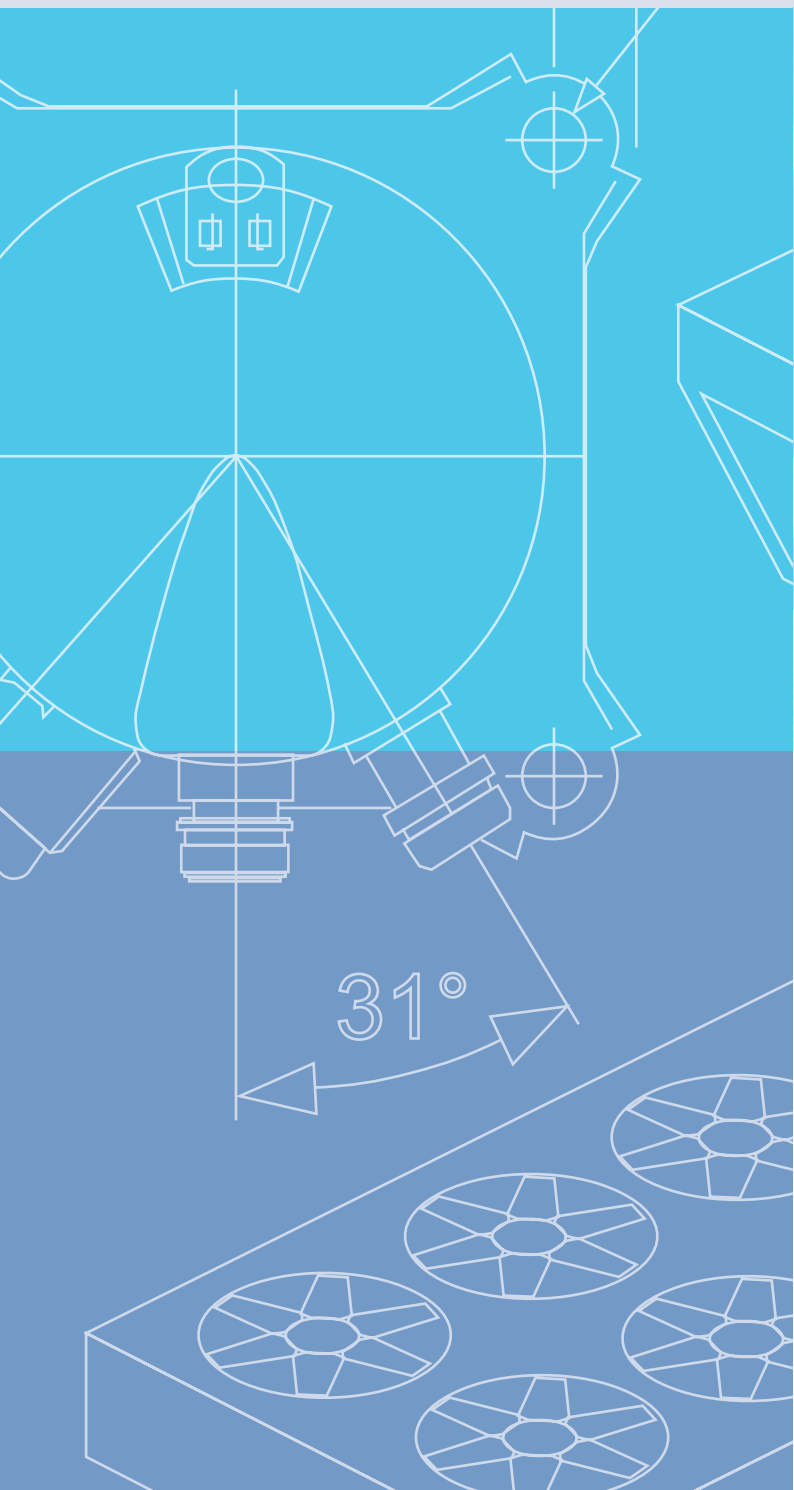




MultiCool Indoor Condensing Units



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1 Safety instructions







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

These condensing units are intended for installation in machines and systems according to the EC Machines directive. They may be put to service only if they have been installed in these systems according to instructions and conform to the corresponding provisions of legislation. For relevant standards please refer to Manufacturers Declaration, available on request.

These instructions should be retained throughout the lifetime of the compressor as well as the condensing unit.

You are strongly advised to follow these safety instructions.

1.1 Icon explanation

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

1.2 Safety statements

- Refrigerant compressors must be employed only for their intended use.
- Only qualified and authorized HVAC or refrigeration personnel are permitted to install, commission and maintain this equipment.
- Electrical connections must be made by qualified electrical personnel.
- All valid standards for connecting electrical and refrigeration equipment must be observed.



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

1.3 General instructions



WARNING

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

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



WARNING

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



CAUTION

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



IMPORTANT

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

The contractor, 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, ie, the air sucked in is mixed with oil gas and can explode due to the high temperature, and thereby destroy the compressor.

2 Product description

2.1 Common information about Copeland MultiCool™ condensing units

Emerson Climate Technologies has developed the Copeland MultiCool™ condensing unit range for medium and low temperature applications. It covers units from 2 to 15 hp and includes units with two compressors, one standard and one Scroll™ Digital, allowing continuous modulation from 10 to 100%.

2.2 About this guideline

This guideline is intended to enable users to ensure the safe installation, starting, operation and maintenance of Copeland MultiCool condensing units. It is not intended to replace the system expertise available from system manufacturers.

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

2.3 Product range

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

The low temperature range features ZF Scroll compressors.

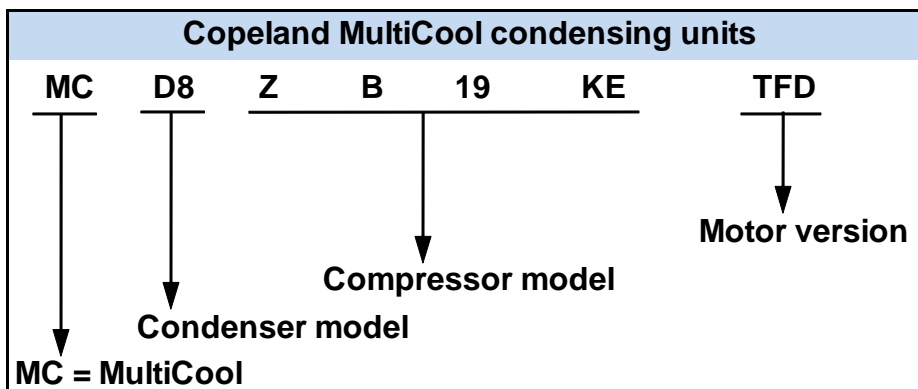
2.4 Product nameplate

The condensing unit nameplate shows the model designation and serial number.

The compressor has its own nameplate with all electrical characteristics.

2.5 Nomenclature

The model designation contains the following technical information about the compressor:



Standard motor versions currently available for Copeland MultiCool condensing units:

- PFJ = 220 - 240 V / 1 Ph / 50 Hz from ZB19K* to ZB26K*
- TFD = 380 - 420 V / 3 Ph / 50 Hz from ZB15K* to ZB114K*, from ZF09K* to ZF18K*
- TWD = 380 - 420 V / 3 Ph / 50 Hz from ZF24K* to ZF48K*, from ZB56K* to ZB11M*

2.6 Application range

2.6.1 Qualified refrigerants and oils



IMPORTANT

It is essential that the glide of refrigerant blends (primarily R407C) is carefully considered when adjusting pressure and superheat controls.

Oil recharge values can be taken from Copeland Scroll™ compressors brochures or Copeland® brand products Selection Software.

Units	MC Units with ZB15K* to ZB11M*	MC Units with ZB50K* to ZB114K*	MC Units with ZBD* & ZBDT*	MC Units with ZF09K* to ZF48K*	MC-B8-ZF06K*
Qualified refrigerants	R404A, R407C, R134a, R22	R404A, R22	R404A	R404A, R22	R404A
Copeland® brand products standard oil	Emkarate RL 32 3MAF				
Qualified servicing oils	Emkarate RL 32 3MAF / MOBIL EAL Arctic 22 CC				

Table 1: Qualified refrigerants and oils

2.6.2 Application limits

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

Medium temperature range

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

2.7 Main component description

2.7.1 Compressor

The PFJ, ZB single-phase compressors are equipped with a run capacitor, start capacitor and start relay.

The TF motor versions have:

- an internal line break motor protection;
- an internal discharge protection for ZB15K* to ZB45K* compressors and an external one for ZF compressors;
- the Advanced Scroll Temperature Protection (ASTP) for ZB50K* to ZB114K* models.

The TW motor versions are equipped with an INT69SCY2 Kriwan thermal protection (motor, discharge temperature, reverse rotation and phase loss protection).

The ZF compressors are also equipped with a liquid injection:

- Discharge Temperature Control (DTC) injection valve on TFD compressors;
- solenoid valve + capillary tube on TWD compressors.

NOTE: Further technical information can be found in the following Application Guidelines: C6.2.20 "Scroll compressors for Refrigeration".

Medium temperature			Low temperature		
Unit Model	Compressor	Motor	Unit Model	Compressor	Motor
MC-D8-ZB15KE MC-H8-ZB15KE	ZB15KCE	TFD/PFJ	MC-B8-ZF06KE	ZF06K4E	TFD
MC-D8-ZB19KE MC-H8-ZB19KE MC-K9-ZB19KE	ZB19KCE	TFD/PFJ			
MC-D8-ZB21KE MC-H8-ZB21KE MC-K9-ZB21KE	ZB21KCE	TFD/PFJ	MC-D8-ZF09KE MC-H8-ZF09KE	ZF09K4E	TFD
MC-H8-ZB26KE MC-K9-ZB26KE	ZB26KCE	TFD/PFJ	MC-H8-ZF11KE	ZF11K4E	TFD
MC-H8-ZB30KE MC-M8-ZB30KE MC-P8-ZB30KE	ZB30KCE	TFD/PFJ	MC-H8-ZF13KE MC-M8-ZF13KE	ZF13K4E	TFD
MC-H8-ZB38KE MC-M8-ZB38KE MC-P8-ZB38KE	ZB38KCE	TFD/PFJ	MC-H8-ZF15KE MC-M8-ZF15KE	ZF15K4E	TFD
MC-M8-ZB42KE MC-R7-ZB42KE	ZB42KCE	PFJ			
MC-M8-ZB45KE MC-M9-ZB45KE MC-R7-ZB45KE	ZB45KCE	TFD	MC-M8-ZF18KE MC-M9-ZF18KE	ZF18K4E	TFD
MC-R7-ZB50KE MC-S9-ZB50KE	ZB50KCE	TFD			
MC-R7-ZB58KE MC-S9-ZB58KE	ZB58KCE	TFD	MC-P8-ZF24KE MC-S9-ZF24KE	ZF24K4E	TWD
MC-V6-ZB76KE MC-V9-ZB76KE	ZB76KCE	TFD	MC-R7-ZF33KE MC-V9-ZF33KE	ZF33K4E	TWD
MC-V6-ZB95KE MC-V9-ZB95KE	ZB95KCE	TFD	MC-V6-ZF40KE	ZF40K4E	TWD
MC-V6-ZB114KE MC-W9-ZB114KE	ZB114KCE	TFD	MC-S9-ZF48KE	ZF48K4E	TWD

Digital		
Unit Model	Compressor	Motor
MC-M8-ZBD30	ZBD30KCE	TFD
MC-M9-ZBD45	ZBD45KCE	TFD
MC-V6-ZBDT60	ZBD30KCE+ZB30KCE	TFD
MC-V6-ZBDT90	ZBD45KCE+ZB45KCE	TFD

Table 2: Compressor type used in Copeland MultiCool condensing units

2.7.2 Condenser

The condensers are constructed with copper tubes and aluminium fins, steel-sheet housing with a fan opening. Here are the main characteristics of the condensers used in Copeland MultiCool condensing units:

Condenser designation	Number of		Finned length mm	Finned height mm	Fin spacing mm	Internal volume l	Fans			Air flow m ³ /s
	rows	tubes					Number of fan(s)	Model	Diameter	
B8	3	14	430	350	2.1	1.6	1	71 (75)	300	0.36
D8	4	16	430	400	2.1	2.5	1	121 (120)	350	0.44
H8	3	19	625	475	2.1	3.2	1	271 (270)	420	0.91
H9	4	19	625	475	2.1	4.3	1	271 (270)	420	0.84
K9	4	16	820	400	2.1	4.7	2	121 (120)	350	0.86
M8	5	25	625	625	2.1	7	1	121 (120)	350	0.92
M9	5	25	625	625	2.1	7	1	611 (610)	500	1.27
P8	4	23	820	575	2.1	6.8	2	121 (120)	350	1.05
R7	3	23	1000	575	2.1	6.2	2	271 (270)	420	1.79
S9	5	26	1000	650	2.1	11.7	2	271 (270)	420	1.65
V5	4	31	1200	775	2.5	13.4	2	271 (270)	420	2.1
V6	5	31	1200	775	2.5	16.7	2	611 (610)	500	2.86
V9	5	31	1200	775	2.1	16.7	2	271 (270)	420	1.95
W9	5	33	1503	825	2.1	22.3	2	611 (610)	500	3.21

Table 3: Condenser type used in Copeland MultiCool condensing units

2.7.3 Condenser fan(s)

The condensers of the Copeland MultiCool condensing units are equipped with single-phase fans. The condensing units are equipped with 1, 2 or 4 fans.

The fan is positioned in order to pull the air from the condenser and over the compressor.

The fan protection is IP54 and its insulation class is "F".

As described in **Table 4**, various fan models are used:

Fan model	Blade diameter mm	Power input W	Voltage V / Ph / Hz	Run capacitor μ F / V	Motor current A	Winding resistance Ω	
						Main	Auxiliary
71	300	85	220 - 240 / 1 / 50	2.5 / 400	0.38	112	141
121	350	110	220 - 240 / 1 / 50	4 / 450	0.45	68	77
271	420	235	220 - 240 / 1 / 50	6.3 / 450	1.15	20.4	33.5
611	500	400	220 - 240 / 1 / 50	10 / 450	1.85	8.9	17.1

Table 4: Condenser fan technical data

After connecting the condensing unit electrically, check the fan rotation direction. The fan must pull air over the condenser then over the compressor.

2.7.4 Liquid receiver

Copeland condensing units are equipped with CE-labelled liquid receivers.

The liquid receivers are equipped with:

- Rotalock service valve on top of the receiver for liquid outlet line;
- 3/8"–14 NPTF connection for relief valve.

Fitting a pressure relief device according to standard EN 378-2 is the responsibility of the installer.

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

Rotalock service valve



Relief valve connection

2.7.5 Electrical box components

Units without Scroll™ Digital: All the unit components are pre-wired in the electrical box: compressor, fans, pressure switch, crankcase heater, fan speed controller (when fitted).

Units with Scroll™ Digital: All electrical components are pre-wired into the panel. The panel contains:

- Compressor contactor(s)
- Fuse(s)
- Terminal blocks
- DIN rail-mounted terminals
- Fan speed controller
- Alarm relays
- Electronic controller for condensing units with two compressors or with Copeland Scroll™ Digital compressor.

Please refer to the controller application guideline C6.1.3 (Part no. 3125495) available on www.emersonclimate.eu.

2.7.6 Pressure switch

All **single-compressor** condensing units are equipped with:

- Dual pressure switch (high and low pressure) with automatic reset ALCO PS2-W7A;
- Manual reset ALCO PS2-C7A (optional).

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

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

All **two-compressor** Copeland condensing units with a **Scroll™ Digital** 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 with HP and LP pressure transmitters.

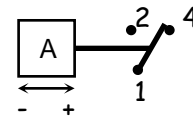
1) PS2-W7A: Alco Controls dual pressure switch with automatic reset (for single compressor unit)

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



NOTE: The HP value should be set at maximum 26.2 bar (according to EN 12263).

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: 26.2 bar
Cut-in point: 22 bar



5) Alco Controls PT5 pressure transmitter

Single-compressor Scroll™ Digital condensing 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 PT5-30M pressure transmitter is used at the high-pressure part of the system. An Alco PT5-07M pressure controller is used at the low-pressure part of the system. The PT5 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) available on www.emersonclimate.eu.



2.7.7 Fan speed controller

An electronic speed control is fitted as standard in the digital condensing units. For the other MultiCool condensing units it is available as an option. It controls 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 condensing units can be equipped with the following optional fan speed controllers:

- **FSX42S** for R404A (R507), R407C & R22
- **FSX41S** for R134a

Two-compressor and digital condensing units are equipped with the following fan speed controller:

- **FSP150**

1) Fan speed controller FSX42S & FSX41S

The fan speed controller selection depends on the fan motor maximum current, the number of fan(s) and the refrigerant pressure range.

- **FSX42S** = nominal current between 0.5A and **4A** for R404A, R507, R407C, R22 (at 40°C ambient temperature).
- **FSX41S** = nominal current between 0.5A and **4A** for R134a (at 40°C ambient temperature).



2) Fan speed controller FSP150

Two-compressor units: fan speed is controlled by the EC2-551 condensing unit controller in combination with a FSP150 fan speed controller.

- **FSP150**: nominal current between 0.3A and **5A**.

2.7.8 Liquid line equipment on Digital Units

1) 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.



2) 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.



3) Liquid line solenoid valve Alco Controls 200 RBT 5

- Compact size
- Snap-on clip for attaching solenoid coils
- Δp minimum = 0.05 bar



NOTE: The solenoid valve is shipped loose with units equipped with a Copeland Scroll™ Digital compressor.

4) Check valve

A check valve is fitted to the discharge line of units with Scroll™ Digital.

2.7.9 Solenoid Valve for Copeland Scroll™ Digital compressor

Scroll™ Digital compressors in Copeland 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.

2.7.10 Oil separator Alco Controls OSH

The Alco Controls OSH oil separator is fitted as standard on two-compressor Copeland condensing units.

The oil separator has the following characteristics:

- hermetic construction;
- complies with UL standard and HP German pressurised vessel regulations (CE standard effective November 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 section 4.1 "Charging procedure".

2.7.11 Weather housing

For outdoor applications of Copeland Scroll™ condensing units, Emerson Climate Technologies offers a range of housings with the following features:

- galvanized
- painted with rust resistant paint (colour = RAL 7032)
- delivered in a flat pack
- easy to mount
- easy access for maintenance

The different weather housing sizes are related to the condenser and compressor sizes.

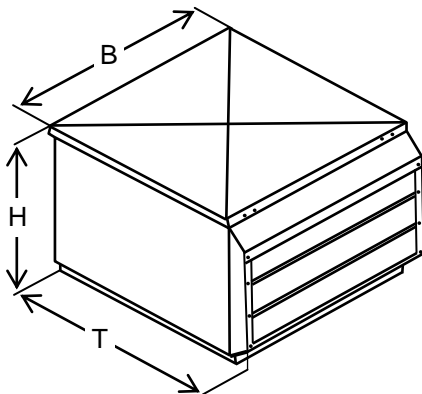


Figure 1: Weather housing dimensions

Model	Condenser	Compressor	Dimensions in mm			Weight (net) in kg
			B	T	H	
B / D	D8	ZB	610	640	485	18.1
D-L	D8	ZF	610	785	485	19.3
J	H8, H9	ZB, ZF	785	750	570	23.4
M	M8, M9	ZB, ZBD, ZF	785	800	745	29.3
F / K	K9	ZB	1000	710	495	25.8
P-CQ	P8	ZB	1000	710	670	30.4
P-QR	P8	ZF	1000	810	670	32.3
R-CR	R7, S9	ZB42, ZB45	1180	750	670	32
R / S-QR	R7, S9	ZF, ZB50, ZB58	1180	890	745	44.6
V	V5, V6, V9	ZB, ZBDT, ZF	1380	890	910	52.6
W	W9	ZB, ZF	1690	890	910	58

Table 5: Weather housing dimensions

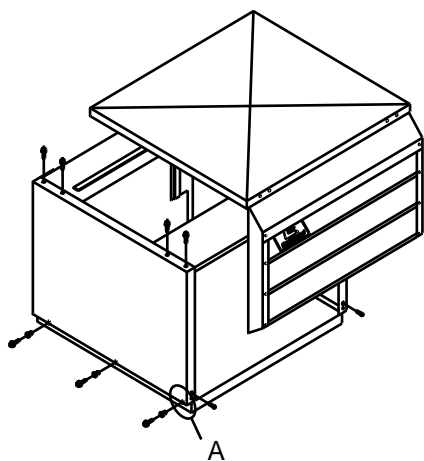


Figure 2: Weather housing assembly instructions
Type B/D/H/M/F/K/P

A: Detailed view

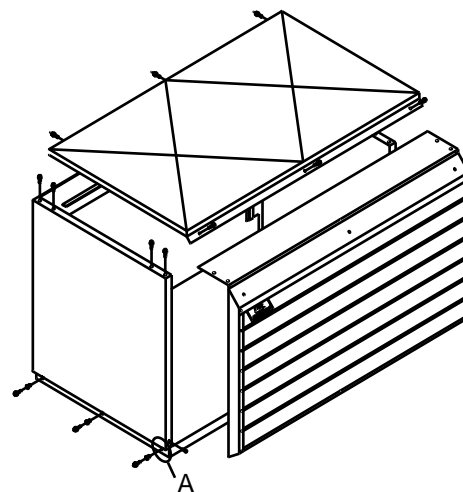
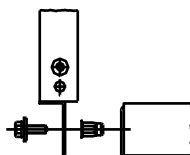


Figure 3: Weather housing assembly instructions
Type R/S

2.8 Dimensions in mm

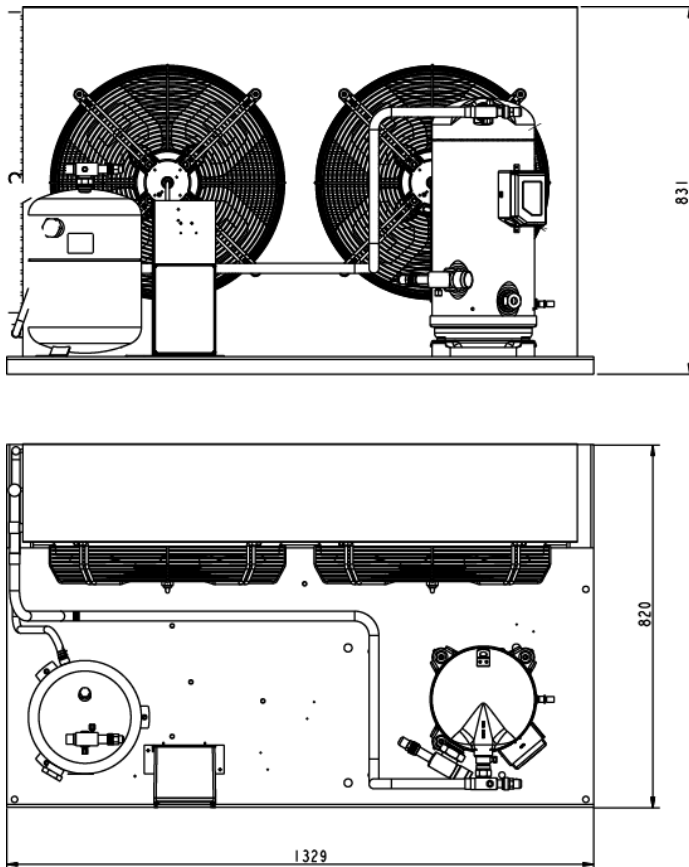


Figure 4: Dimensions

			Base mounting (hole dia) mm	Depth / Width mm	Height, mm
MC-B8-ZF06KE			530 x 330 (11)	570/560	396
MC-D8-ZB15KE		MC-D8-ZF09KE	530 x 330 (11)	570/560	446
MC-D8-ZB19KE	MC-D8-ZB21KE				
MC-H8-ZB15KE	MC-H8-ZB19KE		700 x 370 (14)	680/735	533
MC-H8-ZB21KE		MC-H8-ZF09KE			
MC-H8-ZB26KE		MC-H8-ZF11KE			
MC-H8-ZB30KE		MC-H8-ZF13KE			
MC-H8-ZB38KE		MC-H8-ZF15KE			
MC-K9-ZB19KE	MC-K9-ZB21KE	MC-K9-ZB26KE	915 x 380 (14)	640/950	454
MC-M8-ZB30KE	MC-M8-ZBD30	MC-M8-ZF13KE	700 x 390 (14)	730/735	708
MC-M8-ZB38KE		MC-M8-ZF15KE			
MC-M8-ZB42KE	MC-M8-ZB45KE	MC-M8-ZF18KE			
MC-M9-ZB45KE	MC-M9-ZBD45	MC-M9-ZF18KE			
MC-P8-ZB30KE	MC-P8-ZB38KE	MC-P8-ZF24KE	915 x 380 (14)	640/950	633
MC-R7-ZB42KE	MC-R7-ZB45KE		1095 x 350 (14)	680/1130	633
MC-R7-ZB50KE				820/1130	
MC-R7-ZB58KE		MC-R7-ZF33KE			
MC-S9-ZB50KE			1095 x 475 (14)	820/1130	708
MC-S9-ZB58KE		MC-S9-ZF24KE			
		MC-S9-ZF48KE			
MC-V6-ZB76KE	MC-V6-ZB95KE	MC-V6-ZB114KE	1295 x 475 (14)	820/1330	835
MC-V6-ZBDT60	MC-V6-ZBDT90	MC-V6-ZF40KE			
MC-V9-ZB76KE	MC-V9-ZB95KE	MC-V9-ZF33KE			
MC-W9-ZB114KE			1605 x 475 (14)	820/1640	864

Table 6: Dimensions

3 Installation



WARNING

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

Copeland MultiCool condensing units are delivered with a holding charge of neutral gas.

The condensing unit should be located in such a place to prevent any dirt, 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



WARNING

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



CAUTION

Damage to unit! Do not lift condensing unit by the compressor service valves, the tubing or other accessories.

3.1.1 Packaging

Condensing units are single-packed on a wooden pallet with cardboard protection.

If the packaging is damaged please carefully check if product components are damaged, too.

Please consider the point of gravity when lifting or handling.



Figure 5

3.1.2 Transport and storage

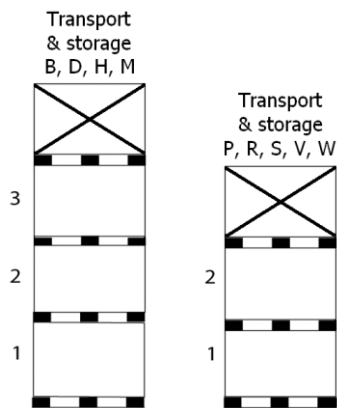


Figure 6

Condensing units starting with the letters B, D, H or M can be stacked up to three high. Other condensing units can only be stacked up to two high.

It is recommended to keep the unit packaged until final installation. The condensing unit, when boxed, can be handled by a fork-lift or pallet truck. The condensing unit without the packaging must be handled by a fork-lift truck or similar.

3.1.3 Weights

Medium Temp	Weight kg	
	Gross	Net
MC-D8-ZB15KE	58	48
MC-D8-ZB19KE	59	50
MC-D8-ZB21KE	60	52
MC-H8-ZB26KE	77	62
MC-H8-ZB30KE	89	76
MC-H8-ZB38KE	92	77
MC-M8-ZB42KE	107	90
MC-M8-ZB45KE	108	91
MC-R7-ZB50KE	120	110
MC-R7-ZB58KE	120	110
MC-V9-ZB76KE	165	151
MC-V9-ZB95KE	173	155
MC-V6-ZB114KE	196	174

Medium Temp	Weight kg	
	Gross	Net
MC-H8-ZB15KE	72	57
MC-H8-ZB19KE	76	59
MC-H8-ZB21KE	76	61
MC-K9-ZB26KE	88	66
MC-M8-ZB30KE	104	88
MC-M8-ZB38KE	106	89
MC-M9-ZB45KE	113	96
MC-S9-ZB50KE	125	113
MC-S9-ZB58KE	125	113
MC-V6-ZB76KE	184	168
MC-V6-ZB95KE	192	172
MC-W9-ZB114KE	196	194

Medium Temp	Weight kg	
	Gross	Net
MC-K9-ZB19KE	87	66
MC-K9-ZB21KE	88	65
MC-P8-ZB30KE	114	87
MC-P8-ZB38KE	116	88
MC-R7-ZB42KE	141	101
MC-R7-ZB45KE	141	102

Low Temp	Weight kg	
	Gross	Net
MC-B8-ZF06KE	68	58
MC-D8-ZF09KE	74	59
MC-H8-ZF11KE	82	67
MC-H8-ZF13KE	92	82
MC-H8-ZF15KE	98	83
MC-M8-ZF18KE	105	88
MC-P8-ZF24KE	176	146
MC-R7-ZF33KE	200	160
MC-V6-ZF40KE	298	218
MC-S9-ZF48KE	229	189

Low Temp	Weight kg	
	Gross	Net
MC-H8-ZF09KE	81	66
MC-M8-ZF13KE	102	85
MC-M8-ZF15KE	103	86
MC-M9-ZF18KE	113	97
MC-S9-ZF24KE	210	170
MC-V9-ZF33KE	275	195

Digital Med Temp	Weight kg	
	Gross	Net
MC-M8-ZBD30	104	92
MC-M9-ZBD45	113	98
MC-V6-ZBDT60	287	218
MC-V6-ZBDT90	298	218

Table 7: Weights

3.1.4 Delivery

Please check whether the delivery is correct and complete. Deficiencies should be immediately reported in writing. Standard scope of delivery:

- Copeland Compliant Scroll compressor with Rotalock valves and filled with ester oil
- Condenser
- Single phase fan(s)
- Receiver with Rotalock valve
- Pipe connections
- HP/LP pressure switch

- Crankcase heater
- Pre-wired terminal box
- Discharge temperature protection
- Injection system on ZF* compressors
- Digital Solenoid valve on ZBD* compressors
- Neutral gas holding charge

3.2 Electrical components

3.2.1 Electrical components pre-wired

When connecting electrically, care should be taken to avoid reverse rotation.

3.2.2 Discharge temperature protection

1) Compressor discharge line thermostat

Under extreme operating conditions internal discharge temperatures can reach very high levels. To avoid compressor damage, ZF09K* to ZF18K* as well as ZF13KVE & ZF18KVE compressors are equipped with an external discharge line thermostat.

2) Internal thermodisc

On models ZB15K* to ZB45K*, an internal thermodisc is positioned adjacent to the discharge port. When the thermodisc opens a small gas by-pass occurs which trips the motor protector.

3) Discharge temperature sensor

Digital units are equipped with a discharge temperature sensor (NTC thermistor) on the compressor top cap and connected directly to the EC2-551.

4) Advanced Scroll Temperature Protection

ZB50K* to ZB114K* Scroll compressors have the Advanced Scroll Temperature Protection (ASTP) which is a temperature sensitive thermo-disc that acts to protect the compressor from discharge gas overheating.

5) INT69SCY2 module

Compressors ZF24KVE to ZF48KVE are equipped with an INT69SCY2 module.

3.2.3 Electrical protection standard (protection class)

- Scroll compressors up to ZB45K* / ZF18K* are IP21 according to IEC 34.
- Scroll compressors ZB50K* to ZB114K* are IP66.
- Scroll compressors ZF24KVE to ZF48KVE 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 IEC 529/EN 175301-803.
- Fan speed controller FS*: IP65 according to IEC 529/DIN 40050. FSP150: IP67 according to IEC 529/EN 60529.
- Solenoid valve coils: IP65 according to DIN 43650.
- EC2-551: IP65 (frontal protection with gasket).

3.2.4 Condensing units electrical data

	Max. Operating Current (Compressor)		Locked Rotor Current (Compressor)		Fan model	Max Fan Current 230/1~/50Hz A	Max. Operating Current (Unit)	
	PFJ A	TFD/TWD A	PFJ A	TFD/TWD A			PFJ A	TFD/TWD A
MC-D8-ZB15KE	12.8	4.9	58	26	121	0.45	13.25	5.35
MC-H8-ZB15KE	12.8	4.9	58	26	271	1.15	13.95	6.05
MC-D8-ZB19KE	12.8	6.5	61	32	121	0.45	13.25	6.95
MC-H8-ZB19KE	12.8	6.5	61	32	271	1.15	13.95	7.65
MC-K9-ZB19KE	12.8	6.5	61	32	2 x 121	0.45	13.7	7.4
MC-D8-ZB21KE	16.4	7.2	82	40	121	0.45	16.85	7.65
MC-H8-ZB21KE	16.4	7.2	82	40	271	1.15	17.55	8.35
MC-K9-ZB21KE	16.4	7.2	82	40	2 x 121	0.45	17.3	8.1
MC-H8-ZB26KE	18	8.85	97	46	271	1.15	19.15	10
MC-K9-ZB26KE	18	8.85	97	46	2 x 121	0.45	18.9	9.75
MC-H8-ZB30KE		10.3		49.3	271	1.15		11.45
MC-M8-ZB30KE		10.3		49.3	271	1.15		11.45
MC-P8-ZB30KE		10.3		49.3	2 x 121	0.45		11.2
MC-M8-ZBD30		7.9		51.5	271	1.15		9.05
MC-H8-ZB38KE		12.8		65.5	271	1.15		13.95
MC-M8-ZB38KE		12.8		65.5	271	1.15		13.95
MC-P8-ZB38KE		12.8		65.5	2 x 121	0.45		13.7
MC-M8-ZB42KE	29.8		150		271		29.8	
MC-R7-ZB42KE	29.8		150		2 x 271		29.8	
MC-M8-ZB45KE		13.1		74	271	1.15		14.25
MC-M9-ZB45KE		13.1		74	611	1.85		14.95
MC-R7-ZB45KE		13.1		74	2 x 271	1.15		15.4
MC-M9-ZBD45		11.4		74	611	1.85		13.25
MC-R7-ZB50KE		15.6		100	2 x 271	1.15		17.9
MC-S9-ZB50KE		15.6		100	2 x 271	1.15		17.9
MC-R7-ZB58KE		15.4		95	2 x 271	1.15		17.7
MC-S9-ZB58KE		15.4		95	2 x 271	1.15		17.7
MC-V6-ZBDT60		7.9 + 10.3		51.5 + 49.3	2 x 611	1.85		21.9
MC-V9-ZB76KE		20.4		118	2 x 271	1.15		22.7
MC-V6-ZB76KE		20.4		118	2 x 611	1.85		24.1
MC-V6-ZBDT90		11.4 + 13.1		2 x 74.0	2 x 611	1.85		28.2
MC-V9-ZB95KE		28.2		140	2 x 271	1.15		30.5
MC-V6-ZB95KE		28.2		140	2 x 611	1.85		31.9
MC-V6-ZB114KE		33.3		174	2 x 611	1.85		37
MC-W9-ZB114KE		33.3		174	2 x 611	1.85		37

Table 8

	Max. Operating Current (Compressor)		Locked Rotor Current (Compressor)		Fan model	Max Fan Current 230/1~/50Hz A	Max. Operating Current (Unit)	
	PFJ A	TFD/TWD A	PFJ A	TFD/TWD A			PFJ A	TFD/TWD A
MC-B8-ZF06KE		5		26	71	0.46		5.46
MC-D8-ZF09KE		6		40	121	0.45		6.45
MC-H8-ZF09KE		6		40	271	1.15		7.15
MC-H8-ZF11KE		7		46	271	1.15		8.15
MC-H8-ZF13KE		8.23		51.5	271	1.15		9.38
MC-M8-ZF13KE		8.23		51.5	271	1.15		9.38
MC-H8-ZF15KE		10		64	271	1.15		11.15
MC-M8-ZF15KE		10		64	271	1.15		11.15
MC-M8-ZF18KE		12		74	271	1.15		13.15
MC-M9-ZF18KE		12		74	611	1.85		13.85
MC-P8-ZF24KE		16.1		99	2 x 121	0.45		17
MC-S9-ZF24KE		16.1		99	2 x 271	1.15		18.4
MC-R7-ZF33KE		22.3		127	2 x 271	1.15		24.6
MC-V9-ZF33KE		22.3		127	2 x 271	1.15		24.6
MC-S9-ZF48KE		30.6		198	2 x 271	1.15		32.9
MC-V6-ZF40KE		25.1		167	2 x 611	1.85		28.8

Table 9

3.3 Refrigeration connections

IMPORTANT



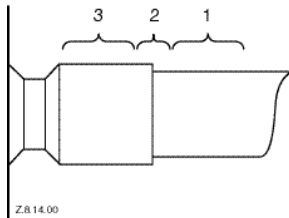
Blockage! Compressor breakdown! Maintain a flow of oxygen-free nitrogen through the system at very low pressure during brazing. Nitrogen displaces the air and prevents the formation of copper oxides in the system. If allowed to form, the copper oxide material can later be swept through the system and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

3.3.1 Brazing recommendations

- 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 to isolate the housing by using a wet cloth on the copper tubing.
- Recommended brazing materials: a copper/phosphorous or copper/phosphorous/silver alloy rod should be used for joining copper to copper whereas to join dissimilar or ferric metals a silver alloy rod either flux coated or with a separate flux would be used.
- Use a double-tipped torch.

3.3.2 Brazing procedure

For brazing of the tubes, please refer to illustration and procedure hereunder:



1. Fit the copper tube into the compressor tube.
2. Heat area 1. As the tube approaches brazing temperature:
3. 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.
4. Add braze material to the joint while moving the torch around the joint to flow braze material around the circumference.
5. Then heat area 3. This will draw the brazing material down into the joint.

Figure 7: Suction tube brazing

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.



WARNING

Danger of frostbite! Liquid line on low-temperature models should be insulated with 19 mm insulation thickness. Temperature could be as low as -15°C .

3.4 Location & fixings

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

3.5 Electronic controller EC2-551

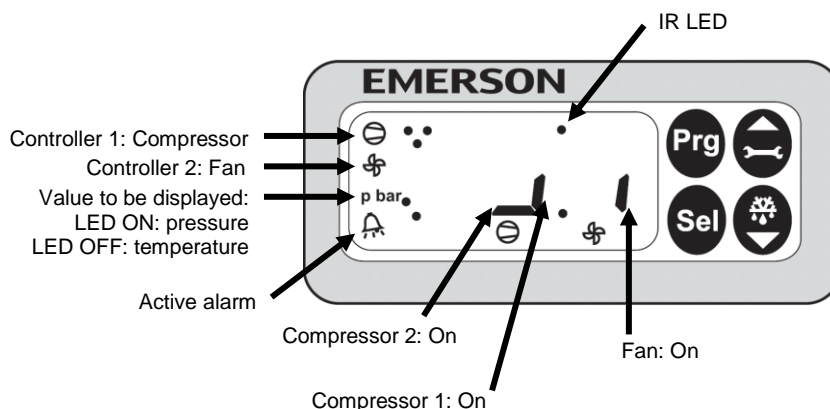
The EC2-551 electronic condensing unit controller has been specially developed for the Copeland condensing unit range.

The EC2-551 electronic condensing unit controller is mounted as standard in the following Copeland condensing units:

- Copeland Scroll™ Digital condensing units
 - Single-compressor condensing unit
 - Two-compressor condensing unit

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 of the condenser controller is to maintain the condensing pressure at a defined value. This is done by varying the fan speed, if fan speed control is ordered with the unit. In that case an EC2-551 controller with a FSP150 fan speed driver module is factory fitted.

3.6 Parameters

3.6.1 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 = Scroll™ Digital capacity (%)

6 = Fan speed (%)

7 = Scroll™ Digital discharge temperature (°C)

3.6.2 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 temporarily 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)

3.6.3 Important parameters on EC2-551 to configure according to Copeland condensing unit model

Major parameters on EC2-551 for operation of Copeland MultiCool condensing units with Scroll™ Digital compressors:

		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	Compressor 1 control mode	0	2	flag	2
c5	Compressor switch logic	0	1	flag	1
c6	Number of compressors to switch on in case of sensor failure	0	2	-	0

Table 10

c1 Number of compressors

This default parameter is set to 2 for two-compressor Copeland condensing units. For single-compressor Copeland condensing units with Scroll™ Digital, 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 Scroll™ Digital compressor only)

NOTE: For a digital condensing unit c4 should only be fixed on "2".

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

Table 11

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

For further information, please refer to the controller application guideline (C6.1.3, Part no. 3125495) available on www.emersonclimate.eu.

4 Starting up & operation

Before commissioning, ensure 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 also be done by charging **gas** through the suction valve of the compressor. The charging procedure should follow the rules of art of refrigeration.

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

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

4.1.2 Oil charging procedure

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

NOTE: The oil level should be approximately halfway up the sight glass.

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

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

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

Two-compressor Copeland 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 with internal protection module INT69SCY2 - MC*-ZF24K* to MC*-ZF48K*

Compressors assembled on above units are equipped with the INT69SCY2 module, which acts as internal protection and checks the phasing. In case of reverse rotation, the module will trip.

4.2.2 Units without internal protection module INT69SCY2

Observing that suction pressure drops and discharge pressure rises when the compressor is energized allows verification of proper rotation direction. 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 (under 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 compressor terminals in the electrical panel will ensure proper rotation direction.

4.3 Maximum compressor cycle

Maximum permitted starts per hour: 10.

On Digital condensing units this can be controlled via the EC2-551 controller (parameters t3, t4 and/or t5).

4.4 Checks before starting up & during operation

- Please check that all Rotalock valves are fully opened.
- Check that the electrical panel is closed.
- After starting-up and operation conditions are stabilised, we recommend to check the oil level in compressor(s) and if needed to add oil to ensure a sufficient oil level (halfway up the sight glass).

5 Maintenance & repair

- De-energize the condensing unit before any intervention.
- Close Rotalock valves or ball valves 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.

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

6 Certification & 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 & disposal



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

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