

***Copeland®  
EazyCool™***

***Copeland EazyCool™  
outdoor condensing units***

Application Guidelines

  
**EMERSON™**  
Climate Technologies

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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

- 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 on the discharge outlet in the compressor. 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, and thereby destroy the compressor.

## 1.4 About this guideline

These guidelines ensure the safe installation, starting, operation and maintenance of Copeland EazyCool<sup>™</sup> condensing units.

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](http://www.ecopeland.com).

## 2 Product Description

### 2.1 About Copeland EazyCool™ condensing units

Copeland has developed the Copeland EazyCool outdoor condensing unit range for medium and low temperature applications. It covers units from 2 to 15 hp and includes units with two compressors, allowing modulation in two steps as well as Copeland EazyCool Digital Scroll™ condensing units, which feature continuous modulation from 10 to 100%.

### 2.2 Product range

Up to 6 hp units are available in 2 versions: a standard and a “low sound” version. Above 6 hp only “low sound” versions are available.

The medium temperature range features ZB Scroll compressors, of which 4 models include a Copeland Digital Scroll™ compressor for continuous modulation.

The low temperature range features ZF Scroll compressors.

Low temperature models OLQ-24V to OLQ-48V, OLTQ-26V and OLTQ-36V are provided with vapour injection technology, using a pre-installed sub-cooler (for R404A/R507 only).

### 2.3 Product nameplate

The condensing unit nameplate shows model designation and serial number.

The compressor has its own nameplate with all electrical characteristics.

### 2.4 Nomenclature

The model designation contains the following technical information:

Copeland EazyCool™ Condensing Units						
O	L	T	Q	26	V	TFD
						Motor version
						Compressor type V=EVI(*), D=Digital (**)
						Compressor size
						Low sound version
						Two compressor unit
						Application Range (M: Medium, L: Low)
Outdoor						

(\*) For low temperature only

(\*\*) For medium temperature only

Compressor size = size as indicated in compressor nomenclature (in above example: two compressors ZF13 KVE)

Standard motor versions available:

PFJ: 220-240V / 1Ph / 50Hz

TFD: 380-420V / 3Ph / 50Hz

## 2.5 Application range

### 2.5.1 Qualified refrigerants and oils

	OM(Q)-15 ~ OMQ-110	OMTQ-60 OMTQ-76 OMTQ-90	OMQ-30D, OMQ-45D OMTQ-60D OMTQ-90D	OL(Q)-09 ~ OL(Q)-18	OLQ-24V~OLQ-48V OLTQ-26V & OLTQ-36V
Qualified refrigerant	R404A/R507 R134a, R407C R22	R404A/R507 R407C R22	R404A/R507 R22	R404A/R507 R22	R404A/R507
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 envelopes, please refer to the compressor application envelope available in Copeland Selection Software version 6.

#### Medium temperature range

Evaporating temperature from -30°C up to 10°C, ambient temperature range depending on model used. See Copeland Selection Software or literature for further information.

#### Low temperature range

Evaporating temperature from -40°C up to 7°C, ambient temperature range depending on model used. See Copeland Selection Software or literature for further information.

## 2.6 Main component description

### 2.6.1 Compressor

Medium Temperature			Low Temperature		
Single compressor unit					
Unit model		Compressor model	Unit model		Compressor model
Standard	Low Sound		Standard	Low Sound	
OM-15-PFJ	OMQ-15-PFJ	ZB15KCE-PFJ-551			
OM-15-TFD	OMQ-15-TFD	ZB15KCE-TFD-551			
OM-21-PFJ	OMQ-21-PFJ	ZB21KCE-PFJ-551			
OM-21-TFD	OMQ-21-TFD	ZB21KCE-TFD-551	OL-09-TFD	OLQ-09-TFD	ZF09K4E-TFD-556
OM-26-PFJ	OMQ-26-PFJ	ZB26KCE-PFJ-551			
OM-26-TFD	OMQ-26-TFD	ZB26KCE-TFD-551	OL-11-TFD	OLQ-11-TFD	ZF11K4E-TFD-556
OM-30-TFD	OMQ-30-TFD	ZB30KCE-TFD-551	OL-13-TFD	OLQ-13-TFD	ZF13K4E-TFD-556
	OMQ-30D-TFD	ZBD30KCE-TFD-250			
OM-38-TFD	OMQ-38-TFD	ZB38KCE-TFD-551	OL-15-TFD	OLQ-15-TFD	ZF15K4E-TFD-556
OM-45-TFD	OMQ-45-TFD	ZB45KCE-TFD-551	OL-18-TFD	OLQ-18-TFD	ZF18K4E-TFD-556
	OMQ-45D-TFD	ZBD45KCE-TFD-250			
	OMQ-56-TWD	ZB56KCE-TWD-551		OLQ-24V-TWD	ZF24KVE-TWD-551
	OMQ-75-TWD	ZB75KCE-TWD-551		OLQ-33V-TWD	ZF33KVE-TWD-551
	OMQ-92-TWD	ZB92KCE-TWD-551		OLQ-40V-TWD	ZF40KVE-TWD-551
	OMQ-110-TWD	ZB11MCE-TWD-551		OLQ-48V-TWD	ZF48KVE-TWD-551
Two compressor unit					
Unit model		Compressor model	Unit model		Compressor model
Standard	Low Sound		Standard	Low Sound	
	OMTQ-60-TFD	2 x ZB30KCE-TFD-551		OLTQ-26V-TFD	2 x ZF13KVE-TFD-551
	OMTD60D-TFD	ZBD30KCE-TFD-250 ZB30KCE-TFD-551			
	OMTQ-76-TFD	2 x ZB38KCE-TFD-551			
	OMTQ90D-TFD	ZBD45KCE-TFD-250 ZBD45KCE-551			
	OMTQ-90-TFD	2 x ZB45KCE-TFD-551		OLTQ-36V-TFD	2 x ZF18KVE-TFD-551

**Table 2:** Compressor type used in Copeland EazyCool™ condensing units

### 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 Copeland EazyCool™ units are equipped with single-phase fans. The “Q” versions are equipped with low speed (910 rpm) 6 pole single-phase fan motors.

Condensing Units		N° of fans	Fan model	Run Capacitor Capacity	Diameter mm	Voltage V/ph/Hz	Power input (W)	Current input (A)	Winding resistance Ohm (Ω)			
Medium Temp	Low Temp											
Standard												
OM-15		1	121	4μF-400	350	220-240 1~ 50	130	0.66	68			
OM-21	OL-09	1	271	6.3μF-400	420		235	1.38	19.1			
OM-26	OL-11											
OM-30	OL-13											
OM-38	OL-15											
OM-45	OL-18											
Low Sound												
OMQ-15		1	65	3.15μF-400V	350	220-240 1~ 50	70	0.38	143			
OMQ-21	OLQ-09	1	145	6.3μF-400V	420		145	0.81	45.9			
OMQ-26	OLQ-11											
OMQ-30(D)	OLQ-13											
OMQ-38	OLQ-15											
OMQ-45(D)	OLQ-18											
OMQ-56	OLQ-24V	2	145	6.3μF-400V	420		145	0.81	45.9			
OMQ-75	OLQ-33V											
OMQ-92	OLQ-40V	2	301	8μF-400V	500					275	1.56	24.7
OMQ-110	OLQ-48V											
OMTQ-60(D)	OLTQ-26V	2	145	6.3μF-400V	420					145	0.81	45.9
OMTQ-76	OLTQ-36V											
OMTQ-90(D)		2	301	8μF-400V	500		275	1.56	24.7			

**Table 3:** Condenser fan: technical data

### 2.6.4 Liquid receiver

Copeland EazyCool™ condensing units are equipped with a liquid receiver with:

- 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)
OM-15 & OL-09	3.7
OMQ-15 & OLQ-09	
OM-21 to OM-45 & OL-11 to OL-18	7.5
OMQ-21 to OMQ-45(D) & OLQ-11 to OLQ-18	
OMQ-56 to OMQ-110 & OLQ-24V to OLQ-48V	14
OMTQ-60(D) to OMTQ-90(D) & OLTQ-26V to OLTQ-36V	

**Table 4:** Receiver volume

Rotalock service valve



Relief valve connection

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



### 2.6.5 Electrical box: components

All electrical components are pre-wired into the panel.

This panel contains:

- Compressor contactor(s)
  - Fuse(s)
  - Terminal blocks
  - DIN rail mounted terminals
  - Alarm relays, if an electronic condensing unit controller is used.
  - Electronic controller on units equipped with two compressors or with a Copeland Digital Scroll™ compressor
- Please refer to the controller application guideline (C6.1.3, Part no.: 3125495) supplied with this unit for further information.

### 2.6.6 Pressure switch

All **single compressor** Copeland EazyCool™ condensing units are equipped with:

- Dual pressure switch with automatic reset: ALCO PS2-W7A
- (Option manual reset: ALCO PS2-C7A)

All Copeland EazyCool™ condensing units with a **Copeland Digital Scroll™** are equipped with:

- Electronic condensing unit controller EC2-551 with HP and PL pressure transmitters.

All **two-compressor** Copeland EazyCool™ condensing units are equipped with:

- Single low pressure switch with automatic reset: ALCO PS1-W3A
- Two high pressure switches with automatic reset ALCO PS3-WF4-HNS
- Electronic condensing unit controller EC2-551 (optional: fan speed control fitted) or EC2-511 (without fan speed control) 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:

- 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) PS2-C7A: Alco Controls dual pressure switch with manual reset (optional variation to dual pressure switch PS2-W7A)

The PS2-C7A pressure switch has the same characteristics as the PS2-W7A except that it has an external manual reset on the HP side.

### 3) 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:

- 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.



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

- Fixed switch point settings  
Cut-out point: 22 bar  
Cut-in point: 26.2 bar.



### 5) Alco Controls PT4 Pressure Transmitter

Single compressor Digital Scroll units and two compressor condensing units (standard or Digital) are equipped with HP and LP pressure transmitters, connected to the EC2 electronic condensing unit controller.

An Alco PT4-30S pressure transmitter is used at the high-pressure part of the system.

An Alco PT4-07S pressure controller is used at the low-pressure part of the system.

The PT4 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.

For EC2, please refer to the controller application guideline (C6.1.3, Part no.: 3125495) supplied with this unit for further information. It is also available for download on [www.eCopeland.com](http://www.eCopeland.com).



### 2.6.7 Fan speed controller (optional)

An electronic fan speed control is available to control the speed of the fans based on condenser pressure. The controller operates with single-phase motors. One or two fans are controlled at the same time.

The electrical connection is made in the terminal box of the condensing unit and the controller is mounted on the liquid valve with a Schraeder fitting.

Using a variable 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.

Single compressor Copeland EazyCool™ condensing units can be equipped with the following optional fan speed controllers:

- FSM41S for R134a
- FSM42S for R404A (R507), R134a, R407C & R22

Two compressor Copeland EazyCool™ condensing units (Standard or Digital) can be equipped with the following optional fan speed controller:

- FSP150

#### 1) Fan speed controller FSM 4...

The fan speed controller selection depends on the fan motor maximum current, the fan quantity and the refrigerant pressure range.

Fan speed controller:

- **FSM-41S** = nominal current between 0.5A and **4A** for R134a
- **FSM-42S** = nominal current between 0.5A and **4A** for R404A, R507, R407C, R22

Model	Refrigerant	Part Number	
		Copeland	Alco
FSM-41S (4.0 to 12.5 bar)	R134a	3130673	715520
FSM-42S (9.2 to 21.2 bar)	R22, R407C, R404A	3130684	715521

**Table 5:** Fan speed controller

#### 2) Fan speed controller FSP150

Two-compressor units: fan speed is controlled by the EC2-551 condensing unit controller in combination with a FSP 150 fan speed controller.

- **FSP 150:** nominal current is between 0.3A and **5A**.



### 2.6.8 Liquid line equipment

#### 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.



#### c) Liquid line solenoid valve Alco Controls 200 RBT 5

- Compact size
- Snap-on clip for attaching solenoid coils
- $\Delta p$  minimum = 0.05 bar

**NOTE** The solenoid valve is shipped loose with all two compressor units as well as with all units equipped with Copeland Digital Scroll.



### 2.6.9 Liquid sub-cooler

Condensing units > 6hp for low temperature applications (**models OLQ-24V, OLQ-33V, OLQ-40V, OLQ-48V, OLTQ-26V, OLTQ-36V**) 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.

Liquid sub-cooler characteristics:

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

IMPORTANT



Since the liquid temperature can be as low as  $-15^{\circ}\text{C}$ , **liquid line insulation** should be applied to avoid freezing of water on the outside of the lines, and to avoid loss of performance gains which were achieved by sub-cooling.

### 2.6.10 Solenoid Valve for Copeland 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



### 2.6.11 Oil separator: Alco Controls OSH

The Alco Controls OSH oil separator is fitted as standard on all two-compressor Copeland EazyCool™ outdoor condensing units. It is available as an option on single-compressor units.

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

**NOTE** The oil separator is not charged with oil. The installer has to charge the system during the first hours in operation. Please see paragraph “charging procedure”.

### 2.6.12 Electronic oil control system (Alco OM3)

The two-compressor Copeland EazyCool™ outdoor units equipped with Digital Scroll are provided with Alco Controls OM3 oil level controllers, which supply oil only when required.



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 OM3

### 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.

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.

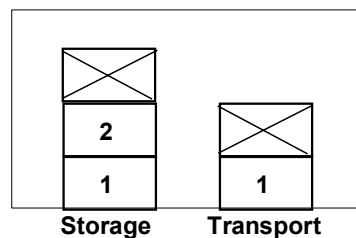
#### 3.1 Condensing unit handling

##### 3.1.1 Transport and storage

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

##### Single fan units:

The single fan unit, when boxed, can be handled by a fork lift or pallet truck.

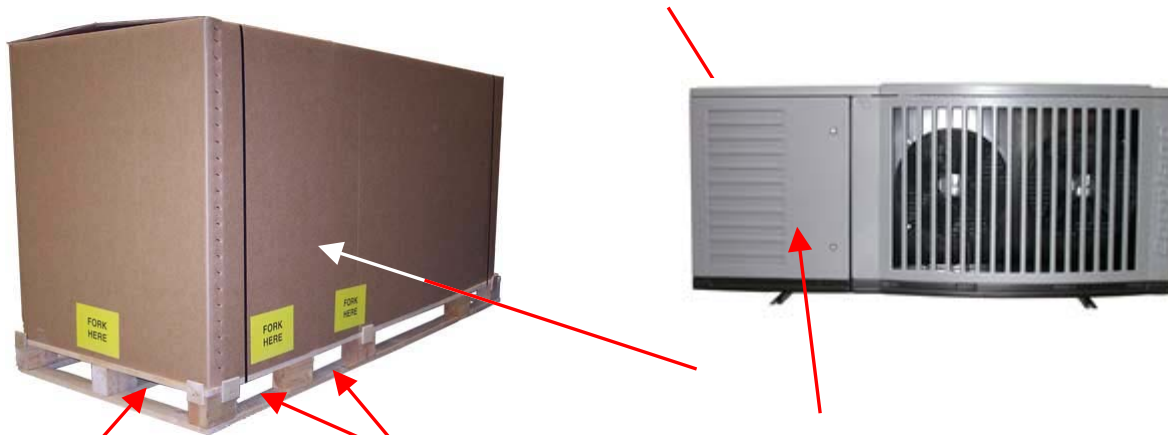


Heaviest end

Lift here with forklift

## Twin fan units:

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. Weights: please refer to table 7.

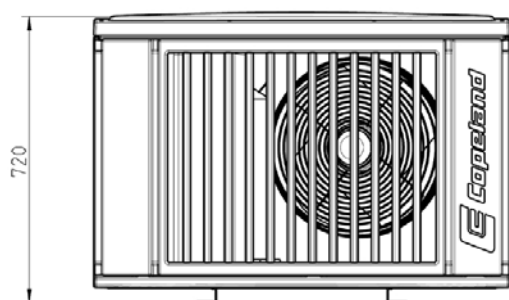
Medium Temperature		Weight (kg)		Low Temperature		Weight (kg)	
Standard	Low Sound	Net	Gross	Standard	Low Sound	Net	Gross
Models with single compressors (& single fan)							
OM-15	OMQ-15	74	102				
OM-21	OMQ-21	84	112	OL-09	OLQ-09	83	111
OM-26	OMQ-26	85	113	OL-11	OLQ-11	86	114
OM-30	OMQ-30(D)	98	126	OL-13	OLQ-13	96	124
OM-38	OMQ-38	99	127	OL-15	OLQ-15	100	128
OM-45	OMQ-45(D)	118	146	OL-18	OLQ-18	119	147
Models with single compressors (& twin fan)							
	OMQ-56	234	278		OLQ-24V	226	270
	OMQ-75	234	278		OLQ-33V	226	270
	OMQ-92	244	288		OLQ-40V	236	280
	OMQ-110	253	297		OLQ-48V	245	289
Models with two compressors (& twin fan)							
	OMTQ-60 (D)	216	260		OLTQ-26V	218	262
	OMTQ-76	218	262				
	OMTQ-90 (D)	222	266		OLTQ-36V	226	270

**Table 7:** Weights

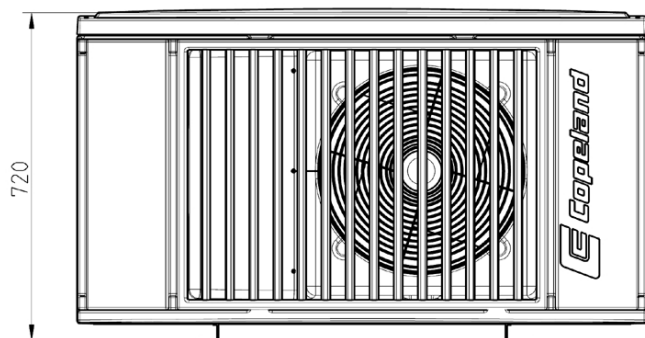
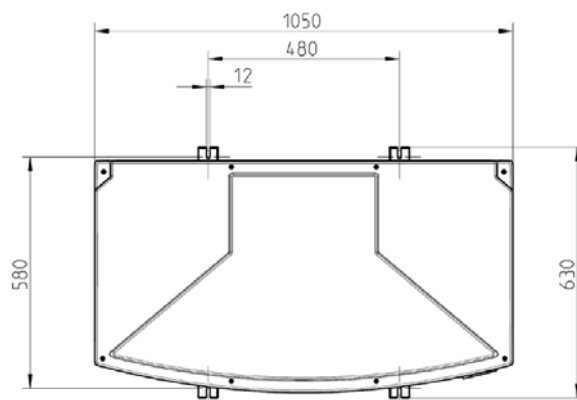
Net weight = bare unit; Gross weight = unit + packaging



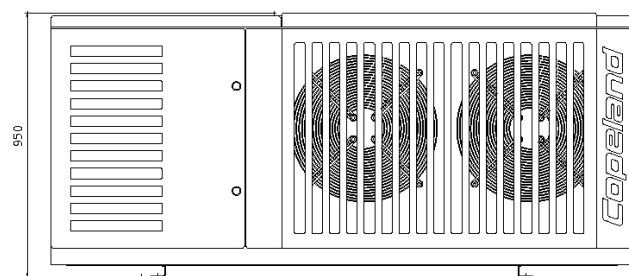
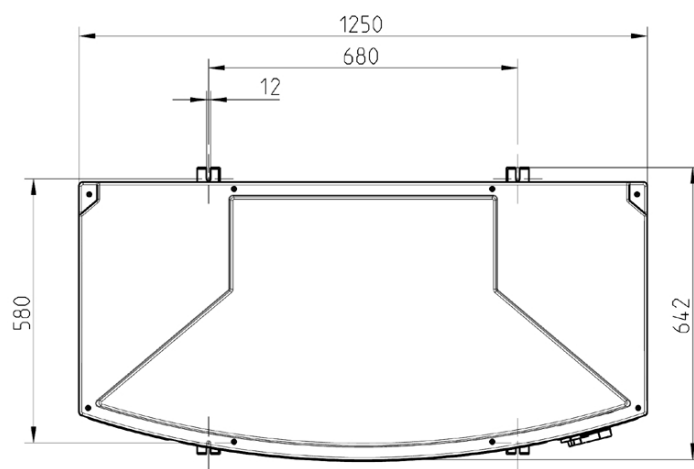
### 3.1.2 Dimensions in mm



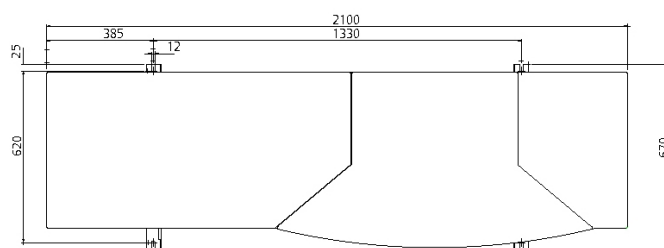
OM(Q)-15 to OM(Q)-38, OL(Q)-09 to OL(Q)-15



OM(Q)-45 (D), OL(Q)-18



OMQ-56 to OMTQ-110, OMTQ-60 to OMTQ-90  
OLQ-24V to OLQ-48V, OLTQ-26V & OLTQ-36V



Copeland EazyCool units with Digital Scroll have same dimensions than the corresponding standard versions (e.g. Dimension OMQ-30 = Dimension OMQ-30D).



## 3.2 Connection access

Access door to electrical and refrigeration components.

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

Side view (left)



Front view



## 3.3 Electrical box access

OM(Q)-15 to OM(Q)-45(D)  
OL(Q)-09 to OL(Q)-18

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



Slide the panel to the top



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

## 3.4 Electrical connection

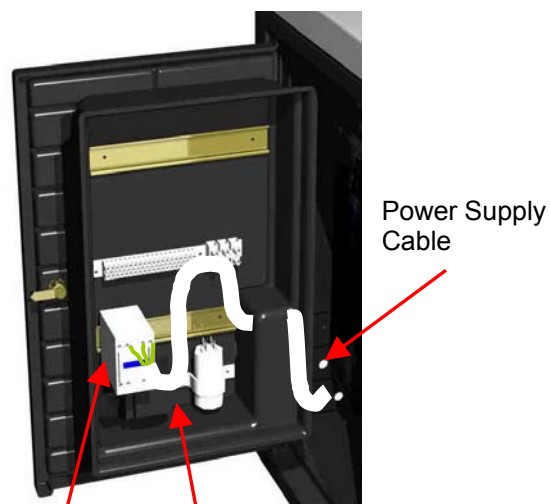
### 3.4.1 Power supply connections

The electrical connection of the Copeland EazyCool 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.

**OM(Q)-15 to OM(Q)-45(D) & OL(Q)-09 to OL(Q)-18**



Ventilation air inlet holes.  
Up to 4 holes can be used  
for cable entry.



Contactor

Electric box: slide the cover  
upward to get access to the  
electrical components.

Mounting area for  
main isolator switch

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



Main electrical cable entry  
Mounting area for main isolator switch



Contactor

### 3.4.2 Electrical components pre-wired

Electrical components, pre-wired	Medium Temperature					Low Temperature		
	OM(Q)-15 to OM(Q)-45	OMQ-56 to OMQ-110	OMTQ-60 OMTQ-76 OMTQ-90	OMQ-30D & OMQ-45D	OMTQ-60D & OMTQ-90D	OL(Q)-09 to OL(Q)-18	OLQ-24V to OLQ-48V	OLTQ-26V & OLTQ-36V
Compressor contactor	1	1	2	1	2	1	1	2
Crankcase heater	1	1	2	1	2	1	1	2
Condenser fan motor	1	2	2	1	2	1	2	2
HP/LP pressure switch PS2	1	1	-	1	-	1	1	-
HP switch PS3	-	-	2	-	2	-	-	2
LP switch PS1	-	-	1	-	1	-	-	1
Liquid line solenoid valve	Pre-wired if shipped mounted	Pre-wired if shipped mounted	Solenoid valve shipped loose only			Pre-wired if shipped mounted	Pre-wired if shipped mounted	Solenoid valve shipped loose only
Digital 24V solenoid valve	-	-	-	1	1	-	-	-
Electronic controller EC2 with Pressure sensor PT4	-	-	1	1	1	-	-	1
	-	-	2	2	2	-	-	2
<b>Options</b>								
Liquid line solenoid valve, not mounted	Solenoid valve shipped loose					Solenoid valve shipped loose		
Fan speed controller	FSM- 41S (R134a) FSM-42S (R404A, R407C& R22)		FSP-150 (R404A, R407C& R22)	FSM- 42S (R404A & R22)	FSP-150 (R404A & R22)	FSM- 42S (R404A & R22)	FSM- 42S (R404A)	FSP-150 (R404A)
Main isolator switch	1	1	1	1	1	1	1	1

**Table 8:** Electrical connections

**Care** should be taken for electrical connection to avoid reverse rotation.

### 3.4.3 Discharge temperature protection

#### Compressor discharge line thermostat

Under extreme operating conditions internal discharge temperatures can reach very high levels. To avoid compressor damage, the ZF09K4E to ZF18K4E as well as ZF13KVE & ZF18KVE compressors are equipped with an external discharge line thermostat. (→ units: OL(Q)-09 to OL(Q)-18, OLTQ-26V & OLTQ-36V). Digital Scroll™ compressors ZBD-30-KCE & ZBD-45-KCE are also equipped with a discharge line thermostat. (→ units: OMQ-30D, OMQ-45D, OMTQ-60D & OMTQ-90D).

#### INT 69 SCY module

Compressors ZF24-KVE to ZF48-KVE as well as ZB56-KCE to ZB11-MCE are equipped with an INT 69 module. (→ units: OLQ-24V to OLQ-48V & OMQ-56 to OMQ-110).

### 3.4.4 Electrical protection standard (protection class)

- 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. FSP 150 is IP67 according to IEC529/EN 60529
- Solenoid valve coils: IP65 according to DIN 43650
- EC2-5X1: IP65 (frontal protection with gasket)

### 3.4.5 Condensing unit electrical data

#### Single compressor condensing units

Copeland EazyCool condensing units	Maximum Operating Current (compressor)		Locked Rotor Current (compressor)		Fan Model	Max. Fan Current  230V / 1~ / 50Hz A	Max. Operating Current (Unit)	
	PFJ A	TFD/TWD* A	PFJ A	TFD/TWD* A			PFJ A	TFD/TWD A

#### Medium Temperature

OM - 15					121	0.66	13.2	5.6
OMQ-15	12.5	4.9	58.0	26	65	0.38	12.9	5.3
OM - 21					271	1.38	17.8	8.6
OMQ-21	16.4	7.2	82.0	40	145	0.81	17.1	8.0
OM - 26					271	1.38	19.4	10.3
OMQ-26	18.0	8.9	97.0	46	145	0.81	18.8	9.7
OM - 30					271	1.38	-	11.7
OMQ-30	-	10.3	-	49	145	0.81	-	11.1
OMQ-30D		7.9		52	145	0.81	-	8.7
OM - 38					271	1.38	-	14.2
OMQ-38	-	12.8	-	66	145	0.81	-	13.6
OM - 45					271	1.38	-	14.5
OMQ-45	-	13.1	-	74	145	0.81	-	13.9
OMQ-45D		11.4			145	0.81	-	12.2
OMQ-56	-	15.4*	-	99*	2 x 145	0.81	-	17.0*
OMQ-75	-	21.7*	-	127*	2 x 145	0.81	-	23.3*
OMQ-92	-	25.1*	-	167*	2 x 301	1.56	-	28.2*
OMQ-110	-	29.2*	-	198*	2 x 301	1.56	-	32.3*

#### Low Temperature

OL - 09	-	6.0	-	40	121	0.66	-	6.5
OLQ-09					65	0.38		6.3
OL - 11	-	7.0	-	46	271	1.38	-	8.4
OLQ-11					145	0.81		7.7
OL - 13	-	8.0	-	52	271	1.38	-	9.4
OLQ-13					145	0.81		8.7
OL - 15	-	10.0	-	64	271	1.38	-	11.4
OLQ-15					145	0.81		10.7
OL - 18	-	12.0	-	74	271	1.38	-	13.4
OLQ-18					145	0.81		12.7
OLQ-24V	-	16.1*	-	99*	2 x 145	0.81	-	17.4*
OLQ-33V	-	22.3*	-	127*	2 x 145	0.81	-	23.6*
OLQ-40V	-	25.1*	-	167*	2 x 145	1.56	-	28.2*
OLQ-48V	-	30.6*	-	198*	2 x 301	1.56	-	33.7*

\* Medium temperature: All models up to OMQ-45 in TFD. All other in TWD.

Low temperature: All models up to OLQ-18 in TFD. All others in TWD.

#### Two compressor condensing units

Copeland EazyCool condensing units	Maximum Operating Current (compressor)		Locked Rotor Current (compressor)		Fan Model	Max. Fan Current  230V / 1~ / 50Hz A	Max. Operating Current (Unit)	
	PFJ A	TFD A	PFJ A	TFD A			PFJ A	TFD A

#### Medium Temperature

OMTQ-60	-	20.6	-	49	2 x 145	0.81	-	22.2
OMTQ-60D		18.2		52				19.8
OMTQ-76	-	25.6	-	66	2 x 145	0.81	-	27.2
OMTQ-90	-	26.2	-	74	2 x 301	1.56	-	29.3
OMTQ-90D		24.5						27.6

#### Low Temperature

OLTQ-26V	-	16.0	-	52	2 x 145	0.81	-	17.6
OLTQ-36V	-	24.0	-	74	2 x 301	1.56	-	27.1

**Table 9:** Electrical data

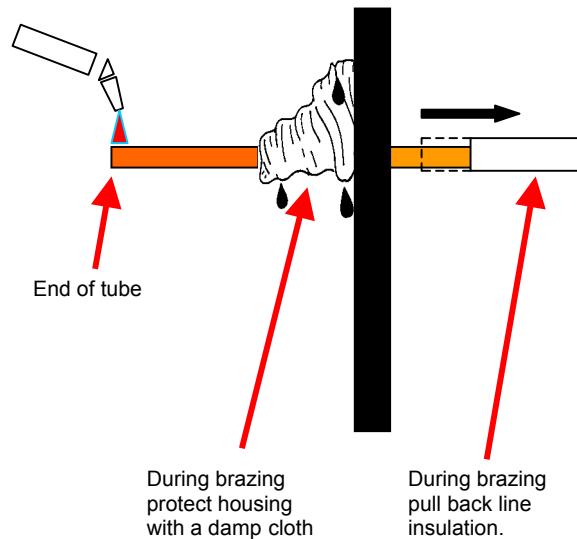
PFJ: 220-240V/1~/50Hz - TFD: 380-420V/3~/50Hz - TWD: 380-420V/3~/50Hz

### 3.5 Refrigeration connections

#### 3.5.1 Brazing recommendation

- Remove the fishtails (=compressed tube ends) by cutting them off in the following sequence:
  1. Remove the discharge connection fishtail
  2. Then remove the suction connection fishtail
 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

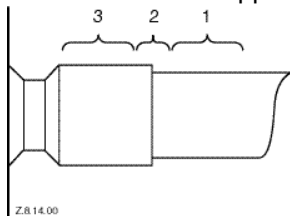
**Sectional view**



#### **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.

OM(Q)-15 to OM(Q)-45 (D)  
OL(Q)-09 to OL(Q)-18



Suction line 7/8"  
Copper to Copper braze

Liquid line 1/2"

End of tube: → see  
**sectional view** on previous  
page

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



Suction line 1 3/8"

Liquid line 5/8"



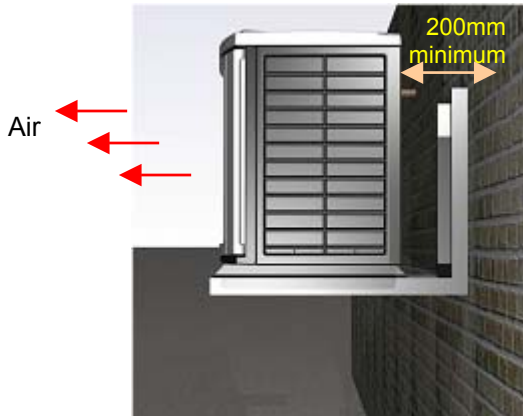
**Danger of frostbite**

Liquid line on low temperature models OLQ-24V to OLQ-48V, OLTQ-26V & OLTQ-36V.  
should be insulated with 19 mm insulation thickness. Temperature could be as low as –  
15°C.



### 3.6 Location & Fixings

Wall mounted



Floor mounted



The unit must be installed without restricting the airflow. Wall mounting brackets are not included.

### 3.7 Electronic Controller EC2-5X1

The EC2-5X1 electronic condensing unit controller has been specially developed for the Copeland EazyCool™ condensing unit range.

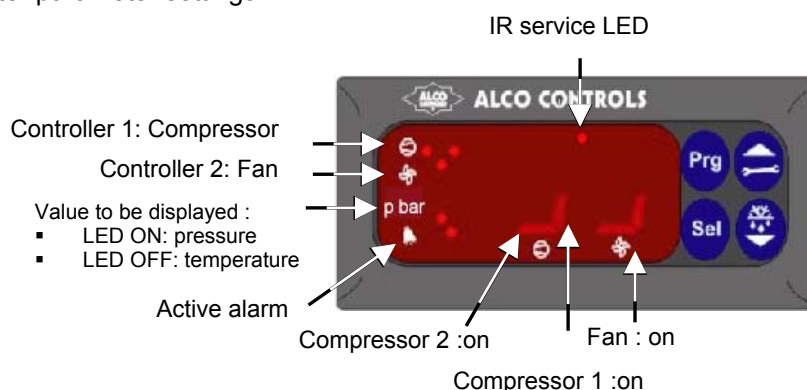
The EC2-5X1 electronic condensing unit controller is mounted as standard in the following Copeland EazyCool™ condensing units:

- Copeland EazyCool™ stand alone two compressor condensing units
- Copeland EazyCool™ stand alone Digital Scroll™ condensing units
  - Single compressor condensing unit
  - Two compressor condensing unit
- Copeland EazyCool™ condensing units for refrigeration networks

The electronic controller enables:

1. Compressor modulation and/or staging based on suction pressure
2. LON (Local Operating Network) communication if connected to a PC with a LON interface installed, monitoring of operation parameters (pressures, temperatures as well as alarm states) becomes possible.
3. Fan speed control if an Alco Controls FSP150 fan speed driver is installed (available as a factory fitted option).

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



The control (1) target of the compressor controller is to maintain the suction pressure at a defined value by varying the available compressor capacity.

The control (2) target for the condenser controller is to maintain the condensing pressure at a defined value. This is done by either

- Switching fans on/off (EC2-511 controller fitted)

Or

- Varying the fan speed, if fan speed control is ordered with the unit. In that case an EC2-551 controller with a FSP 150 fan speed driver module are factory fitted.

Type of EC2-5X1 mounted (depending on condensing unit configuration)

Condensing unit configuration	Medium Temperature			Low Temperature
	OMTQ-60 OMTQ-76 OMTQ-90	OMTQ-60D & OMTQ-90D	OMQ-30D & OMQ-45D	OLTQ-26V & OLTQ-36V
Standard Version: Without fan speed controller	EC2-511	EC2-551	EC2-551	EC2-511
Optional factory fitted: with fan speed controller FSP 150 (controlled by EC2-551)	EC2-551	EC2-551		EC2-551
Optional factory fitted: with fan speed controller FSM-42S (not controlled by EC2-551)			EC2-551	

**Table 10:** Type of EC2-5X1 per unit configuration



## 3.8 Parameters

### 3.8.1 Select parameter configuration

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 "Parameter 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 "Parameter modification" below.

#### /1 Value to show on display

0 = compressors and fans states (controller 1 = Compressor(s), and controller 2 = Fan(s))

1 = suction pressure (bar(g))

2 = saturation temperature from suction pressure (°C)

3 = condensing pressure (bar(g))

4 = saturation temperature from condensing pressure (°C)





5 = Digital Scroll capacity (%)



6 = Fan speed (%)

7 = Digital Scroll discharge temperature (°C)

} Only for controller EC2-551

### 3.8.2 Parameter 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).

### 3.8.3 Important parameters on EC2-5X1 to configure according to Copeland EasyCool™ model

**EC2-511** for Copeland EasyCool™ condensing unit with two compressors **without** fan speed control

Major parameters for operation

Parameter		EC2-511			
c	Application Parameters	Min	Max	Unit	Def
c1	Number of compressors	1	2	-	2
c3	Control mode (network system)	2	3	-	2
c4	<b>Compressor 1 control mode</b>	<b>0</b>	<b>1</b>	-	<b>0</b>
c5	Compressor switch logic	0	1	flag	1
c6	Number of compressor to switch on in case of sensor failure	0	2	-	0

#### c4 Compressor 1 control mode

0 = compressor 1 in standard control loop

1 = compressor 1 act as base load compressor

The installer needs to fix suction parameters for ON/OFF compressor modulation [P0 & P1, controller 1] and discharge parameters for ON/OFF fan modulation [P0 & P1, controller 2].

**NOTE:** With optional fan speed control (EC2-551), factory fitted compressor settings are the same, only Controller 2 (Fan: set-point & dead-band) should be adjusted.

**EC2-551** for Copeland EazyCool™ condensing unit with **Copeland Digital Scroll** compressor

Major parameters for operation

	Parameter	EC2-551			
c	Application Parameters	Min	Max	Unit	Def
c1	Number of compressors	1	2	-	2
c3	Control mode (network system)	2	3	-	2
c4	<b>Compressor 1 control mode</b>	<b>0</b>	<b>2</b>	<b>flag</b>	<b>2</b>
c5	Compressor switch logic	0	1	flag	1
c6	Number of compressor to switch on in case of sensor failure	0	2	-	0

c1 Number of compressors

This default parameter is set to 2 for two-compressor Copeland EazyCool™ condensing units.

For single-compressor Copeland EazyCool™ condensing units with Copeland Digital Scroll™, c1 should be changed to 1.

c4 Compressor 1 control mode

0 = compressor 1 in standard control loop

1 = compressor 1 act as base load compressor

2 = compressor 1 act as modulating (PWM control for Copeland Digital Scroll™ compressor only)

**NOTE:** For a digital condensing unit c4 should only be fixed on “2”

	Parameter	EC2-551			
F	Modulating Parameters	Min	Max	Unit	Def
F2	Minimum output value	10	100	%	20
F3	Maximum output value	10	100	%	100

Minimum & maximum output value could be adjusted

In case of a single compressor Copeland EazyCool™ condensing unit with a Copeland Digital Scroll compressor, the maximum output could be set below 100% if system requests less than the maximum capacity. In that case **F3 > F2**.

Please refer to the controller application guideline (C6.1.3, Part no.: 3125495) supplied with this unit for further information.

## **4 Starting up & Operation**

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Before commissioning, insure that all Rotalock valves and other valves on the condensing unit are fully opened.

### **4.1 Charging Procedure**

#### **4.1.1 Refrigerant charging procedure**

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

Alternatively, it could be also done by charging **gas** through the suction valve of the compressor.

#### **4.1.2 Oil charging procedure**

Copeland EazyCool™ condensing units are supplied only with a compressor oil charge. After commissioning, oil level should be checked and recharged if necessary.

**NOTE:** Oil level should be approx. half sight glass

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

- ICI Emkarate RL 32 CF
- Mobil EAL Artic 22 CC

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

Two compressor Copeland EazyCool™ condensing units equipped with an oil separator are delivered with a small oil can to add oil, if necessary.

### **4.2 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.**

#### **4.2.1 Units OMQ-56 to OMQ-110, OLQ-24V to 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.

#### **4.2.2 Units OM(Q)-15 to OM(Q)-45(D), 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.

### 4.3 Maximum compressor cycle

Maximum permitted start per hour: 10 times

### 4.4 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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