

A detailed close-up photograph of a Copeland EasyCool outdoor condensing unit. The image shows the intricate mechanical components, including the compressor, condenser coils, and various pipes and valves. The unit is a complex assembly of metal parts, with a prominent circular component on the right side. The overall color scheme is a mix of metallic grays and blues, with some highlights from the lighting.

Copeland[®]
EasyCool[™]

Copeland EasyCool[™]
outdoor condensing units
for refrigeration networks

Application Guidelines

The Emerson Climate Technologies logo, featuring a stylized graphic of three slanted parallel lines above the company name.

EMERSON[™]
Climate Technologies

Application Guideline

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1 Safety instructions

The Copeland EazyCool[™] condensing units are manufactured according to the latest and valid industrial standards.

Particular emphasis has been placed on the user 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 machines according to the existing instruction and as a whole agree with the corresponding provisions of legislation (standards to apply: refer to Manufacturers declaration).

Manufacturer declaration and declarations of conformity are available on request.

Retain these operating instructions during the entire lifetime of the compressor as well as the condensing unit.

We strongly advise to follow these safety instructions.

1.1 Icon explanation



WARNING

This Icon indicates instructions to avoid heavy personnel injuries and heavy material damage.



High Voltage

This icon indicates operations with a danger of an electric shock.



Danger of burning or frostbite

This icon indicates operations with a danger of burning or frostbite.



Explosion Hazard

This Icon indicates operations with a danger of explosion.



CAUTION

This Icon indicates instructions to avoid property damage without or with low personnel injuries.



IMPORTANT

This icon indicates instructions to avoid malfunction of the compressor.

NOTE this word indicates a recommendation for easier operations.

1.2 Safety statements

- Refrigerant compressors must be employed only for the use they are made for.
- Only qualified and authorised refrigeration personnel are allowed to do the installation, commissioning and maintenance.
- Qualified electrical personnel must connect the condensing unit and its accessories.
- All valid standards for connecting electrical and refrigeration equipment must be observed.



Use personnel safety equipment. This is important to avoid injuries from the refrigerant.

1.3 General instructions

WARNING



System breakdown! Personnel 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! Personnel injuries! Only approved refrigerant and refrigerating oils must be used.



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.

Only qualified personnel should install and intervene on COPELAND condensing units. The contractor, responsible for the installation of the unit, should ensure sufficient liquid sub-cooling in the line to the expansion valve(s) to avoid “flash-gas” in the liquid line. It is of vital importance that the discharge stop valve has been fully opened before the compressor is started. If the discharge stop valve is closed or partly closed an unacceptable pressure with accordingly high temperatures may develop in the cylinder head. When operating with air the so-called diesel effect may occur, i.e. the air sucked in is mixed with oil gas and can explode due to the high temperature in the cylinder head, and thereby destroy the compressor.

1.4 About this guideline:

These guidelines ensure the safe installation, starting, operation and maintenance of Copeland EazyCool[™] condensing units.

In case of a failure, important topics are mentioned in the chapter **causes of failure**.

These guidelines are not meant to replace the system expertise available from system manufacturers.

For additional information, please refer to the “Product Catalogue” or to the “Copeland Selection Software” accessible from the Copeland website at www.ecopeland.com.

2 Product Description

2.1 About Copeland EasyCool[™] condensing units for refrigeration networks

Copeland has developed a special version of Copeland EasyCool condensing units that can be used to create medium and larger size refrigeration network systems. The range consists of Copeland EasyCool condensing units for medium and low temperature applications and covers units from 7.5 to 15 hp. It includes units with two compressors, allowing modulation in two steps as well as Copeland EasyCool Digital Scroll[™] Condensing Units, which feature continuous modulation from 10 to 100%.

The concept of a condensing unit refrigeration network is based on connecting up to four condensing units mechanically (tubing) and electronically (control system). The control and oil distribution system is a Master/Slave configuration in which the Master unit takes care of:

- Compressor staging based on suction pressure
- Oil distribution (oil reservoir in master unit)
- Communication for remote monitoring

The Slave unit takes care of:

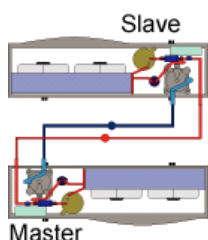
- Fan speed control
- And emergency control in case of communication line disruption between the unit (master/slave)

Each Network should have only one master unit.

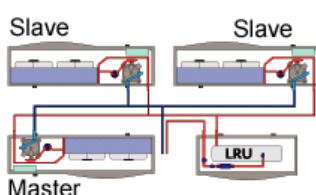
2.2 Network configurations

Basically there are three different configurations possible: two-unit network, three-unit network and four-unit network. The three and four condensing unit network requires an external receiver. Copeland offers a LRU (Liquid Receiver Unit) which contains a 90 l receiver. If a larger receiver is required, this should be obtained from a third party. The two-unit network consists of units with internal receivers, which allow faster installation.

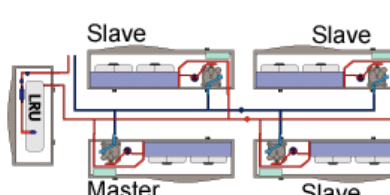
2 Unit Network



3 Unit Network with LRU



4 Unit Network with LRU



LRU: Liquid Receiver Unit

2.3 Product nameplate

The condensing unit nameplate shows model designation and serial number.

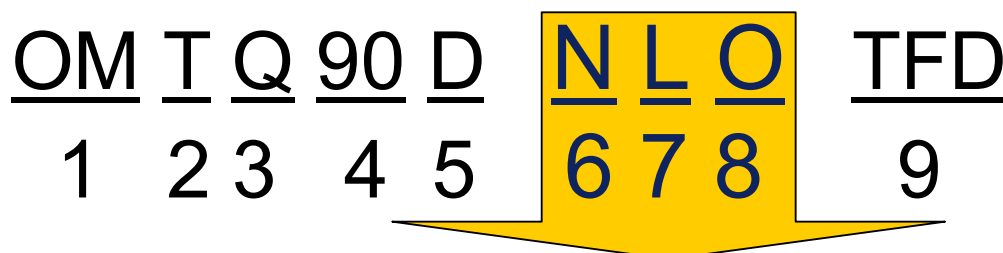
The compressor has its own nameplate with all electrical characteristics.

The medium temperature range features ZB Scroll compressors, some models include a Digital Scroll[™] compressor.

The low temperature range features ZF Scroll compressors with vapour injection using a pre-installed sub-cooler.

2.4 Nomenclature

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



1 - Condensing unit family:

OM = Medium temperature Copeland EazyCool™ unit

OL = Low temperature Copeland EazyCool™ unit

2 - Number of compressor: “blank” = single compressor, “T” = two compressors

3 - Quiet version

4 - Compressor size: 90 = 1 x ZBD45KCE (digital), 1 x ZB45KCE

5 - D = Copeland Digital Scroll™

- V = Low temperature: Copeland Scroll™ with vapour injection (EVI)

6 - N = Unit suitable for creation of a refrigeration **network**

7 - L = **Liquid receiver** included (only for 2 unit network)

8 - O = **Oil reservoir** included (always Master)

9 - Motor version: TFD or TWD: 380-420V/3Ph/50H

2.5 Application range

2.5.1 Qualified refrigerants and oils

	OMQ-56-Nxx ~ OMQ-110-Nxx	OMTQ-60(D)-Nxx OMTQ-76-Nxx OMTQ-90(D)-Nxx	OLQ-24V-Nxx ~ OLQ-48V-Nxx OLTQ-26V-Nxx & OLTQ-36V-Nxx
Qualified refrigerant	R404A/R507 R134a, R407C R22	R404A/R507 R22	R404A/R507 R22
Qualified Servicing Oil	ICI Emkarate RL 32 CF		
	Mobil EAL Artic 22 CC		

Table 1: Qualified refrigerants and oils

2.5.2 Application limits

For Application envelope, please refer to the Compressor application envelope available in Copeland Selection Software version 6.

Medium temperature range

Evaporating Temperature: from -30°C up to 12.5°C

Low temperature range

Evaporating Temperature: from -40°C up to 7°C

2.6 Main component description

2.6.1 Compressor

Medium Temperature		Low Temperature	
Unit Model	Compressor Model	Unit Model	Compressor Model
Single compressor unit			
OMQ-56-Nxx-TWD	ZB56KCE-TWD-551	OLQ-24V-Nxx-TWD	ZF24KVE-TWD-551
OMQ-75-Nxx-TWD	ZB75KCE-TWD-551	OLQ-33V-Nxx-TWD	ZF33KVE-TWD-551
OMQ-92-Nxx-TWD	ZB92KCE-TWD-551	OLQ-40V-Nxx-TWD	ZF40KVE-TWD-551
OMQ-110-Nxx-TWD	ZB11MCE-TWD-551	OLQ-48V-Nxx-TWD	ZF48KVE-TWD-551
Two compressor unit			
OMTQ-60-Nxx-TFD	2 x ZB30KCE-TFD-551	OLTQ-26V-Nxx-TFD	2 x ZF13KVE-TFD-556
OMTQ-60D-Nxx-TFD (*)	1 x ZBD30KCE-TFD-250 1 x ZB30KCE-TFD-551		
OMTQ-76-Nxx-TFD	2 x ZB38KCE-TFD-551		
OMTQ-90-Nxx-TFD	2 x ZB45KCE-TFD-551	OLTQ-36V-Nxx-TFD	2 x ZF18KVE-TFD-556
OMTQ-90D-Nxx-TFD (*)	1 x ZBD45KCE-TFD-250 1 x ZB45KCE-TFD-551		

(*) Digital Scroll™ available in Master version only (NLO & NO)

Table 2: Compressor type used in Copeland EazyCool™ condensing units for refrigeration networks

2.6.2 Sound Blanket

The OM(T)Q and OL(T)Q units include one or two compressors, equipped with a sound jacket.

The sound jacket developed by Copeland has no impact on the performance of the compressor.

The design consists of a top cap cover and compressor shell cover with adjustable Velcro system.

It has good characteristics in case of fire and is resistant to:

- Mineral and Polyolester oil
- Refrigerants R22/R404A
- Temperature up to 150°C
- Water

2.6.3 Condenser Fan(s)

The condensers of the OM (T) Q & OL (T) Q units for refrigeration networks are equipped with single-phase fans, with low speed (910 rpm) 6 pole single-phase motor.

Condensing unit		N° of Fan	Fan Model	Run Capacitor Capacity	Diameter Ø (mm)	Voltage V/ph/Hz	Power input (W)	Current input (A)	Winding resistance Ohm (Ω)
Medium Temp	Low Temp								
OMQ-56-Nxx	OLQ-24V-Nxx	2	145	4µF-400V	420	220-240 1~50	145	0.67	70
OMQ-75-Nxx	OLQ-33V-Nxx								
OMQ-92-Nxx	OLQ-40V-Nxx	2	301	8µF-400V	500		290	1.4	25
OMQ-110-Nxx	OLQ-48V-Nxx								
OMTQ-60(D)-Nxx	OLTQ-26V-Nxx	2	145	4µF-400V	420		145	0.67	70
OMTQ-76-Nxx									
OMTQ-90(D)-Nxx	OLTQ-36V-Nxx	2	301	8µF-400V	500		290	1.4	25

Electrical data @ 50 Hz

Table 3: Condenser fan: technical data

2.6.4 Liquid receiver

Liquid receiver for 2 unit network system

Master and Slave units for 2-unit network configuration are equipped with a liquid receiver.

The liquid receivers are equipped with:

- Rotalock service valves for connection of a liquid level equalisation line as well as a gas pressure equalisation line between the receivers to ensure equal liquid levels in both receivers. Both lines are partly pre-installed and protrude at the rear of the units.
- Rotalock service valve on top of the receiver for liquid outlet line.
- 3/8"–14 NPTF connection for relief valve. Maximum allowable working pressure - MAWP 33 Bar

Fitting a pressure relief device according to standard EN378-2 is the responsibility of the installer.

Model Type	Receiver volume l
OMQ-56-Nxx to OMQ-110-Nxx OLQ-24V-Nxx to OLQ-48V-Nxx OMTQ-60-Nxx to OMTQ-90-Nxx OLTQ-26V-Nxx to OLTQ-36V-Nxx	24

Table 4: Receiver volume

Rotalock service valve



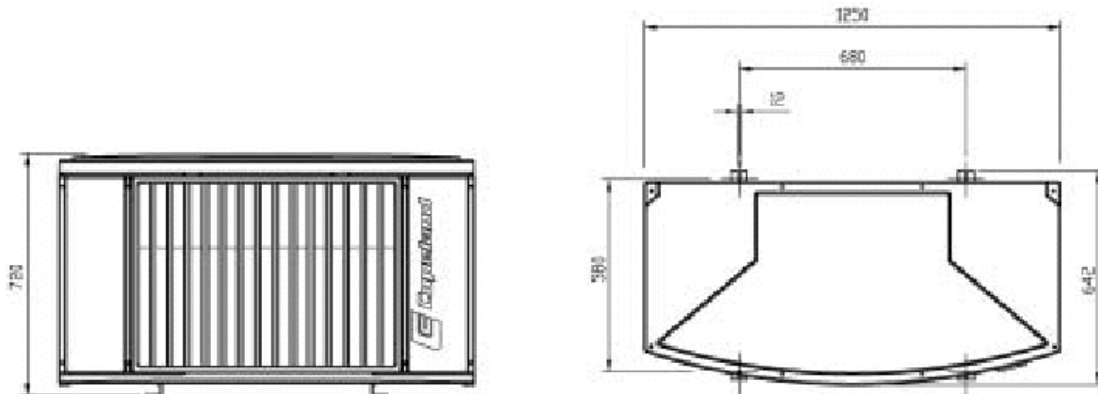
It is recommended to charge the system with refrigerant via the Rotalock service valves.

Liquid receiver for 3 and 4 unit network system

With larger systems (refrigeration systems requiring 3 or 4 units in a network) a remote liquid receiver should be used. The condensing unit models for systems with remote receivers are provided without liquid receiver. The condenser liquid outlet line protrudes from the rear of the unit to allow an easy connection to a remote liquid receiver.

Copeland offers a LRU (Liquid Receiver Unit), which contains a 90 litres liquid receiver for remote use with filter drier, sight glass with moisture indicator and ball valves for liquid inlet and outlet. If a larger receiver is required, this should be obtained from a third party.

The LRU collects liquid refrigerant from each condenser in a network. It has a single liquid inlet and outlet line.



	Receiver Capacity l ¹⁾	Depth / Width T/B mm	Height H mm	Dimensions (holes) b x t,(ø mm)	Liquid Inlet diameter ø (inch)	Liquid Outlet diameter ø (inch)	Weight Net/Gross kg
Liquid Receiver Unit	90	630 / 1250	720	680 x 580 (12)	1 5/8	1 3/8	120 / 142

Table 5: Liquid receiver unit LRU

¹⁾ Receiver volume in litre also indicates the pump down capacity in kg (at 50°C Liquid temperature) when the receiver is 95% filled – Receiver CE approved.

- 1/2"–14 NPTF connection for relief valve. Maximum allowable working pressure - MAWP 33 Bar
- Fitting a pressure relief device according to standard EN378-2 is the responsibility of the installer.

2.6.5 Electrical box: components

All electrical components are pre-wired into the panel.

This panel contains:

- Compressor contactor(s)
- Fuse
- Terminal blocks
- DIN rail mounted terminals
- Electronic controller
- Fan Speed controller
- Alarm relays

2.6.6 Pressure switch

All single compressor Copeland EazyCool™ condensing units for refrigeration networks are equipped with:

- Single low pressure switch with automatic reset: ALCO PS1-W3A
- Electronic Condensing Unit Controller with HP and LP pressure transmitters

All two-compressor Copeland EazyCool™ condensing units for Refrigeration Network are equipped with:

- Single low pressure switch with automatic reset: ALCO PS1-W3A
- Two high pressure switches ALCO PS3-WF4-HNS
- Electronic Condensing Unit Controller with HP and LP pressure transmitters

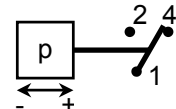
1) PS2-W7A: Alco Controls® dual pressure switch with automatic reset (for single compressor unit)

The switch is equipped with display scale and pointers to indicate the approximate settings. The display scales are printed in relative pressure units “bar” and “psi”.

For precise setting of the control, external gauges must be used.

The **PS2-W7A** has the following characteristics:

- Automatic reset dual pressure controls
Combined pressure limiter for low pressure / high-pressure protection.
On pressure rise above the upper setpoint, contacts 1-2 open and contacts 1-4 close.
On decreasing pressure below lower setpoint contacts 1-4 open and contacts 1-2 close.
- Adjustable dual pressure switch
Setpoint adjustment range: LP (left) = -0.5 to 7 bar and HP (right) = 6 to 31 bar.
Differential adjustment range: LP = 0,5 to 5 bar, HP = 4 bar.
Factory setting: LP = 3,5 / 4,5 bar, HP = 20 bar.



2) PS1-W3A: Alco Controls single low pressure switch with automatic reset

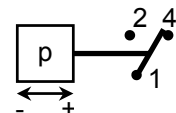
The control is equipped with display scale and pointers to indicate the approximate settings.

The display scales are printed in relative pressure units “bar” and “psi”.

For precise setting of the control, external gauges must be used.

The **PS1-W3A** has the following characteristics:

- Automatic reset single pressure controls
Pressure limiter for low-pressure protection.
On decreasing pressure below lower set-point contacts 1-4 open and contacts 1-2 close.
- Adjustable single pressure switch
Setpoint adjustment range: = -0.5 to 7 bar.
Differential adjustment range: = 0,5 to 5 bar.
Factory setting: = 3,5 / 4,5 bar.



3) PS3-WF4-HNS: Alco Controls high pressure switch with an automatic reset

- Automatic reset single pressure switch
Pressure limiter for high-pressure protection.
Switches from 1-2 to 1-4 on rising pressure and from 1-4 to 1-2 on falling pressure.
- Fixed switch point settings
Cut-out point: 22 bar
Cut-in point: 26.2 bar.



4) PT3 Pressure Transmitter (Alco Controls)

Two compressor-condensing units are equipped with HP and LP pressure transmitters that are connected to the EC2 electronic controller.

The EC2 controller description and programming instructions are available in the corresponding guideline (C6.1.5/E, Part no: 3136444) which is shipped with the units. It is also available for download on www.eCopeland.com.

An Alco PT3-30A pressure transmitter is used at the high-pressure part of the system. An Alco PT3-07A pressure controller is used at the low-pressure part of the system. The PT3 pressure transmitter converts a pressure into a linear electrical 4-20 mA current output signal. The heart of the transmitter is a piezo resistive chip enclosed in an oil capsule.

Features:

- Pressure sensitive piezo-based cell with strong primary output signal for precise and sound-free operation
- Vibration and pulsation resistant



2.6.7 Fan speed controller (FSP150) Alco Controls

An electronic speed control is fitted as standard in units suitable for refrigeration networks. It controls the speed of the fans based on condenser pressure. Fan speed is controlled by the EC2-551 condensing unit controller in combination with a FSP-150 fan speed controller.

Two fans are controlled at the same time.

The control operates with single-phase motors.



The electrical connection is made in the terminal box of the condensing unit.

Using a fan speed controller offers the following benefits for your application:

- The head pressure can be kept high enough to ensure proper operation of the expansion valve, and hence, sufficient mass flow through the expansion valve to feed the evaporator. This maintains the required cooling capacity and avoids a drop of evaporator temperature.
- The sound level of fan motors can be kept at a minimum by avoiding the permanent on/off cycling of the fan motor. The Alco Controls fan speed control can be delivered with the Copeland units or as a separate accessory.

2.6.8 Liquid line equipment (only for 2 unit network configuration)

a) Filter drier Alco Controls ADK-plus

ADK-plus liquid line filter-drier is for new installation or after service. Optimum blend of molecular sieve and activated alumina



b) Liquid sight glass Alco Controls AMI 1SS*

The AMI series of moisture indicator is designed to monitor the moisture content within the liquid line of a refrigeration system. When the line is empty of liquid, circles may be seen in the glass. However, when the liquid refrigerant touches the glass, the circles disappear indicating the system is fully charged.



2.6.9 Liquid line solenoid valve (for low temp. model only) Alco Controls 200 RBT 5

This is used in low temperature with 2, 3 & 4 unit network systems

- Compact size
- Snap-on clip for attaching solenoid coils
- Δp minimum = 0,05 bar



2.6.10 Liquid sub-cooler

Condensing units for low temperature applications are equipped with a liquid sub-cooler. This heat exchanger is used to provide additional sub-cooling to the refrigerant before it enters the evaporator. This sub-cooling provides a considerable cooling capacity increase. During the sub-cooling process, a small amount of refrigerant is evaporated in the liquid sub-cooler. It (sub) cools high-pressure refrigerant liquid that will be injected into the evaporator. The small amount of evaporated refrigerant in the liquid sub-cooler is injected into the compressor and provides additional cooling at higher compression ratios, similar to liquid injection. The diagram below explains the refrigerant flows.

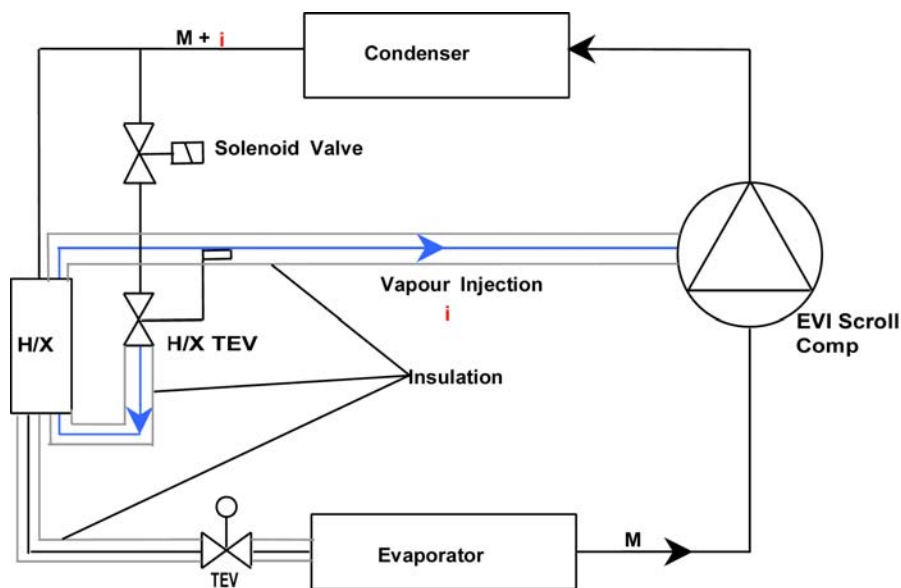
■ Since the liquid temperature can be as low as -15°C , **liquid line insulation** should be applied to avoid freezing of water on the outside of the lines.

VO = Vapour Out, vapour leaving to compressor injection
VI = Vapour In, vapour entering the economiser
LO = Liquid Out, sub-cooled liquid leaving the economiser
LI = Liquid In, Liquid from condenser



Liquid sub-cooler characteristics:

- Standard connection size = 1", Material EN 10272-1.4401 (AISI 316)
- Brazing material = pure copper



2.6.11 Solenoid Valve for Digital Scroll™ compressor

Digital Scroll™ compressors in Copeland EazyCool™ condensing units are equipped with a 24 Volt AC solenoid valve.

The Electronic Condensing Unit Controller operates the solenoid valve used for digital compressor modulation based on the suction pressure.

Solenoid valve: Copeland part number 8400784



2.6.12 Oil separator: Alco Controls OSH

The Alco OSH oil separator is fitted as standard on all Copeland EazyCool™ outdoor units for refrigeration networks.

The oil separator has the following characteristics:

- Hermetic construction
- Comply with UL standard and HP German pressurised vessel regulations (CE standard effective Nov. 1999)
- PED category I

2.6.13 Electronic oil control system (Alco OM3)

Each compressor is fitted with an Alco Controls OM3 oil level controller, which supplies oil only when required. An oil reservoir is provided on the “Master” unit in a network, and hence variations in oil quantity in the system can be accommodated.



Model	OM3-CCA
- Oil Fill	Yes
- Alarm	Yes
- Compressor Lockout	Yes
- Level control	40%~60%
- Time Delay Alarm	20 sec
- Time Delay Filling	10 sec

Table 6: Properties OMA Traxoil

2.6.14 High pressure oil reservoir (Master unit only)

The master unit in network is equipped with a large oil reservoir of 8 litres, which collects oil from Master & Slave oil separators. Oil is re-distributed to each compressor via the oil level controller OM3.

- PED category I

3 Installation

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



WARNING

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

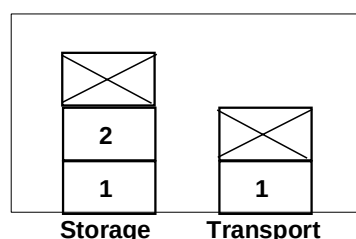
The condensing unit should be located in such a place to prevent any dirt, plastic bag, leaves or papers from covering the condenser and its fins. A clogged condenser will increase the condensing temperature, thus reduce the cooling capacity, and lead to a high pressure switch tripping. Clean the condenser fins on a regular basis.

3.1 Condensing unit handling

3.1.1 Transport and storage

It is recommended to keep the unit packaged until final installation.

We recommend handling large outdoor units (when boxed) with a forklift on the position indicated on the box.



Compressor(s) and liquid receiver compartment



Side loading for forklift

Front loading for forklift at the side of the unit where the centre of gravity is shown



Approx. location of centre of gravity

The unit without packaging must be handled by a forklift truck, while taking care of the centre of gravity of the unit. See also pictures above (front view). Weights: please refer to table 7.

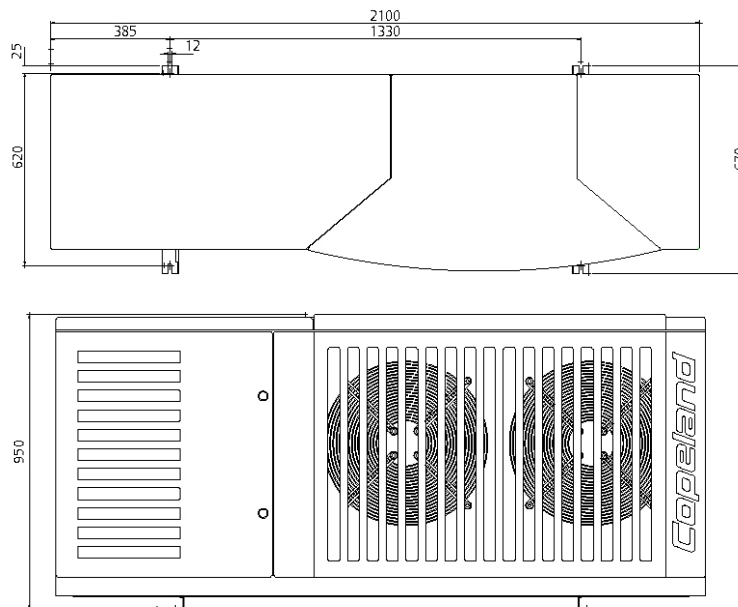
Medium temperature units		Weight (kg)		Low temperature units		Weight (kg)		
		Net	Gross			Net	Gross	
Condensing unit with single compressor								
OMQ-56	NLO/NL/NO/N	234	278		OLQ-24V	NLO/NL/NO/N	226	270
OMQ-75	NLO/NL/NO/N	234	278		OLQ-33V	NLO/NL/NO/N	226	270
OMQ-92	NLO/NL/NO/N	244	288		OLQ-40V	NLO/NL/NO/N	236	280
OMQ-110	NLO/NL/NO/N	253	297		OLQ-48V	NLO/NL/NO/N	245	289
Condensing unit with two compressors								
OMTQ-60	NLO/NL/NO/N	216	260		OLTQ-26V	NLO/NL/NO/N	218	262
OMTQ-60(D)	NLO /NO	216	260					
OMTQ-76	NLO/NL/NO/N	218	262					
OMTQ-90	NLO/NL/NO/N	222	266		OLTQ-36V	NLO/NL/NO/N	224	268
OMTQ-90(D)	NLO/NO	222	266					

Table 7: Weights twin fan units

Net weight = bare unit; Gross weight = unit + packaging

3.1.2 Dimensions in mm

Copeland EasyCool[™] units NLO / NL / NO / N
OMQ-56 to OMQ-110, OMTQ(D)-60 to OMTQ(D)-90
OLQ-24V to OLQ-48V, OLTQ-26V & OLTQ-36V



3.2 Connection access

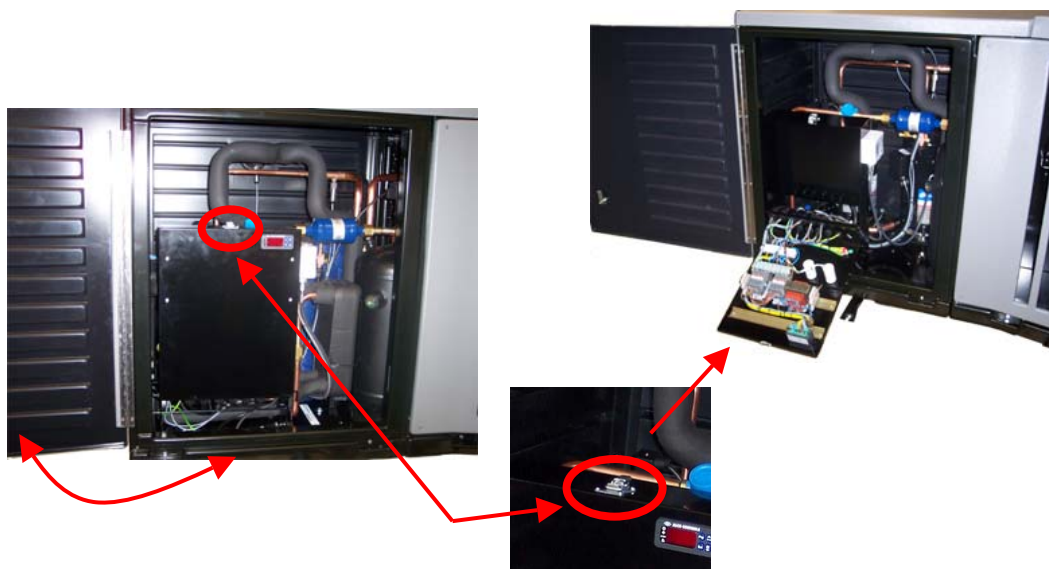
Access door to electrical and refrigeration components.

Access door opening: use supplied key to open and close the access door.



3.3 Electrical box access

OMQ-56-Nxx to OMQ-110-Nxx, OMTQ-60(D)-Nxx to OMTQ90(D)-Nxx
OLQ-24V-Nxx to OLQ-48V-Nxx, OLTQ-26V-Nxx & OLTQ-36V-Nxx



Open the latch on the top of the electrical panel to open it forward

3.4 Electrical connection

3.4.1 Power supply connections

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



Main electrical cable entry

Mounting area for main isolator switch



Contactor
Access to the
electrical components.

3.4.2 Electrical components pre-wired

- Compressor(s) contactor
- Condenser Fan motors
- Fan Speed controller
- High and Low pressure switches
- Electronic controller
- Crankcase heater(s)

Care should be taken for electrical connection to avoid reverse rotation (see paragraph 6.6)

3.4.3 Discharge temperature protection

Discharge line thermostat

Under extreme operating conditions internal discharge temperatures can reach very high levels. To avoid compressor damage, the ZF13KVE & ZF18KVE compressors are equipped with an external discharge line thermostat. Digital Scroll™ compressors ZBD-30-KCE & ZBD-45-KCE are also equipped with a discharge line thermostat.

INT 69 SCY module

Compressors ZF24-KVE, ZF33-KVE, ZF40-KVE & ZF48-KVE are equipped with an INT 69 module.

3.4.4 Electric protection standard

- Scroll compressors up to ZB45 / ZF18 are IP 21 according to IEC 34. All larger compressors are IP54.
- Fan IP54 according to IEC 34.
- HP-LP and HP safety pressure switches (Alco PS2 and PS1) are IP44 according to IEC 529/EN 60529.
- PS3 switch with cable assy IP65 according to EN 175301-803/IEC 529.
- Fan speed controller FSM is IP 65 according to IEC529/DIN 40050.
- Solenoid valve coils: IP65 according to DIN 43650
- EC2-5X1: IP65 (frontal protection with gasket)
- Electrical panel IP Rating: IP54

3.4.5 Condensing unit electrical data

Single compressor condensing unit	Max. operating Current (compressor)	Locked Rotor Current (compressor)	Fan Model	Max. fan Current	Max. operating Current (Unit)
	A	A		A	A
Medium Temperature	TWD	TWD		230V / 1~/50Hz	TWD
OMQ-56-NLO/NL/NO/N	15.4	99	2 x 145	0.67	16.74
OMQ-75-NLO/NL/NO/N	21.7	127	2 x 145	0.67	23.04
OMQ-92-NLO/NL/NO/N	25.1	167	2 x 301	1.56	28.22
OMQ-110-NLO/NL/NO/N	29.2	198	2 x 301	1.56	32.32
Low Temperature	TWD	TWD		230V / 1~/50Hz	TWD
OLQ-24V-NLO/NL/NO/N	16.1		2 x 145	0.67	17.44
OLQ-33V-NLO/NL/NO/N	22.3		2 x 145	0.67	23.64
OLQ-40V-NLO/NL/NO/N	25.1		2 x 301	1.56	28.22
OLQ-48V-NLO/NL/NO/N	30.6		2 x 301	1.56	33.72

Two compressor condensing unit	Max. operating Current (compressor) ¹⁾	Locked Rotor Current (compressor) ¹⁾	Fan Model	Max. fan Current ³⁾	Max. operating Current (Unit)
	A	A		A	A
Medium Temperature	TFD	TFD		230V / 1~/50Hz	TFD
OMTQ-60-NLO/NL/NO/N	10.3	49	2 x 145	0.67	21.94
OMTQ-60(D)-NLO /NO	7.9 / 10.3 ²⁾	52	2 x 145	0.67	19.54
OMTQ-76-NLO/NL/NO/N	12.8	66	2 x 145	0.67	26.94
OMTQ-90-NLO/NL/NO/N	13.1	74	2 x 301	1.56	29.32
OMTQ-90(D)-NLO/NO	11.4 / 13.1 ²⁾	74	2 x 301	1.56	27.62
Low Temperature	TFD	TFD		230V / 1~/50Hz	TFD
OLTQ-26V-NLO/NL/NO/N	8	52	2 x 145	0.67	17.34
OLTQ-36V-NLO/NL/NO/N	12	74	2 x 301	1.56	27.12

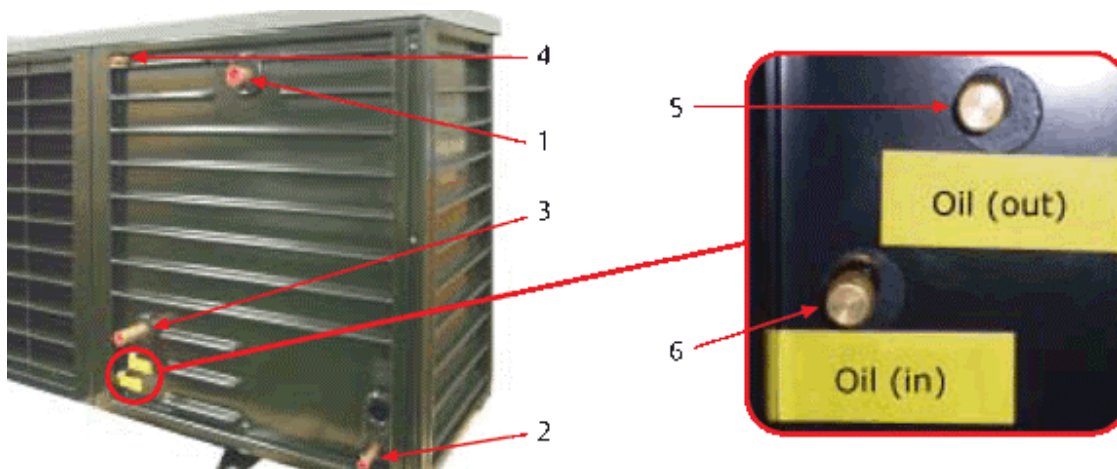
¹⁾ Data for one compressor

²⁾ Digital Scroll™ / Standard Compressor

³⁾ Data for one fan motor

Table 8: Electrical data

3.5 Refrigeration connections



Master unit oil in / out connections

- 1 = Suction line
- 2 = Liquid outlet line
- 3 = Liquid level equalisation line (receiver) (*)
- 4 = Liquid receiver pressure equalisation line (receiver) (*)
- 5 = Outlet oil distributing circuit

“Oil Out” of the Master unit should be connected to the **“Oil In” connection of the Slave unit**, this line is oil from the oil reservoir (Master unit) to the slave unit(s) compressor(s)

- 6 = Inlet oil distributing circuit

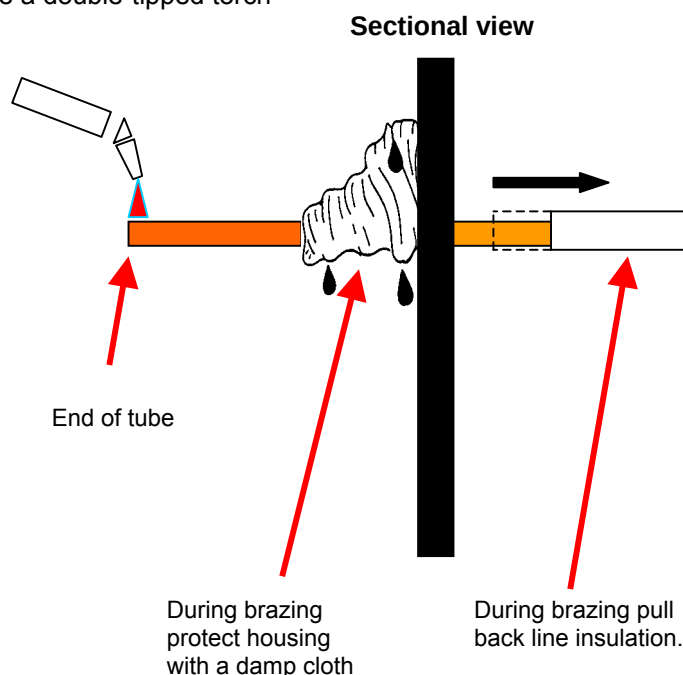
“Oil In” of the Master unit should be connected to the **“Oil Out” connection of the Slave unit**, this is oil from Slave unit oil separator to the Master unit oil reservoir.

(*) Only on condensing units in network of 2 units. (Liquid line should be insulated on OLQ-24V-N to OLQ-48V-N, OLTQ-26V-N & OLTQ-36V-N. Temperature could be as low as -15°C).

3.5.1 Brazing recommendation

- Remove the plugs in the following sequence:
 1. Remove the discharge connection plug
 2. Then remove the suction connection plug
 Removing the plugs in this sequence prevents oil mist from coating the suction tube making brazing difficult.
- 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 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.

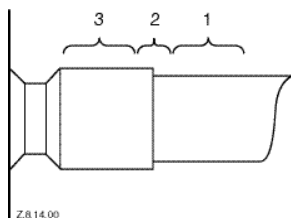
- Use a double-tipped torch



Brazing of the tubes:

For brazing of the tubes see illustration below and the following procedures:

Fit the copper tube into the compressor tube.



1. Heat area 1. As the tube approaches brazing temperature:
2. 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.
3. Add braze material to the joint while moving the torch around the joint to flow braze material around the circumference.
4. 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.

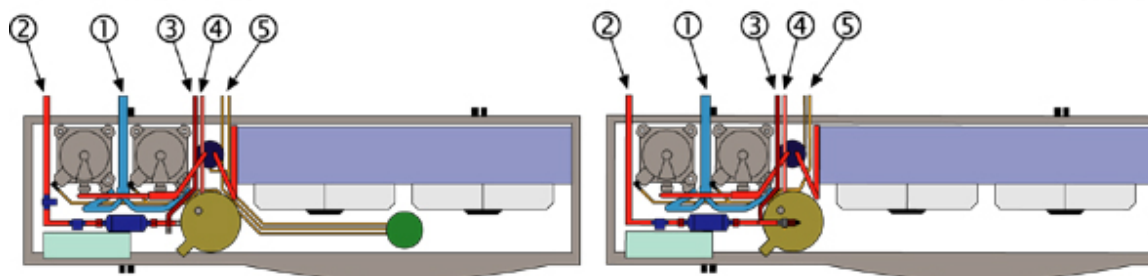
To reconnect:

See the procedure above.

3.6 2 Unit Network : installation

Medium temperature
Master (NLO)

Slave (NL)



Connection		ø (inch)
1	Suction line	1 3/8
2	Liquid line	5/8
3	Liquid line equalization line (between receivers)	1 1/8
4	Liquid line pressure equalization line (between receivers)	5/8
5	Oil distribution lines with Schraeder valves	1/4

Table 9: Connection Sizes

In a 2-unit network, the tubing arrangement for low temperature as well as medium temperature is similar.

Pipe position at rear of the unit is identical for single compressor condensing units.

IMPORTANT

For low temperature network systems, Copeland recommends to insulate the complete liquid outlet line to the evaporator expansion valve in order to optimise the sub-cooling effect.

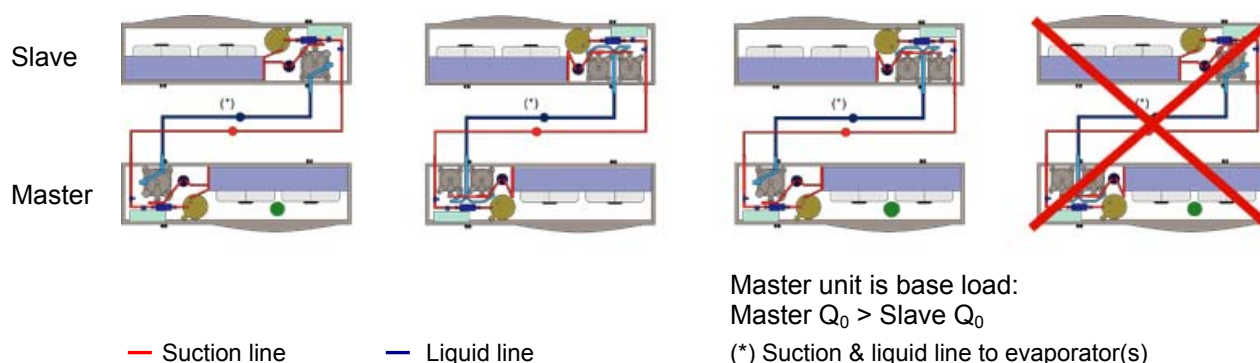
3.6.1 2 Unit Network: Master/Slave selection recommendations

As compressor-starting priority is based on balancing running hours, Copeland recommends the compressor used in the Master unit to be bigger and/or equal in capacity as in Slave units, in order to achieve identical capacity modulation steps. Therefore a network could be composed of either only single compressor units or two-compressor units.

Network configuration could be composed also by a single compressor unit (as master, which will start first always) and a two-compressor unit as slave.

NOTE: Configuration with a two compressor unit as master and a single compressor unit as slave is not recommended as modulation steps would not be all the time equal.

3.6.2 2 Unit network: Possible Master/Slave configurations



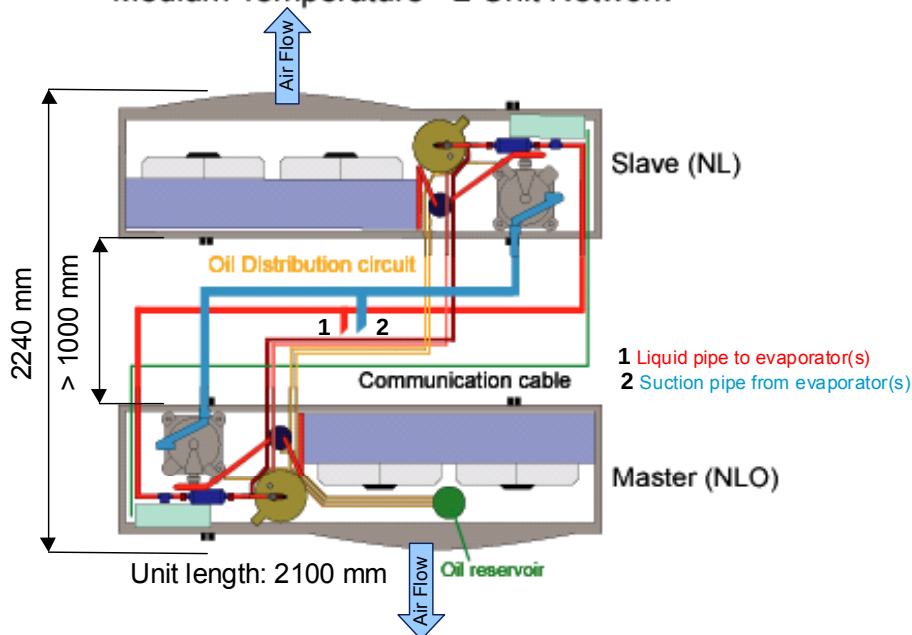
Master unit is base load:
Master $Q_0 > \text{Slave } Q_0$

(*) Suction & liquid line to evaporator(s)

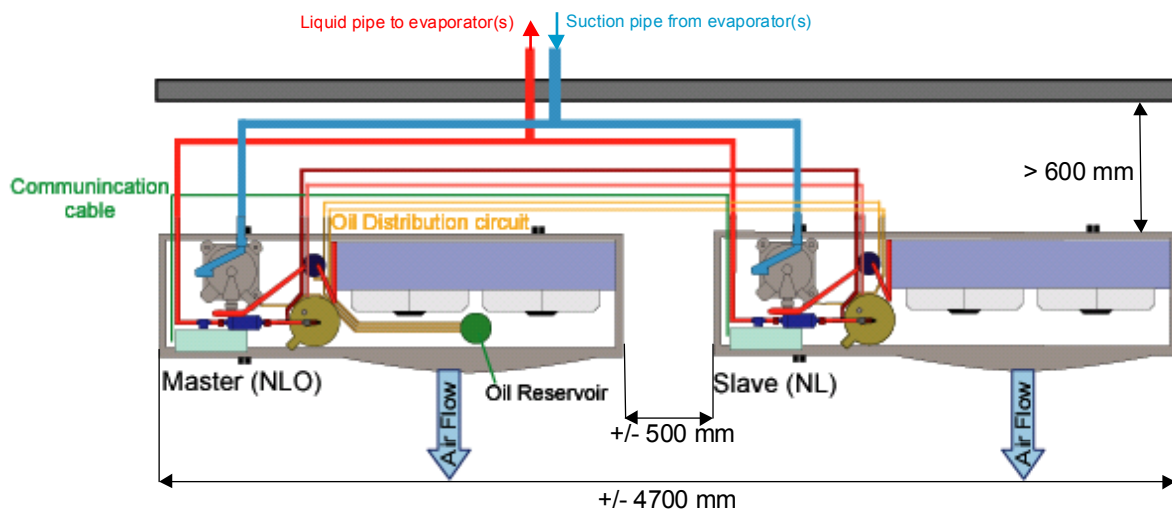
3.6.3 Installation, dimensions and piping details

Put the units in their final position as indicated:

Medium Temperature - 2 Unit Network



Medium temperature - 2 Unit Network Side by Side Configuration

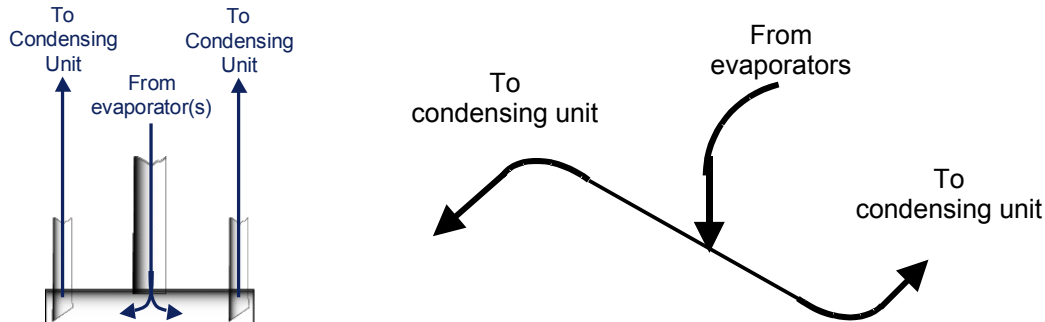


- Suction line from evaporator(s)
- Liquid line outlet line to the evaporator(s)
- Liquid equalization line (between receivers)
- Liquid receiver pressure equalization line (between receivers)
- Oil distribution lines (2 lines; "In" & "Out")
- Communication cable

Suction line connections

An adequately sized suction header providing equal distribution of returning refrigerant to each condensing unit must be used. Suction type diameter at the rear of the unit is 1 3/8.

Copper connection



Liquid line

Each unit outlet liquid line should be connected to a liquid line header.

For low temperature system Copeland recommends to insulate liquid line to evaporator in order to keep the sub-cooling effect from the heat exchanger.

Receiver equalization lines

- Liquid equalization line to be connected between 2 receivers is on the middle bottom of the unit.
Copper connection. Diameter 1 1/8.
- Gas pressure equalization
Copper connection. Diameter 5/8.

Oil inlet and outlet

The oil distribution lines with Schraeder valves need to be connected with flexible hoses (Option proposed by Copeland).

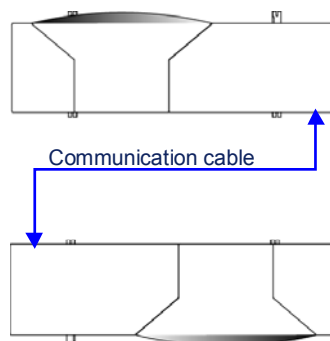
- 2 unit Network back to back configuration:
Copeland recommends the 2 metres flexible kit.
- For 2 unit Network side by side configuration:
Copeland recommends 4 metres flexible kit.



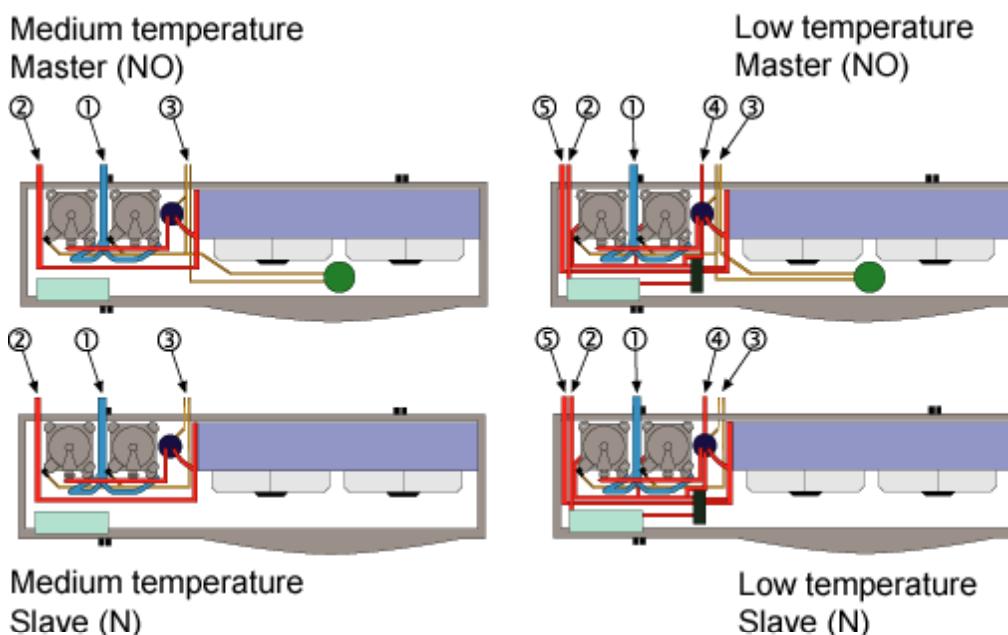
Care should be taken when connecting the hoses, “oil in” of the master unit should be connected to the “oil out” of the slave unit.

Communication cable

A communication cable with M12 connectors (option proposed by Copeland) needs to be connected between units. A 4 metres cable is recommended for 2-unit network configuration. If connection to a monitoring system is required, an additional cable is needed.



3.7 3 & 4 Unit Network



Connection		ø (inch)
1	Suction line	1 3/8
2	Liquid line to liquid receiver unit (LRU)	1 1/8
3	Oil distribution lines with Schraeder valves	1/4
Only for low temperature units:		
4	Liquid line from receiver to heat exchanger (sub-cooler)	1 1/8
5	Liquid outlet to liquid header	5/8

Table 10: Connection Sizes

The pipe position at the rear of the unit is identical for single compressor condensing units.

IMPORTANT

- For low temperature network systems, Copeland recommends to insulate the complete liquid outlet line to the expansion valve in order to optimise the sub-cooling effect.

3.7.1 3 & 4 Unit Network: Master/Slave selection recommendations

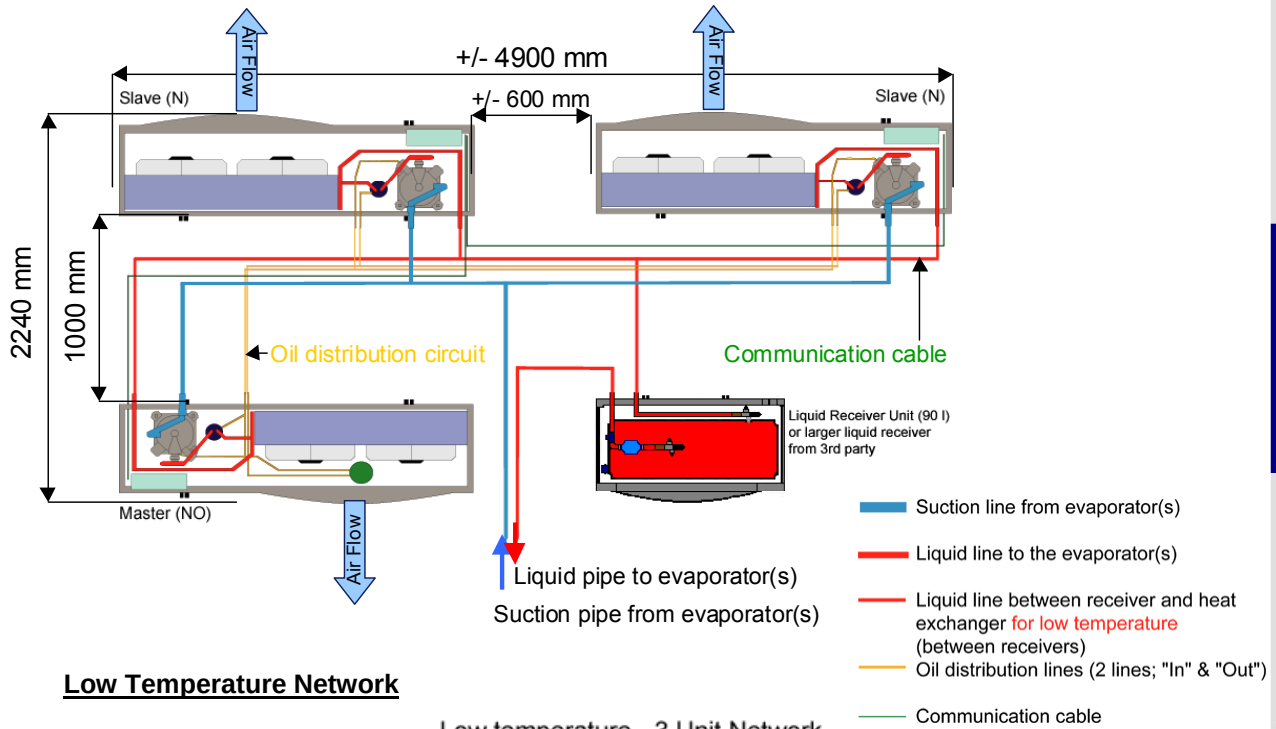
As compressor-starting priority is based on balancing running hours, Copeland recommends the compressor used in the Master unit to be bigger and/or equal in capacity as in Slave units, in order to achieve identical capacity modulation steps. Therefore a network could be composed of either only single compressor units or two-compressor units.

A network could be composed also by a single compressor unit (as master, which will start first always) and 2 or 3 two-compressor unit as slaves.

NOTE: Configuration with a two compressor unit as master and 2 or 3 single compressor unit as slaves is not recommended as modulation steps would not be all the time equal.

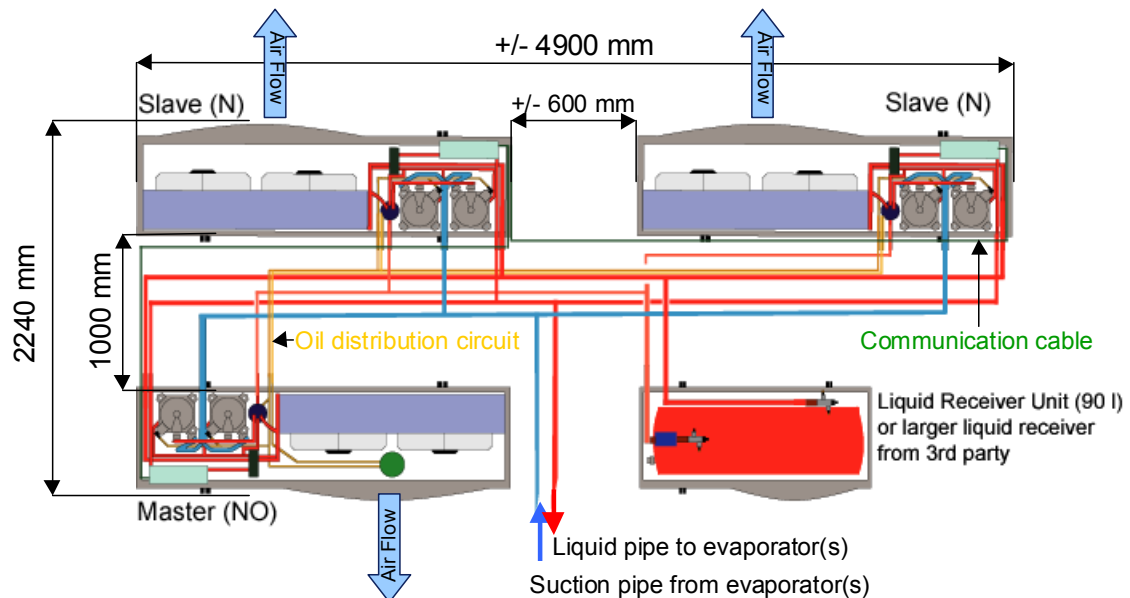
3.7.4 3 Unit Network : Installation, dimensions and piping details

Medium Temperature Network



Low Temperature Network

Low temperature - 3 Unit Network



Low temperature networks need additional piping between each unit heat exchanger and the receiver, in order to get liquid for vapour injection.

IMPORTANT

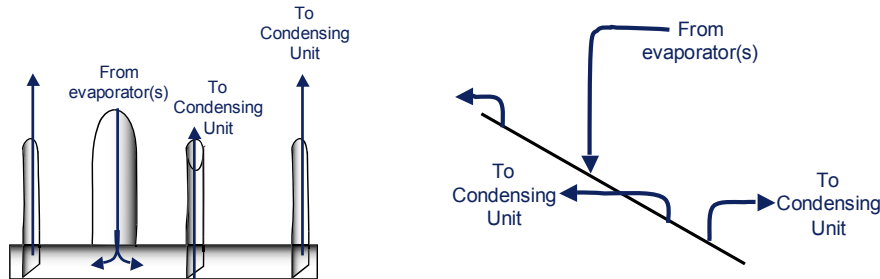
For low temperature network systems, Copeland recommends to insulate the complete liquid outlet line to the expansion valve in order to optimise the sub-cooling effect.

Suction Header

An adequately sized suction header providing equal distribution of returning refrigerant to each condensing unit must be used.

Suction type diameter at the rear of the unit is 1 3/8.

Copper connection



The non-symmetrical design as shown is acceptable and does not create oil level problems between units.

Liquid line from receiver to Heat Exchanger (for low temperature networks)

Each condensing unit needs to be connected to the liquid receiver to supply liquid to heat exchanger.

A copper pipe of 1 1/8" needs to be connected from the receiver to each heat exchanger.

Liquid line from Heat Exchanger (for low temperature networks)

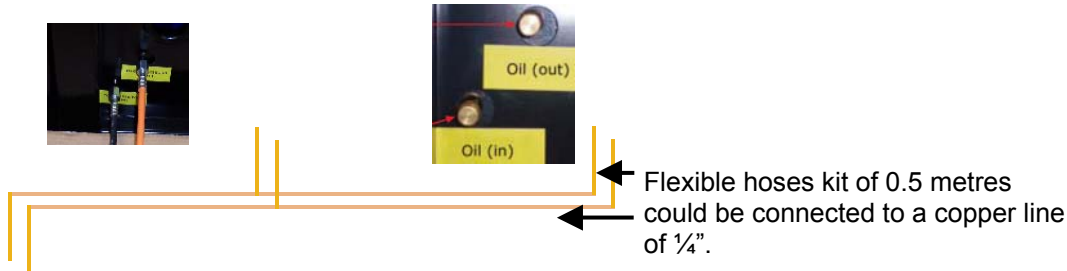
The liquid outlet line from the heat exchanger to the system (to evaporators) needs to be insulated.

Liquid outlet diameter is 5/8.

Oil inlet and outlet

The oil distribution lines with Schraeder valves need to be connected with flexible hoses (option proposed by Copeland).

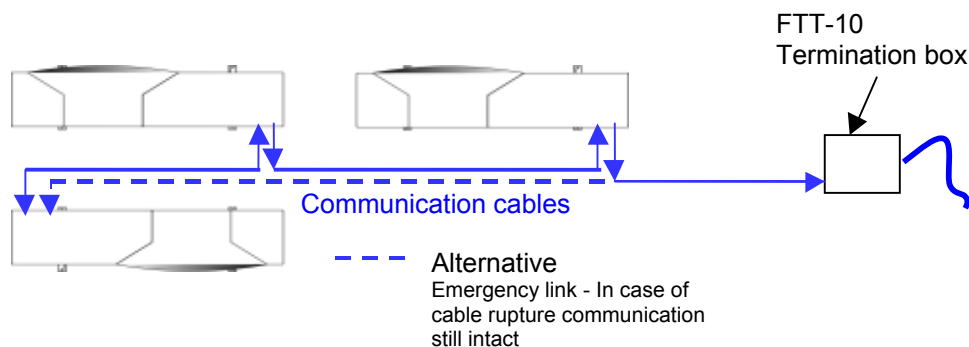
Care should be taken when connecting the hoses, “oil in” of the master unit should be connected to the “oil out” of the slave unit.



Communication cable

2 communication cables with M12 connectors (option proposed by Copeland) need to be connected between units.

It is possible to add a cable to close the communication network and insure back up when communication fails between master and the slave 1. In this configuration 3 kits will be needed. If connection to a monitoring system is required, an additional cable is needed.

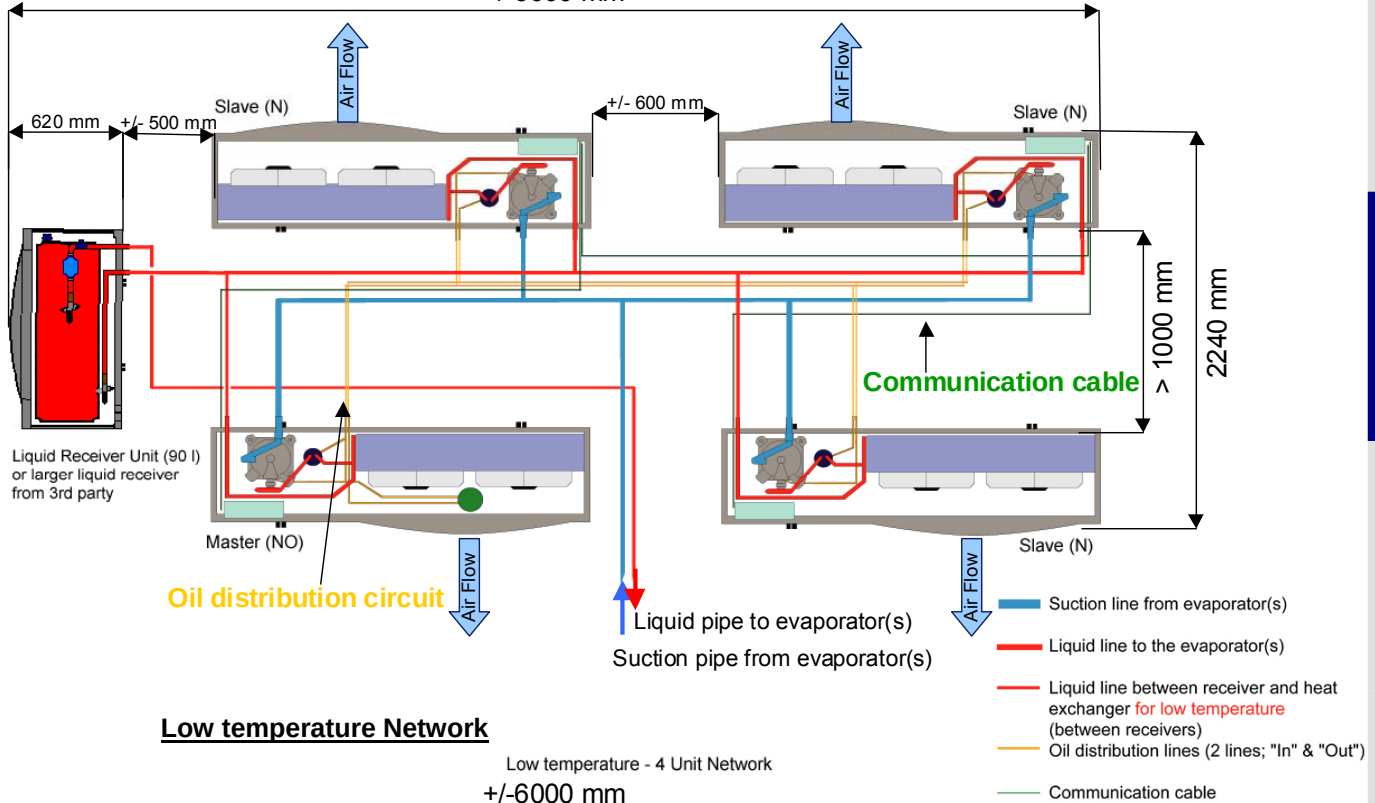


3.7.5 4 Unit Network: Installation, dimensions and piping details

Medium Temperature Network

Medium temperature - 4 Unit Network

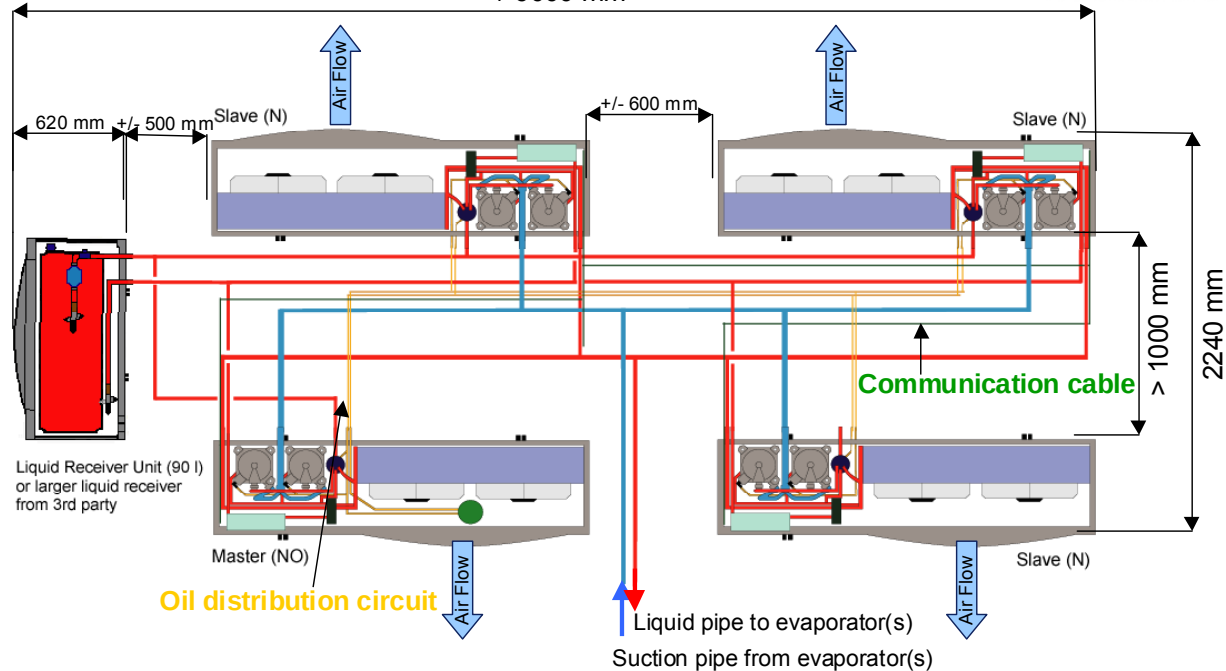
+/-6000 mm



Low temperature Network

Low temperature - 4 Unit Network

+/-6000 mm



IMPORTANT

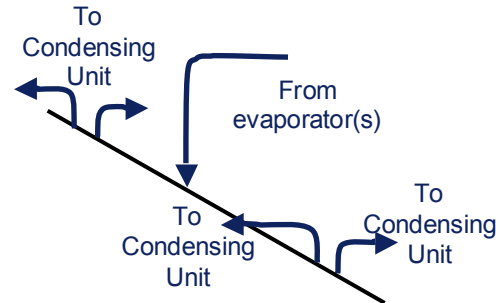
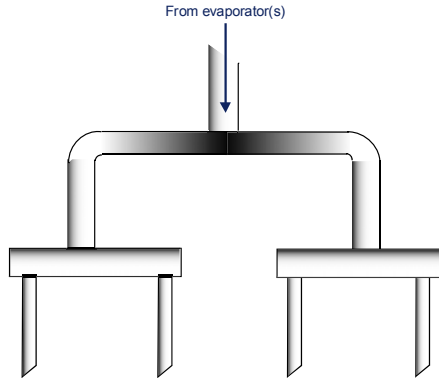
- For low temperature network systems, Copeland recommends to insulate the complete liquid outlet line to the expansion valve in order to optimise the sub-cooling effect.

Suction Header

An adequately sized suction header providing equal distribution of returning refrigerant to each condensing unit must be used.

Suction type diameter at the rear of the unit is 1 3/8.

Copper connection



Liquid line from receiver to Heat Exchanger (for low temperature networks)

Each Condensing unit needs to be connected to the liquid receiver to supply liquid to heat exchanger.

A copper pipe of 1 1/8" needs to be connected from the Receiver to each heat exchanger.

Liquid line from Heat Exchanger (for low temperature networks)

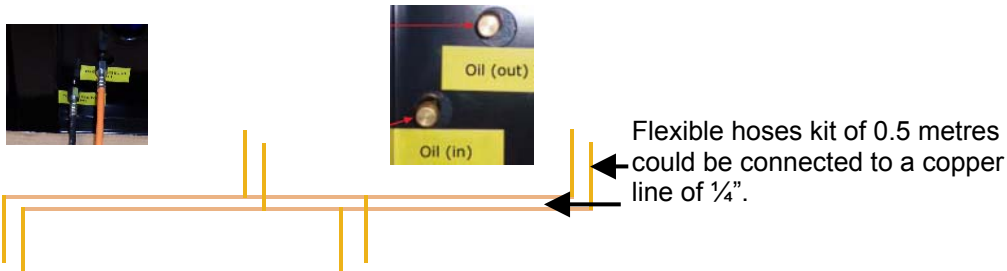
Liquid outlet line from the heat exchanger to the system (to evaporators) needs to be insulated.

Liquid outlet diameter is 5/8.

Oil inlet and outlet

The oil distribution lines with Schraeder valves need to be connected with flexible hoses (option proposed by Copeland).

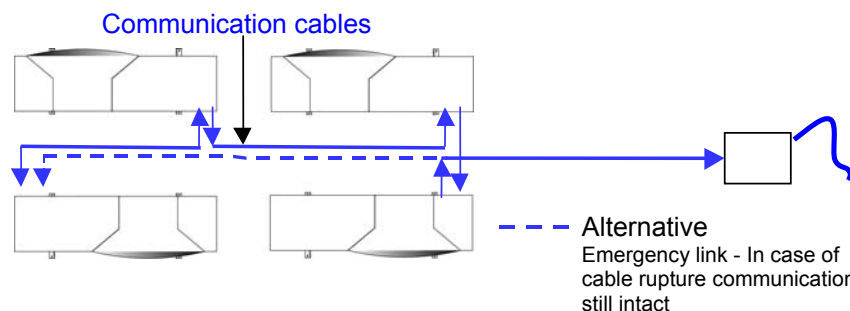
Care should be taken when connecting the hoses, “oil in” of the master unit should be connected the to “oil out” of the slave unit.



Communication cable

3 communication cables with M12 connectors (option proposed by Copeland) need to be connected between the units.

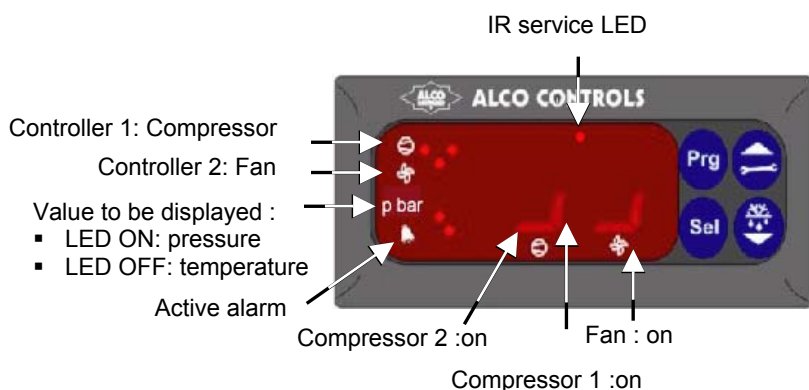
It is possible to add a cable to close the communication network and insure back up when communication failed between master and slave 1. In this configuration 4 kits will be needed. If connection to monitoring system is required, an additional cable is needed.



3.8 Electronic Controller EC2-551

3.8.1 Binding Process

EC2-551 controllers are pre-programmed as “Master” controllers by default. However, in a condensing unit network only one “Master” is allowed, all other controllers need to become “Slaves”.



By altering parameters, controllers can be turned into Slaves and the Master can identify which controllers it has to communicate with. This process is called “binding” and is almost automatic. Commission the controllers together before modifying the system parameters.

NOTE Digital Scroll™ condensing unit needs to be allocated as Master unit always! (Modulated compressor should always start first.)

The number of controllers that can communicate is limited to 4 (maximum 4 units in a network).

The following steps should be taken to set the communication links between the controllers (“binding”):

- 1) Press the “defrost” button for 5 sec. min. on the unit which should become the Master (this unit will take care of compressor staging). The master unit will be also typically the one with a digital compressor (if applicable) or the one with a compressor to cover the base load).
- 2) Enter the “password” : default = 12
- 3) Press “Sel” key. The Display shows a blinking b1 (master unit)
- 4) Press the “Service Pin” button for 1 sec. min. on every slave unit that will take part of the paralleling group.
- 5) The display on the master increments the digit following the “b”. The number of slave units is restricted to 3. (b2 to b4)
- 6) To execute the binding process, press the “defrost” button for 5 sec. Min.
- 7) Enter the “password” : default = 12
- 8) Press “Sel” key
- 9) The Display on every controller shows “---“ for 10 sec, resets and goes to normal operation.

Automatically the controller where the binding process was initiated will become the master and all other units will be configured as slaves. This avoids setting manually the configuration parameter “c3” on every controller. If the binding process was successful, the service LED should blink on every controller in the binding group when traffic arrives on the input network variable

3.8.2 Timeout on binding process (Escape function)

When the binding process is initiated on a controller (display shows blinking “b1”) and the operator doesn’t press any key during 2 minutes, a timeout brings the controller back into normal operation without changing anything.

3.8.3 Delete bindings

- 1) Initiate binding process on a controller (display shows blinking “b1”).
- 2) Terminate binding process on this controller without pressing any service key on other controllers. (“b1” is still displayed)
- 3) The binding memory on the local controller will be cleared and the controller will be set to master mode.

3.8.4 Back-up in case of communication cable or controller failure

In case of communication breakdown or controller failure, all units will start to operate in "stand alone mode".

To enable this (and to prevent a shortage of capacity due to compressors not starting), setpoints for suction pressure should be set as in the Master controller (parameter P0), but with a slightly higher values (0.1 bar higher versus the value of P0 in the Master unit).

3.8.5 Parameters information

3.8.5.1 Parameters

The configuration parameters can be protected by a numerical password. A value of "0" disables this protection (default password: 12).

To select the parameter configuration:

- Press the Prg button for more than 5 seconds

In case of password value equal to "0":

- The first modifiable parameter code is displayed (/1).
- To modify parameters see Parameters modification below.

In case of password value not equal to "0":

- A flashing 0 is displayed
- Press or until the password value is displayed.
- Press Sel to confirm password
- The first modifiable parameter code is displayed (/1).
- To modify parameters see Parameters modification below.

3.8.5.2 Parameters modification

- Press or to show the code of the parameter that has to be changed;
- Press Sel to display the selected parameter value;
- Press or to increase or decrease the value;
- Press Sel to temporally confirm the new value and display its code

Repeat the procedure from the beginning "press or to show..." to modify another parameter, etc.

To exit modifying the parameters with the new values:

- Press Prg to confirm the new values and exit the parameter modification procedure.

To exit without modifying any parameter:

- Do not press any button for at least 60 seconds (TIME OUT).

For more information please refer to the corresponding application guideline (C6.1.5/E, Part no.: 3136444), which is provided with the unit.

4 Starting up & Operation

4.1 Charging Procedure

It is recommended to charge the unit with refrigerant into the receiver, via the Rotalock service valve.

4.2 Sound

Sound data is given in the Copeland Selection software, available on www.eCopeland.com.

The value published is the A-weighted average sound pressure level at 10 metres, with a free sound propagation.

You can calculate the sound pressure for a further distance by using the following formula:

$$LPA_d = LPA_{1m} - 20 \log(d)$$

LPA_d = A-weighted sound pressure level at a "d" distance
 LPA_{1m} = A-weighted sound pressure level at 1 metre
 D = distance

The sound pressure values measured on the field might be slightly different from the published value due to the surrounding, different room characteristics, reverberating object or walls, etc.

The unit must be installed without restricting the airflow.

All sound levels stated are with condenser fan(s) running at full speed. During reduced ambient temperatures if optional fan speed controller is operating, lower sound levels will be achieved.

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.**

4.3.1 Units OMQ-56, OMQ-75, OMQ-92, OMQ-110, OLQ-24V, OLQ-33V, OLQ-40V & OLQ-48V

Compressors assembled on above units are equipped with the INT69SCY module, which acts as internal protection and checks the phasing. The module will trip in case of reverse rotation.

4.3.2 Units OMTQ-60(D), OMTQ-76, OMTQ-90(D), OLTQ-26V & OLTQ-36V

Please follow the underneath procedure:

Observing that suction pressure drops and discharge pressure rises when the compressor is energized makes verification of proper rotation direction possible. There is no negative impact on durability caused by operating three-phase Copeland Scroll™ compressors in the reversed direction for a short period of time (less than one hour), but oil may be lost. After several minutes of operation in reverse, the compressor's protection system will trip due to high motor temperature. However, if allowed to repeatedly restart and run in reverse without correcting the situation, the compressor will be permanently damaged.

All three-phase scroll compressors are identically wired internally. Therefore, once the correct phasing is determined for a specific system or installation, connecting properly phased power leads to the identified terminals in the electrical panel will insure proper rotation direction.

4.4 Maximum compressor cycle

Maximum start per hour: 10 times

4.5 Checks before starting & during operation

Please check that all Rotalock valves are fully opened.

Check that the electrical panel is closed.

After starting and operation conditions are stabilised, we recommend to check the oil level in compressor(s) and if needed add oil to insure a sufficient oil level (middle of oil sight glass).

5 Maintenance & Repair: Replacing a compressor

- De-energize the condensing unit before any intervention.
- Unscrew and lift the housing top panel to get access from the top to the compressor.
- Close Rotalock valves or ball valve to isolate the compressor from the system and unscrew the flare Rotalock connector from the compressor.
- Release the compressor mounting parts and then lift it to replace with a new compressor.

6 Certification and Approval

- The piping is in compliance with the Pressure Equipment Directive 97/23/EEC (Art.3§3 - Sound Engineering Practice)
- 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 60335-1 (Safety Household and Similar Electrical Appliance, Part 1: General Requirements)
- To incorporate these products into a machine the Manufacturer's Declaration of incorporation has to be respected.

7 Dismantling and Disposal



- Removing oil and refrigerant:
- Do not disperse it in the environment.
- Use the correct equipment and method of removal.
- Dispose oil and refrigerant properly.
- Dispose the compressor properly.

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