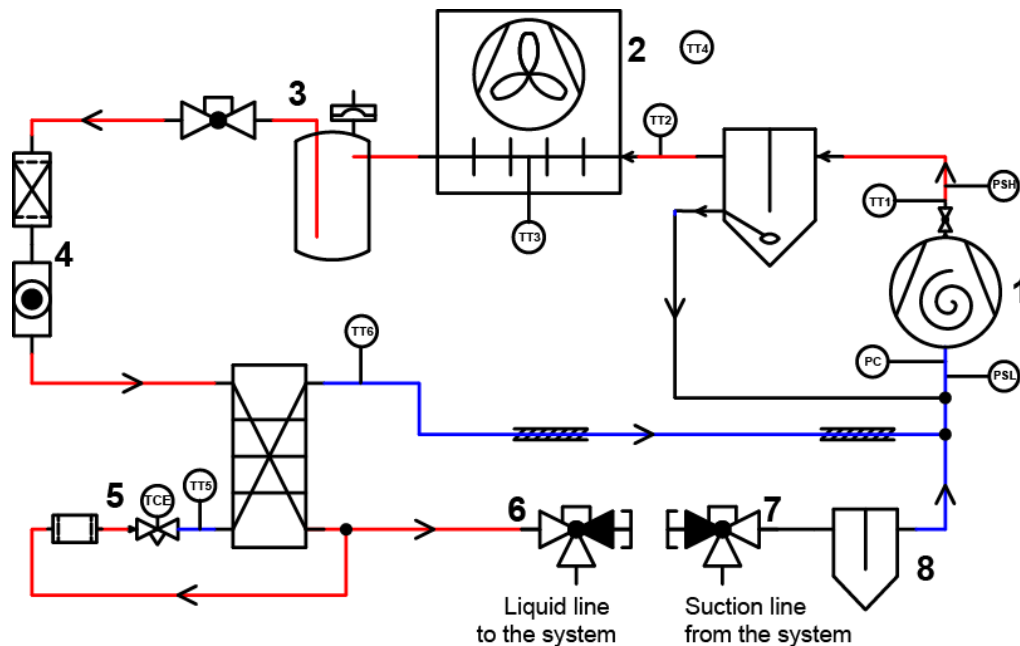


Figure 2

Legend

- 1.....High efficient Copeland Scroll ZX
- 2.....Condenser with 1 or 2 fans
- 3.....Liquid receiver with burst disk & service valve
- 4.....Filter drier / sight glass combination
- 5.....Expansion device & filter for enhanced vapour injection (EVI)
- 6.....Liquid line service valve
- 7.....Suction line service valve
- 8.....Liquid separator

- PSL....Pressure safety switch, not adjustable, low pressure
 PSH ...Pressure safety switch, not adjustable, high pressure
 PC.....Pressure switch, adjustable, low pressure
 TT1Discharge temperature sensor
 TT2Condenser inlet temperature sensor
 TT3Condenser coil temperature sensor
 TT4Ambient temperature sensor
 TT5Vapour in temperature sensor
 TT6Vapour out temperature sensor

2.8 Electronic board control and operating features

The function of the electronic board is to react to the On/Off signals received from devices such as thermostat to operate and protect the ZX unit. The electronic board control panel is fitted as standard and has been developed along with the compressor to provide the following control and protection systems:

2.8.1 Electronic board features

Automatic liquid injection: The electronic board automatically instructs cool liquid refrigerant to be injected into the suction line of the Scroll compressor to reduce discharge temperatures generated when the unit operates at increasing compression ratios. The electronic board controller reacts automatically to a thermistor which is attached to the discharge line on all ZXME and ZXLE models. The controller converts this signal for the linear stepper motor driving the liquid injection valve to a position that enables the compressor to continue operating within its safe envelope.

Compressor phase reversal (ZXME/ZXLE): Ensures that the compressor remains running in one direction only – 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 (ZXME/ZXLE): is provided (also via the electronic board) eliminating the need for external current protection for the compressor motor.

Fixed low-pressure and high-pressure switches (ZXME): These are non-adjustable protection devices to prevent the compressor operating outside of its safe evaporating and condensing pressure ranges. Reset is automatic for a set number of trips, and then the unit will lock out and require manual restart. The latter feature is important to prevent the ZX unit cycling under these controls for a long period of time.

A **crankcase heater** is wired through a normally closed contact of the compressor contactor in the usual manner, becoming energized whenever the compressor cycles off.

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

- **Liquid line assembly** (filter drier and sight glass/moisture indicator) - fitted
- **Anti corrosion treatment to the condenser fins** - supplied as standard
- **Adjustable LP switch** for low-pressure pump down control - fitted

The electronic board is also the **base controller** for the connection of many **optional** and **customer supplied** functions such as:

- **Main load controller** (or thermostat)
- **Evaporator electric defrost heater contactor**
- **Evaporator fan contactor**
- **Diagnostic module:** This module provides the ZX with a self-diagnostic function, signalling individual component failure in three ways:
 - **Visible LED combination** (supplied with ZXME/ZXLE);
 - **Remote audible buzzer** (supplied with ZXLE);
 - **A "ring out" dial connection** for the purpose of sending a common fault signal through a telephone service to a remote location.

2.8.2 Electronic board description

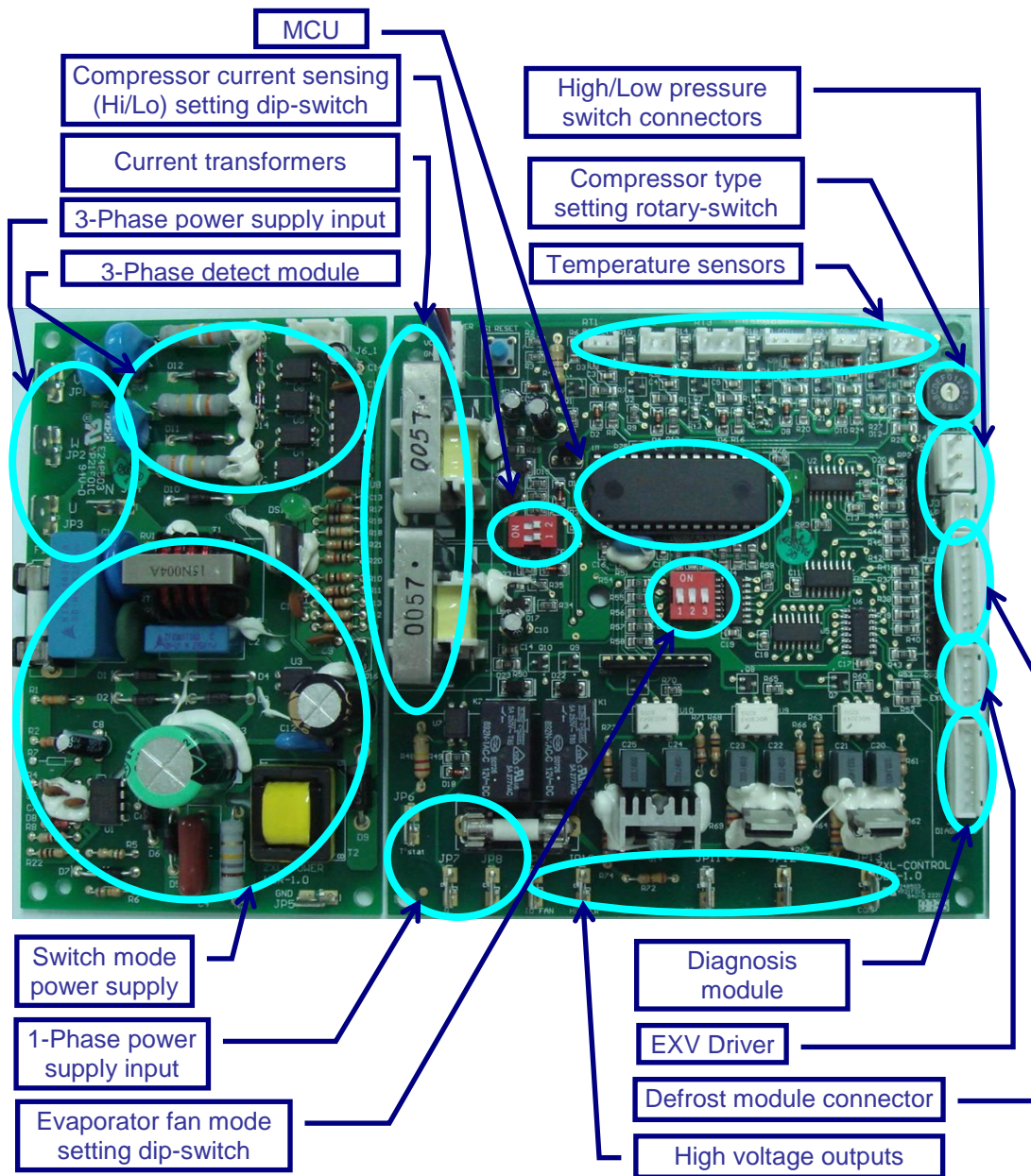


Figure 3: Electronic board

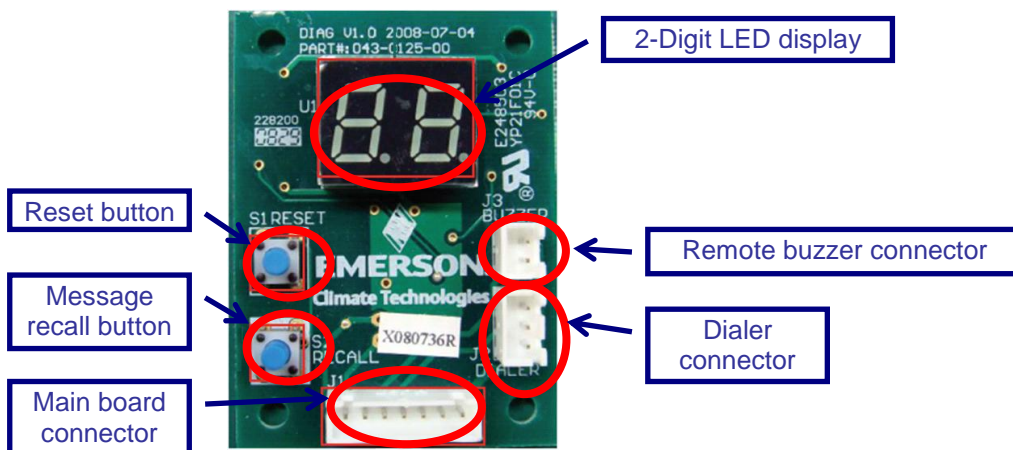


Figure 4: Diagnostic module

2.8.3 Diagnostic signals (only on ZXME & ZXLE models)

LED1-Unit Status		LED2-Error/Warning Code	
Display	Status	Display	Error/Warning
0	Idle (Stop When Reach To Set-point)	0	No error/warnings
1	Run	1	Compressor Phase Error (Wrong Phase Sequence/Loss Of Phase)
2	About To Start ¹	2	Compressor Inside Thermal Protector Trip
3	Defrost	3	Compressor Over Current
4	Stop Due To Error	4	Discharge Gas Overheat
5	Lockout	5	Compressor High Pressure Cut Out
		6	Compressor Low Pressure Cut Out ²
		7	DLT Thermistors Failure
		8	Ambient Temperature Sensor Failure
		9	Mid-coil Temperature Sensor Failure
		A	PHE Vapor In Temperature Sensor Failure or over range ³
		C	PHE Vapor Out Temperature Sensor Failure or over range ³
		E	System Liquid Flood Back Warning

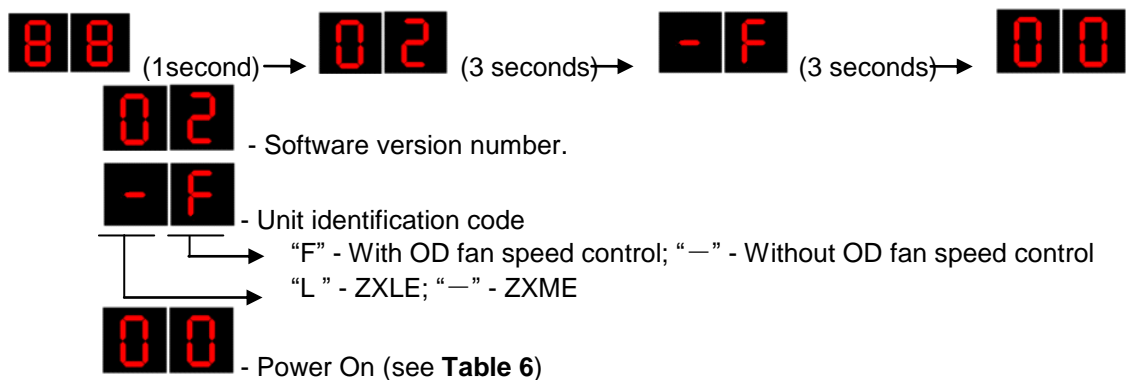
Note:

- ¹ This signal is for Fresh Start, Normal Start Program and any start request delay.
- ² "LP Cutout" signal is not applicable in ZXLE condensing unit.
- ³ PHE Vapor In/Out Temperature Sensor is not applicable in ZX medium temperature condensing unit.

Table 4: Description of diagnostic signals

NOTE: All error/warning messages are priority-ranked from highest to lowest.

If unit is initially powered on, the diagnosis module will show signals as follows:



Unit type	OD fan speed control	Software version no.	Unit identification code
ZXME	Yes	02	- F
ZXLE	Yes	00	L F

Table 5: Initialization signals

Events		LEDs	Events	LEDs
Unit Off / Phase "U" or "N" missing		Off		
Power On	W/O error	00	DLT Thermistor Failure	When compressor On 17
Compressor On	W/O error	10		When compressor Off 07
Compressor about to turn On O,1	W/O error	20		Try To Restart (Only in ZXL Unit) 27
Defrost	W/O error	30	Compressor High Pressure Cut-out	Try to restart 25
Discharge Gas Overheat Error	Try to restart	24		System lock 55
Outdoor Ambient Temp. Sensor Failure	When compressor On	18	Compressor Over Current	Try to restart 23
	When compressor Off	08		System lock 53
Condenser Mid-coil Temp. Sensor Failure	When compressor On	19	Compressor Wrong Phase Sequence / Loss of Phase	Try to restart 21
	When compressor Off	09		When Compressor Off 41
Compressor Low Pressure Cut-out	Try to restart	26	PHE Vapour Inlet Temp. Sensor Failure (only ZXL)	When compressor On 1A
				When compressor Off 0A
Warning – System Liquid Floodback	When compressor On	1E	PHE Vapour Outlet Temp. Sensor Failure (only ZXL)	When compressor On 1C
				When compressor Off 0C
Warning – Compressor intends to start but current transformers sense no current				12

Table 6: Common signals

2.9 Electronic controller XC645

The XC645 electronic controller has been specially developed for condensing units. All Digital EazyCool[™] ZXDE condensing units are equipped with this controller.

The electronic controller enables:

- Compressor modulation and / or staging based on suction pressure;
- TTL / RS485 communication;
- Alarm messaging.



Figure 5: Electronic controller XC645

The controller has been pre-programmed with a number of parameter values that are most likely correct for common applications. Individual installation requirements however may make it necessary to alter parameter settings.

One functional target of the compressor controller is to maintain the suction pressure at a defined value by varying the available compressor capacity.

The control function for the condenser fans is to maintain the condensing pressure at a defined value. This is done by varying the fan speed.

2.9.1 Function keys

SET....(SET)

Standard visualization: To see or modify the set point. In the programming mode it selects a parameter or confirms an operation.

ALARM menu: Press the key for **3 seconds** to erase the current alarm.

▲....(UP)

In programming mode: This browses the parameter codes or increases the displayed value.

With Hot key inserted: This starts the Hot key programming procedure.

To access the INFO menu: Push and release to access the INFO menu.

▼....(DOWN)

In programming mode: This browses the parameter codes or decreases the displayed value.

Start

....**Manual restart of loads:** Press the key for **3 seconds** to switch on again the loads that were previously locked by a safety digital input alarm.



🔧



....**MAINTENANCE/CLOCK:** To display the loads running hours. Press the key for **3 seconds** to enter the **MAINTENANCE** menu.



📖!

....**To access the ALARM menu.**

2.9.2 Key combinations

 +  To lock and unlock the keyboard.







 +  To enter the programming mode.



 +  To leave the programming mode.

2.10 Parameters

2.10.1 Refrigerant selection

The pre-set refrigerant is **R404A**. If another refrigerant is used, follow the procedure below:

1. Enter the Programming mode by pressing  and  simultaneously for 3 seconds.
2. Select the “Pr2” parameter and enter the password **3 2 1 0**.
3. Select the “FtyP - kind of refrigerant” parameter.
4. Press : the value of the parameter will start blinking.
5. Press  or  to select the refrigerant: **r22** = R22; **r404** = R404A; **507** = R507; **134** = R134a.
6. Press  to store the new value and move to the following parameter.



To exit: press  and  simultaneously or wait for 90 seconds without pressing any key.



Value to show on the display:

UPPER DISPLAY	LOWER DISPLAY	ICONS
Suction temperature or pressure	Discharge temperature or pressure	1- Working loads 2- Measurement unit 3- Alarm or status icons







2.10.2 Parameter modification


▪ How to see the set point of compressors and/or fans

1. Press and release the  key.
2. The lower display will show the “SEtC” label, while the upper display will show its value in °C relative to suction pressure.
3. To see the fan set point, press  again.
4. The lower display will show the “SEtF” label, while the upper display will show the fan set point in °C relative to condensing pressure.

To exit: press  and  simultaneously or wait for 90 seconds without pressing any key.

▪ How to modify the set point of compressors and/or fans

1. Press  for more than 2 seconds.
2. The lower display will show the “SEtC” label, while the upper display will show its value flashing.
3. To change the set value, press  or  within 30 seconds.
4. To memorize the new value and continue to the fan set point, press .
5. The lower display will show the “SEtF” label, while the upper display will show the fan set point flashing.
6. To change the value, press  or  within 30 seconds.

To exit: press **SET** and  simultaneously or wait for 90 seconds without pressing any key.

NOTE: More detailed information on the controller functions can be found in the dedicated XC645 operating instructions.

2.11 Compressor / Unit setting

Each ZX unit model has a unique compressor model and this has to be programmed in the set-up of the electronic board controller. For this purpose a compressor rotary switch is located near the top right-hand corner of the electronic board (see **Fig. 3** on page 8). This is factory set and should not be re-set after leaving the factory. Any tampering with this compressor rotary switch may result in any warranty claim becoming null and void.

For maintenance purposes only: any replacement electronic board needs to be configured according to the compressor use (see recommended electronic board switch settings in **Table 7**).

NOTE: Switches must be set to the right position according to compressor model.

Compressor model		Rotary switch	2-bit Dip-switch	3-bit Dip-switch
Medium temperature	Low temperature			
		0	On/On	Off/Off/Off
ZX15KCE-TFD	ZX06KCE-TFD	1	On/On	Bit 1: To set evaporator fan control mode - "Off": Evaporator fan On/Off logic same as compressor - "On": Evaporator fan will be On all the time whether compressor is On, Off or defrosting Bit 2 and Bit 3 must be set as Off
ZX21KCE-TFD	ZX08KCE-TFD	2	On/On	
ZX30KCE-TFD	ZX09KCE-TFD	3	On/On	
ZX38KCE-TFD	ZX11KCE-TFD	4	On/On	
ZX45KCE-TFD	ZX14KCE -TFD	5	On/On	
ZX51KCE-TFD	ZX15KCE-TFD	6	On/On	
ZX15KCE-PFJ	ZX18KCE-TFD	7	On/On	
ZX19KCE-PFJ		8	On/On	
ZX21KCE-PFJ		9	On/On	
ZX29KCE-PFJ		A	Off/Off	

Table 7: Setting of switches (only for ZXME & ZXLE models)

2.12 Fresh Start Program

This "Fresh Start Program" is a bump start procedure that will energize and start the compressor for 3 seconds then stop it for a 20-second off-cycle time. This will occur for 3 cycles then continuous power will be supplied to the compressor for normal operation.

The "Fresh Start Program" will be executed on initial start up or anytime power is reapplied when the ambient temperature is lower than 35°C. In addition the "Fresh Start Program" will be executed for any start when the unit has been cycled off for more than an hour when the ambient temperature is lower than 35°C.

2.13 Stop Program

When the unit reaches the target setting or there is an error which requires the unit to be shut down, the controller will execute a Stop Program. The compressor and the condenser fan will cycle off and the injection valves will close.

For ZXLE units with vapour injection, the EXV will close immediately when the unit is switched off, but the compressor will delay shutdown for 5 seconds to prevent reverse rotation.

2.14 Automatic liquid injection

Automatic liquid injection ensures that the scroll compressor operates within safe temperature limits. ZX condensing units use a patented liquid injection system that injects a saturated refrigerant into the suction line at the compressor. A thermistor attached to the compressor discharge line activates the liquid injection valve. A signal is sent to the stepper motor of the injection valve, opening the valve in response to increasing discharge temperature, which injects saturated refrigerant to reduce the discharge temperature.

2.15 Compressor motor protection

The electronic board protects the compressor motor against the following:

- over current;
- loss of any one phase;
- incorrect phase rotation.

If the compressor motor current exceeds a pre-defined (non-adjustable) current limit, then the electronic board shuts down the unit and generates an error signal to the LED's on the board. For this function to operate, two of the main phase supply lines to the compressor (compressor via the contactor) are routed through the current abnormality coils.

2.16 Compressor pressure protection

2.16.1 High pressure switch

A sensor is registered by the electronic board. The sensing device is a non-adjustable, high-pressure switch that will open in the event of an abnormally high discharge pressure (above 30 bar).

- The unit will stop then restart automatically after a 3-minute delay and after unit pressure has decreased to 24 bar.
- After 5 successive HP cut-outs over 1 hour, the unit will lock out.

2.16.2 Low pressure switch

Fixed LP switch cut-out (ZXME): In a similar way to the high-pressure sensor, the electronic board registers the switching action of a non-adjustable, low-pressure switch that will open in the event of an abnormally low suction pressure (below 1 bar).

- The unit will stop then restart automatically after a 3-minute delay and when unit pressure reaches 2 bar.

Adjustable LP cut-out: There is an adjustable LP cut-out in all ZXME and ZXLE units with pre-settings as follows:

- ZXME models: 4 bar(g) cut-in and 2 bar(g) differential cut-out.
- ZXLE models: 2 bar(g) cut-in and 2 bar(g) differential cut-out.

For units with Digital Scroll compressors (ZXDE) the low pressure adjustments are made by means of the electronic controller.

2.17 Other inputs to the board

2.17.1 Customer-supplied control (thermostat)

The electronic board accepts a normal 220 volt AC input On/Off 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 system (see wiring diagrams in **Appendices 1 to 4**). If the system is controlled by low-pressure cut-out for a multiple evaporator system and/or pump down system, the electronic board accepts signals directly from an adjustable low-pressure switch (optional).

2.17.2 Case temperature controller

An alternative method of system temperature control can be used. The electronic board accepts an input from a common commercial thermostat.

2.17.3 Condenser coil & ambient air thermistors

These two thermistor-type sensors are supplied by Emerson Climate Technologies and are connected to the electronic board for condenser fan speed control. This is usually applicable where low ambient and (sometimes) low condensing temperatures are likely to adversely affect refrigeration performance and control.

2.18 Other outputs from the electronic board

2.18.1 Liquid line solenoid valve (not supplied)

An On/Off output connection is provided and wired to the main terminal strip for convenience of installation. This will assist the customer in wiring the liquid line solenoid valve coil into the unit. When the customer uses LP switch for pump down system, the solenoid valve should be driven by customer thermostat.

NOTE: The solenoid valve has to be fitted externally by the customer. The solenoid coil voltage rating must be 220VAC and the board can accommodate current ratings of 30VA (hold) or 300VA (inrush). If the rating of the solenoid coil is above the limit, please use a proper contactor to control the valve instead of connecting the solenoid coil to the board directly.

2.18.2 Defrost heater contactor coil (not supplied)

An On/Off output connection is provided on the electronic board for direct connection of a customer-supplied contactor (coil) for convenience of installation when the defrost option is included. Terminals are male spade type. Coil voltage rating should be 220VAC and current ratings 30VA (hold) and 330VA (inrush).

2.18.3 Evaporator fan contactor coil (not supplied)

An On/Off output connection is provided on the electronic board for direct connection of a customer supplied contactor (coil) for convenience of installation when the evaporator fan is included. Terminals are male spade type. Coil voltage rating should be 220VAC and current ratings 30VA (hold) and 330VA (inrush).

2.18.4 Alarm output

In case of an alarm status as indicated by the diagnostic module the unit supplies a 12VDC alarm signal which can be connected to a buzzer or other indicating device (see wiring diagrams in **Appendices 1 to 4**). In idle condition this signal is 3VDC.

2.19 Dimensions in mm

The figures hereafter show the overall dimensions of the ZX condensing units:

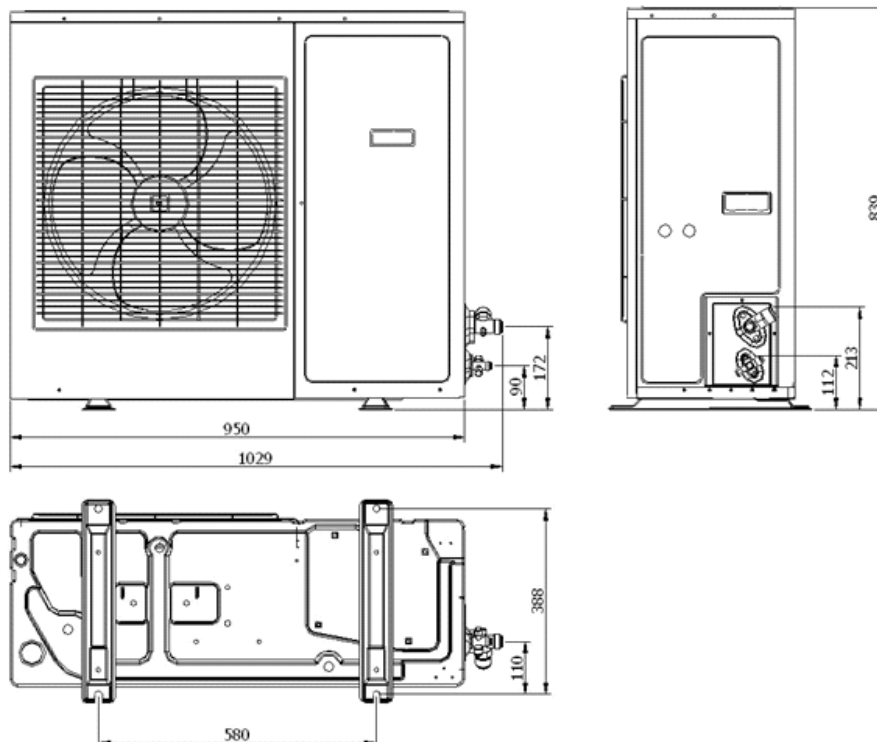


Figure 6: Physical dimensions of models ZXME020E, ZXME025E, ZXME030E & ZXME040E and models ZXLE020E, ZXLE030E & ZXLE040E (single-fan units)

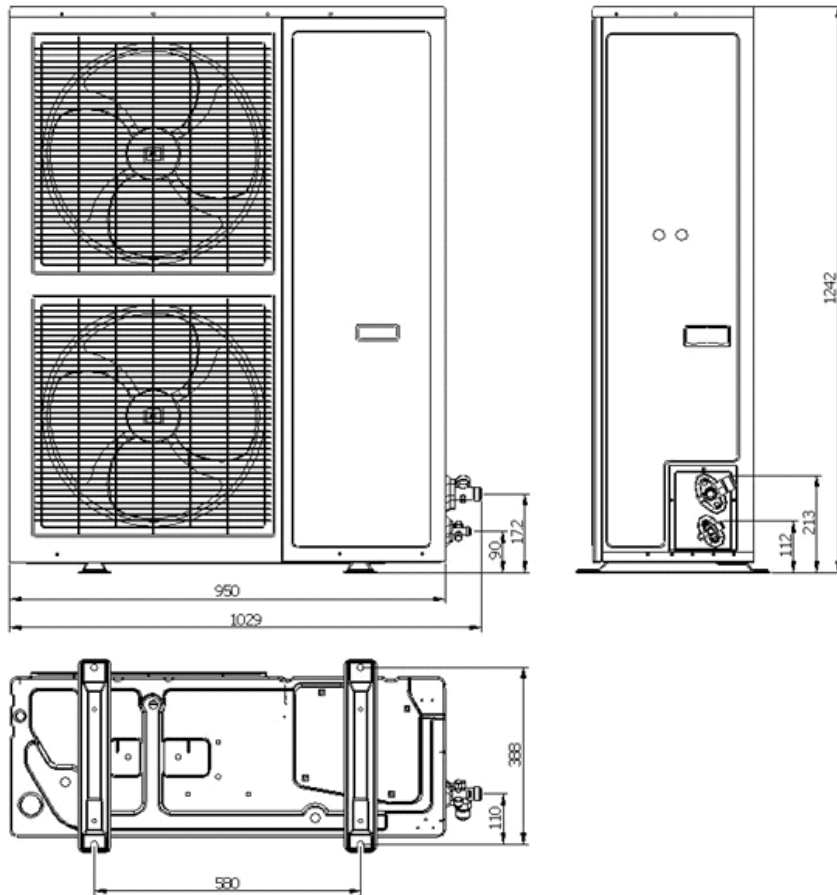


Figure 7: Physical dimensions of models ZXME050E, ZXME060E, ZXME075E, ZXDE040E, ZXDE050E, ZXDE060E, ZXDE075E, ZXLE050E & ZXLE060E (dual-fan units)

3 Installation



WARNING

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

Copeland EazyCool[™] ZX condensing units are delivered with a holding charge of neutral gas.

The condensing unit should be located 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 Condensing unit handling

3.1.1 Transport and storage



WARNING

Risk of collapse! Personal injuries! Move condensing unit only with appropriate mechanical or handling equipment according to weight. Keep in the upright position. Stack pallets on top of each other when not exceeding 300 kg. Do not stack single boxes on top of each other. Keep the packaging dry at all times.

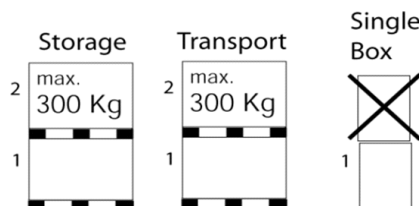


Figure 8

3.1.2 Weights

Condensing units					
Standard compressors				Digital compressors	
Medium temperature	Weight (kg)	Low temperature	Weight (kg)	Medium temperature	Weight (kg)
ZXME020E	76	ZXLE020E	79		
ZXME025E	79	ZXLE025E	81		
ZXME030E	79	ZXLE030E	81		
ZXME040E	91	ZXLE040E	93	ZXDE040E	104
ZXME050E	108	ZXLE050E	106	ZXDE050E	112
ZXME060E	112	ZXLE060E	116	ZXDE060E	114
ZXME075E	118			ZXDE075E	122

Table 8: Weights

3.2 Electrical connection

3.2.1 Power supply connections

The electrical connection of the condensing unit to the power supply must be made by qualified technicians, who should refer to the electrical diagrams located inside the electric connection panel.

The units are designed for a 400V / 3Ph / 50 Hz power supply for TFD, 230V / 1Ph / 50 Hz for PFJ. A voltage tolerance of $\pm 10\%$ is acceptable.

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

Table 9 hereafter shows power supply wire sizes, and can also be used for the ground wire selection.

Unit model	Minimum current-carrying capacity	Wire size	
		mm ²	AWG*
Medium temperature			
Standard			
ZXME-020E-TFD	7.3	0.82	18
ZXME-030E-TFD	8.6	0.82	18
ZXME-040E-TFD	10.4	1.3	16
ZXME-050E-TFD	14.2	2.1	14
ZXME-060E-TFD	14.8	2.1	14
ZXME-075E-TFD	16.8	2.1	14
ZXME-020E-PFJ	17.6	2.1	14
ZXME-025E-PFJ	19.3	3.3	12
ZXME-030E-PFJ	20.3	3.3	12
ZXME-040E-PFJ	26.1	5.3	10
Digital			
ZXDE-040E-TFD	11.7	1.3	16
ZXDE-050E-TFD	15.1	2.1	14
ZXDE-060E-TFD	14.1	2.1	14
ZXDE-075E-TFD	17.6	2.1	14
Low temperature			
ZXLE-020E-TFD	8.1	0.82	18
ZXLE-030E-TFD	8.6	0.82	18
ZXLE-040E-TFD	12.3	1.3	16
ZXLE-050E-TFD	14.6	2.1	14
ZXLE-060E-TFD	16.0	3.3	12

* AWG = American Wire Gauge

Table 9

3.2.2 Electrical wiring

Before commissioning, ensure that the neutral "N" wire is connected on the terminal block ("N" furthest to the right). After proper connection the control LED on power board and control board will lighten. For more details, see wiring diagrams in **Appendices 1 to 4**.

3.2.3 Electrical protection standard (protection class)

- Scroll compressors up to ZX51: IP21 according to IEC 34.
- Fan: IP44 according to IEC 34.
- Solenoid valve coils: IP65 according to DIN 43650.

3.3 Refrigeration connections

3.3.1 Refrigeration piping installation

IMPORTANT

Tubing 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 of time (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



No insulation on liquid line! Air moisture condensation and lack of performance! Moisture from air will condensate on the liquid line and water will rain from the tube. 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 ZX unit and the evaporator.

The pipe should be sized to ensure optimum performance and good oil return. The sizing must also take into account the full capacity range through which this particular 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. P 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 10** 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 10

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

3.3.2 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.
- Then 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 diameter and tube outer diameter 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.

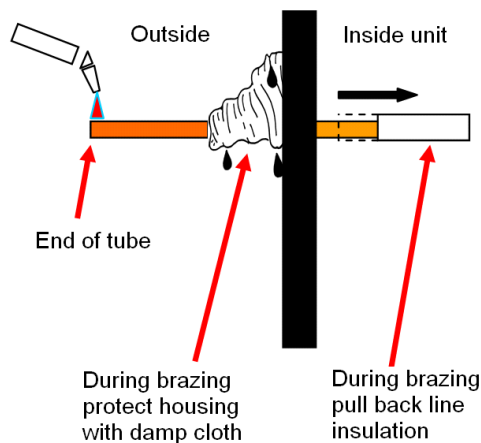


Figure 9: Sectional view

3.3.3 Brazing procedure

For brazing of the tubes, please refer to **Figure 12** and procedure hereunder:

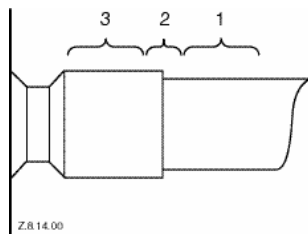


Figure 10: Suction tube brazing

- 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.



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 .

3.4 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, and will reduce the lifetime of the unit.

It is recommended that a clearance of 300 mm from the wall (or the next unit) be maintained from the unit left and rear panels whereas a clearance of 500 mm must be maintained from the unit right, top and front panels (seen facing the front of the unit). 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 at all times.

Ideally, the unit should be mounted level on a solid concrete slab with anti-vibration pads between unit feet and concrete. However the ZX condensing unit has also been designed for wall mounting on suitable brackets. In this case it is equally important that the dimensional guidelines given on page 21 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 condensing temperatures and ultimately resulting in reducing the life of the unit. A baffle is a remedy for this situation.

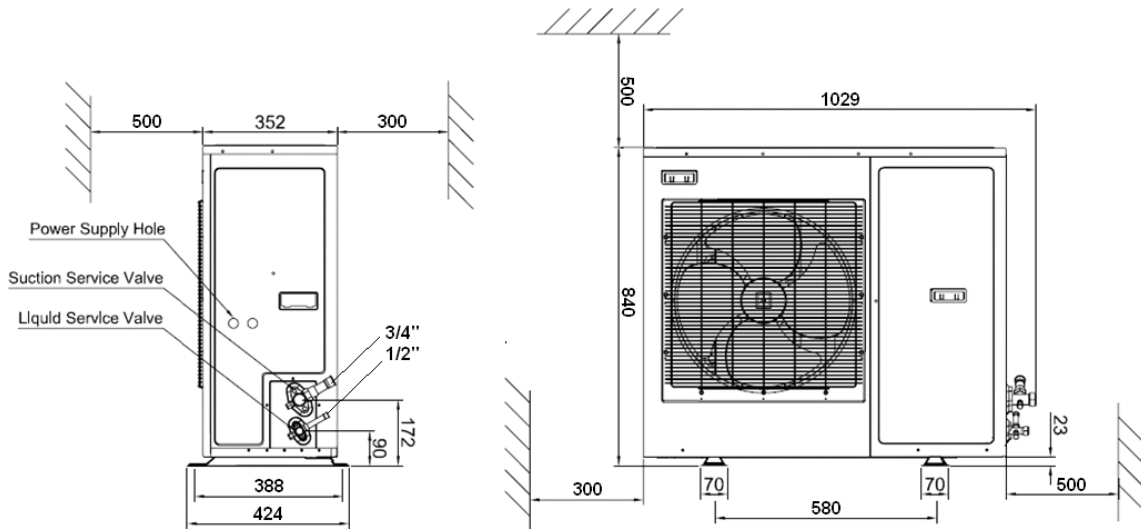


Figure 11: Fixing dimensions and distances - Single-fan unit

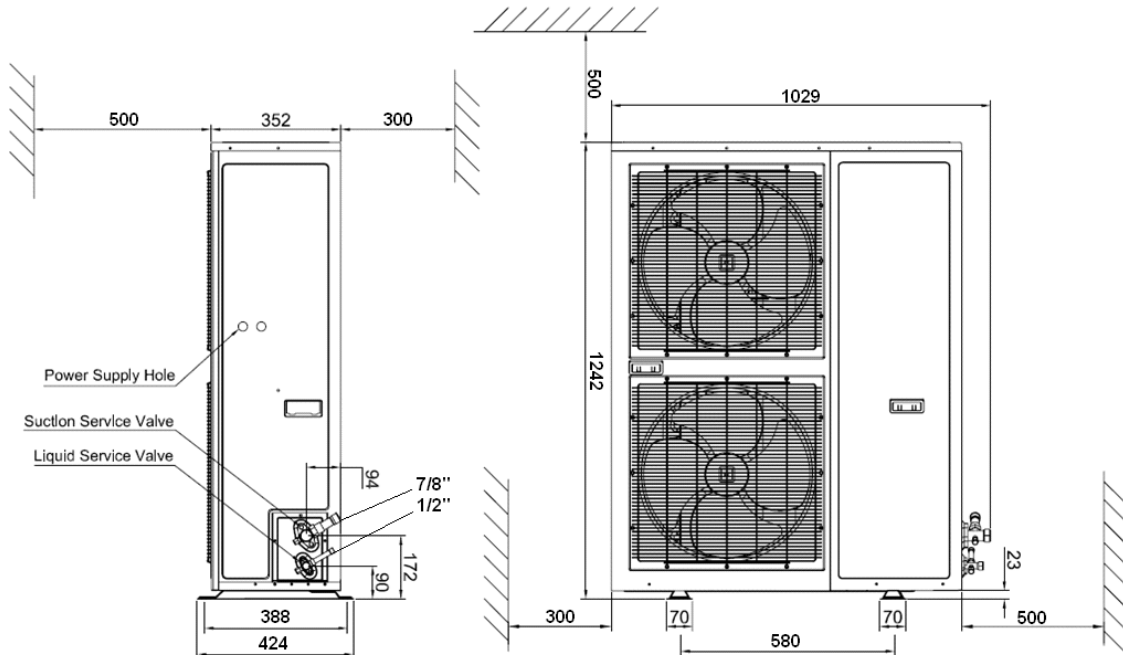


Figure 12: Fixing dimensions and distances - Dual-fan unit

4 Starting up & operation

Before commissioning, ensure that all valves on the condensing unit are fully opened.

4.1 Evacuation



IMPORTANT

The evacuation procedure is based upon achieving an actual system vacuum standard and is **NOT TIME DEPENDENT!**

Before the installation is put into commission, it has to be evacuated with a vacuum pump. 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. To achieve undisturbed operation the compressor valves are closed and the system is evacuated down to 0.3 mbar / 0.225 Torr. Pressure must be measured using a vacuum pressure (Torr) 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 vapour (gas) charge the ZX Scroll unit! 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.

It is recommended to charge the ZX unit with refrigerant via its service valves.

Recommendation is to break vacuum in the system with partial charge of refrigerant, then start the system.

For charge adjustment it is recommended to check the liquid sight glass just before the expansion valve.

4.2.2 Oil charging procedure

Copeland EazyCool[™] ZX condensing units are supplied only with a compressor oil charge. After commissioning, the oil level should be checked and topped up if necessary.

NOTE: The oil level should be approximately halfway up the sight glass (ZXLE/ZXDE units).

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

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

Charging is done through the Schraeder valve located on the suction valve.

4.3 Rotation direction of Scroll compressors

Scroll compressors, like several other types of compressors, will only compress in one rotational direction. Direction of rotation is not an issue with single-phase compressors since they will always start and run in the proper direction. Three-phase compressors will rotate in either direction depending upon phasing of the power. Since there is a 50-50 chance of connecting power in such a way as to cause rotation in the reverse direction, **it is important to include**

notices and instructions in appropriate locations on the equipment to ensure proper rotation direction when the system is installed and operated.

4.4 Maximum compressor cycle

Maximum permitted starts per hour: 10.

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, in order to prevent trapping liquid.

- Check that all valves are fully opened.
- We recommend to check the oil level in compressor(s) after starting and operation conditions have stabilised, and to add oil if needed to ensure a sufficient oil level (halfway up the sight glass).

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, the majority of contaminated oil will be removed with the compressor. The rest of the oil is cleaned through the use of 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 that the suction accumulator be replaced 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.
- Unscrew and lift the housing top panel to get access to the top of the compressor.
- Close valves to isolate the compressor from the system.
- 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.

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 general rule and for a clean environment we recommend the fins be cleaned with liquid detergent diluted with clean water. The ZX has a well designed chassis with falling levels towards a large drainage hole and provided the unit is installed level, 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! Turn off the unit isolating switch before undertaking this task!

All condensing units will generate some degree of vibration. Copeland EazyCool[™] ZX units are no exception. However the vibration level from the compliant scroll technology is less severe than in units using reciprocating compressor technology. Due to this reduced vibration, ZX condensing units can be mounted on simple, less expensive rubber mounting pads.

Over time, due to temperature extremes 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.

5.4 Electronic panel

The electronic panel is a fixed PCB (Printed Circuit Board) and other than the terminations mentioned in the previous section, the panel itself is not a routine maintenance item.

The PCB has one fuse as protection and the wiring diagram provides a guide to its location on the board. It is important not to upgrade it from its design 3.5 A rating otherwise the electronic board will not be protected. If the fuse keeps blowing this is usually an indication that some external (to electronic panel) and connected device, eg, solenoid valve coil is causing the problem.

It is strongly advisable not to touch any components on the electronic board unless anti-static finger gloves are used.

NOTE: The electronic board casing must not be removed and the electronic board must not be tampered with unless absolutely necessary!

5.5 Routine leak testing

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

5.6 Condenser fan(s) & motor(s)

A yearly inspection of these items is recommended. Fastenings can come 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 in compliance with the Pressure Equipment Directive 97/23/EEC (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: Particular 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 has to be respected.

7 Dismantling & disposal



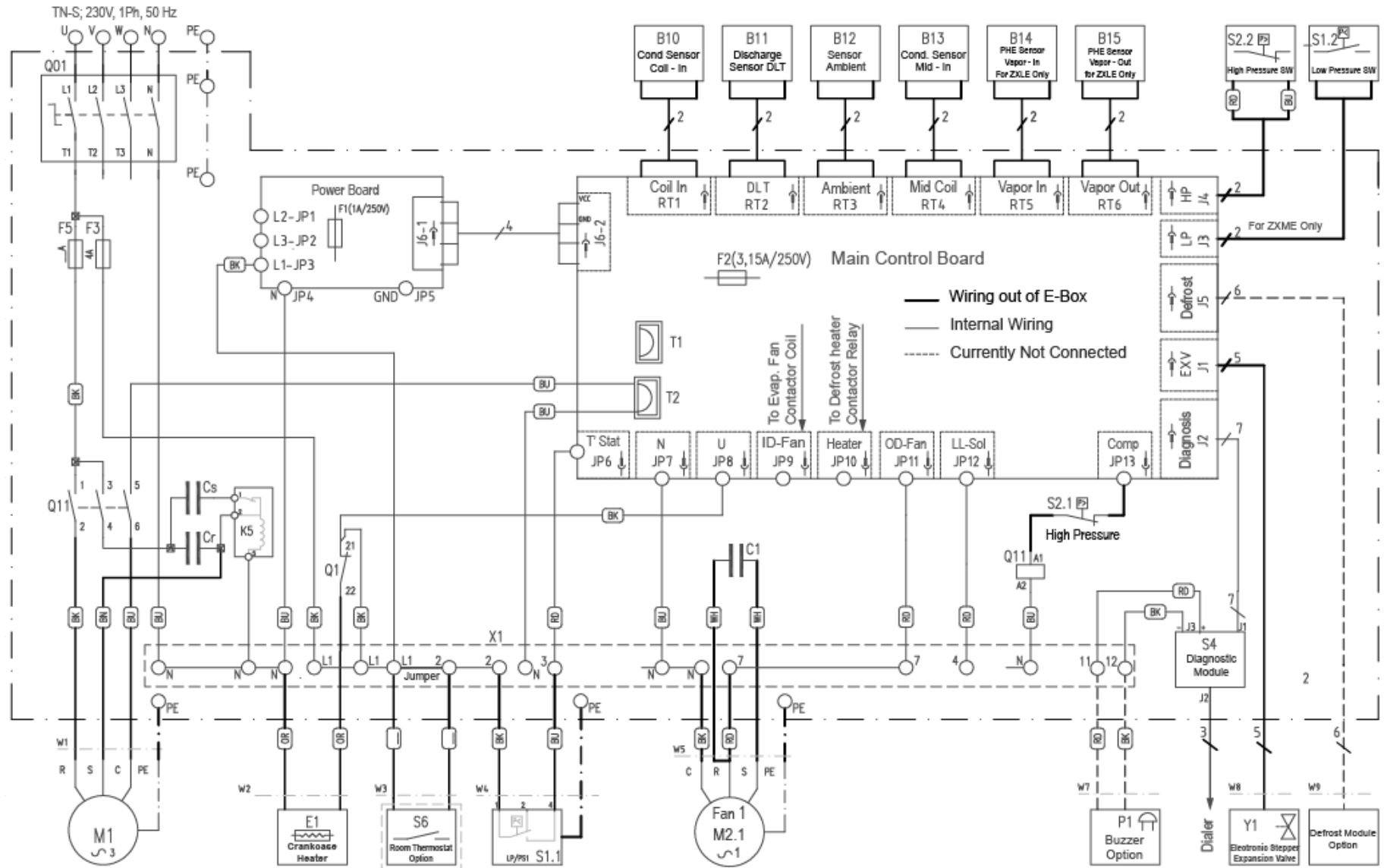
Removing oil and refrigerant:

- Do not disperse in the environment.
- Use the correct equipment and method of removal.
- Dispose of oil and refrigerant properly.
- Dispose of unit properly.

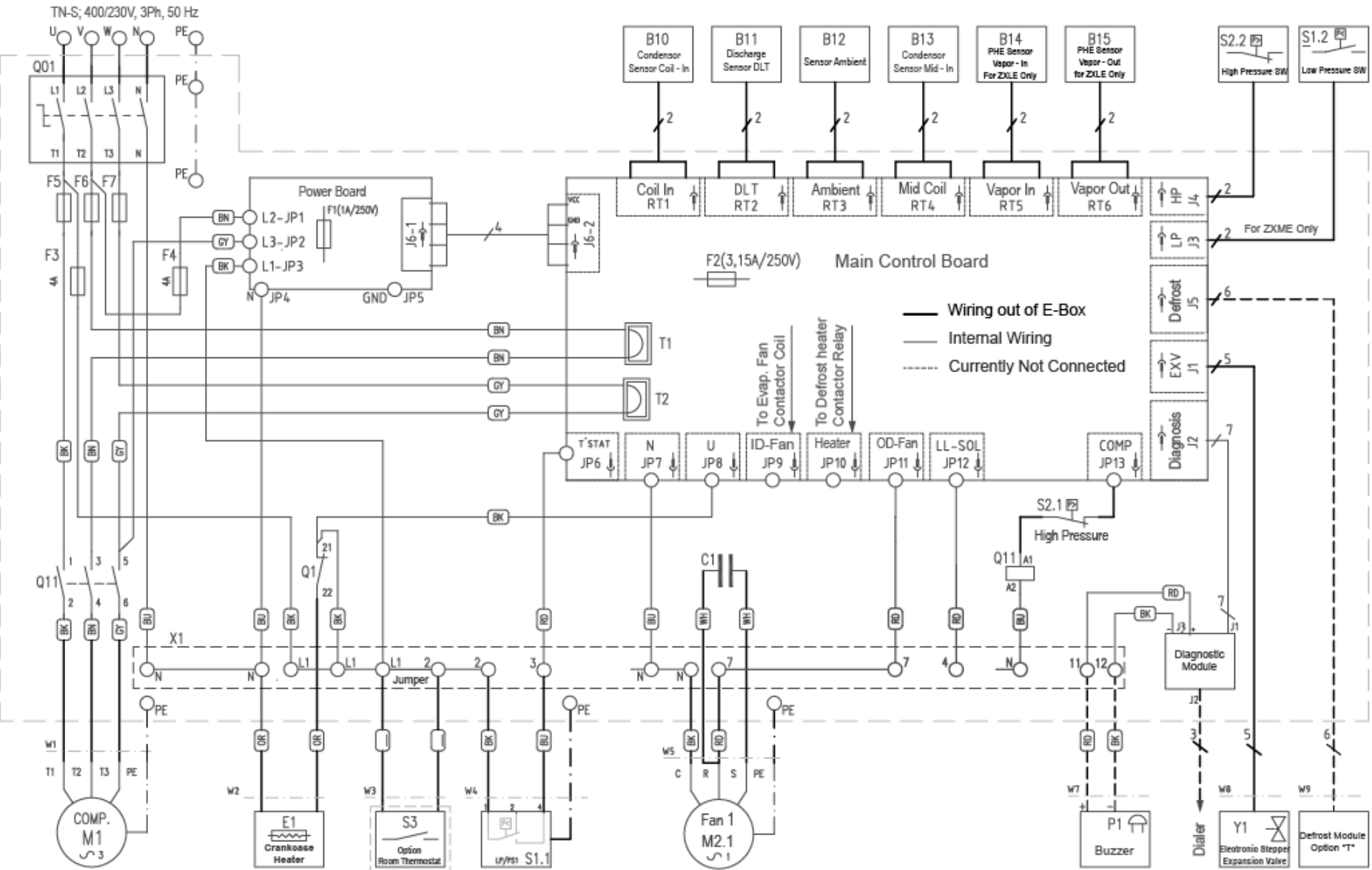
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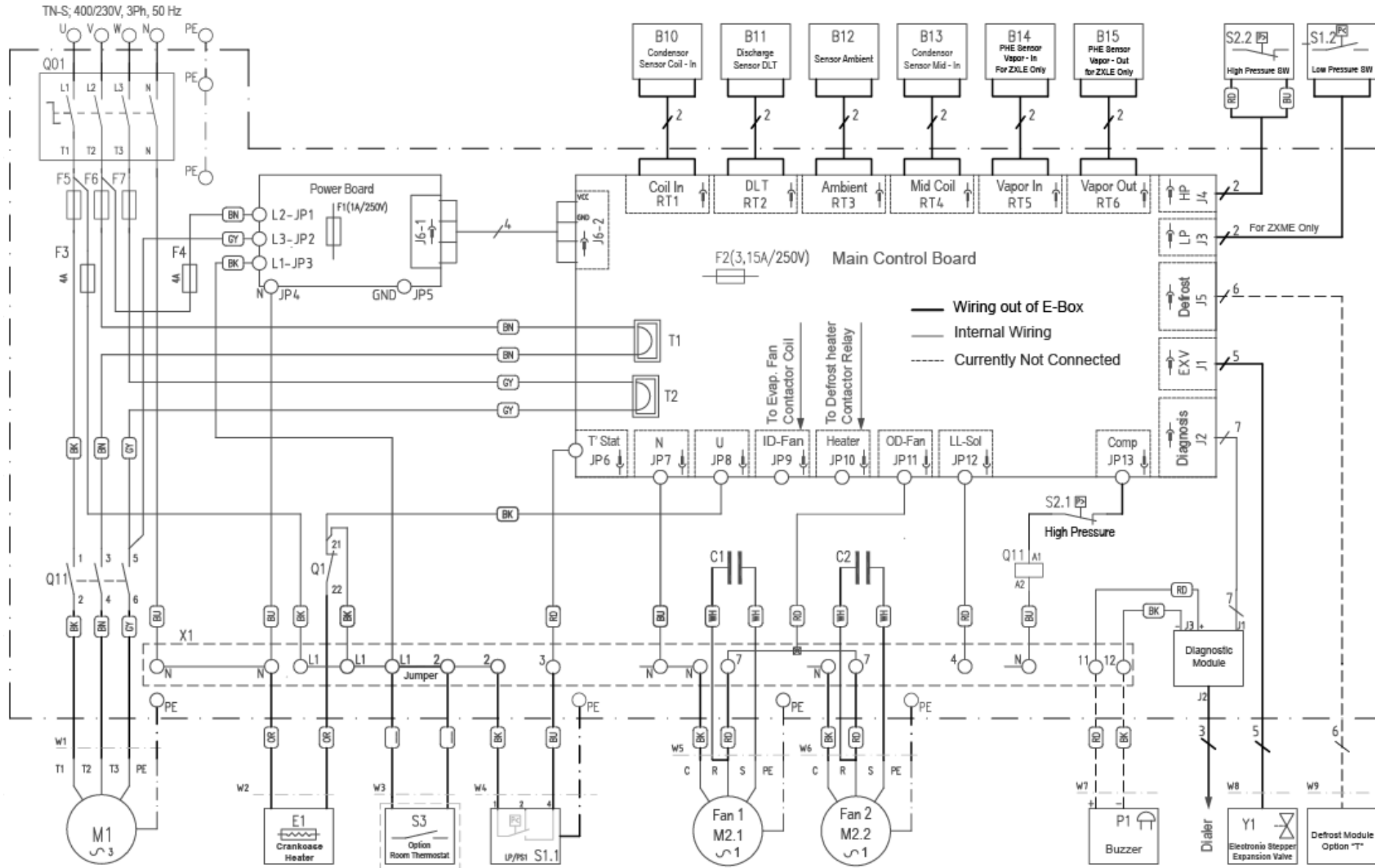
Appendix 1: Wiring diagram - ZXM Condensing unit (220V / 1Ph / 50 Hz)



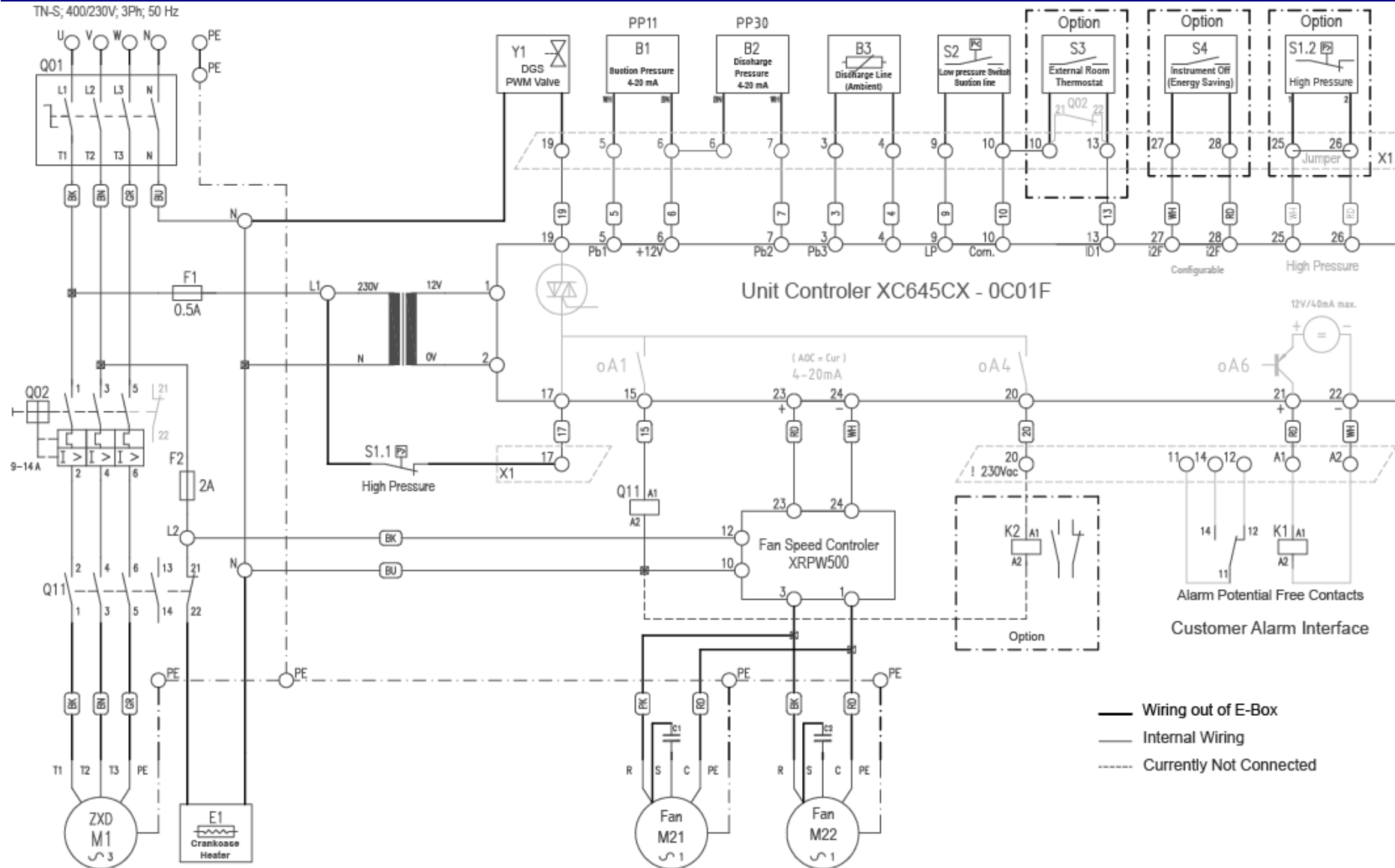
Appendix 2: Wiring diagram - ZXME / ZXLE Condensing unit with one fan (380-420V / 3Ph / 50 Hz)



Appendix 3: Wiring diagram - ZXME / ZXLE Condensing unit with 2 fans (380-420V / 3Ph / 50 Hz)



Appendix 4: Wiring diagram - ZXDE Condensing unit with 2 fans (380-420V / 3Ph / 50 Hz)



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