

DWM COPELAND

Semi-Hermetic Condensing Units

Application Guidelines



EMERSON
Climate Technologies

APPLICATION GUIDELINES FOR DWM COPELAND SEMI-HERMETIC CONDENSING UNITS

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1 Introduction

The present guideline is dealing with air-cooled condensing units equipped with Semi-Hermetic piston compressors. The selection of the units can be done by the help of the product catalogues and/or the Copeland Selection Software (Select).

2 Safety Information



- Refrigerating condensing units must be employed only for the use they are made for.
- Approved refrigerants and refrigerating oils may only be used.
- Do not start the unit until it is charged with refrigerant.
- Correctly used, the compressor and the pressure line piping may reach temperatures that may cause burning if touched.



- In case of leak of refrigerant avoid eye contact.
- If the refrigerant needs to be removed from the system, do not disperse it in the environment, use specific equipment to collect the refrigerant.
- For storage, use original packaging and avoid collisions and tilting.



- Trained electrical personnel must connect the unit and its accessories.
- All valid standards for connecting electrical and refrigeration equipment must be observed.
- Limit values for the supply voltage of the unit may not be exceeded.

Only qualified personnel should install and intervene on DWM COPELAND condensing units.

The compressor and the tubing can reach temperatures high enough to induce burns.

It is not allowed to run a test without the compressor being connected to the system and without refrigerant.

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.

3 Nomenclature

The nameplate of the condensing unit shows the main characteristics of it.

The compressor also has its own nameplate.

Thanks to the condensing unit nomenclature you can easily recognise the main components.

Nomenclature for Air Cooled Condensing Units

<u>H8</u>	<u>LL 40X</u>	<u>EWL</u>	<u>Z9</u>	<u>4DH250X</u>	<u>AWM</u>
1	2	3	1	2	3

- | | |
|---|---|
| 1 | Condenser model (see chapter 4.3.2) |
| 2 | Compressor model ("X" or "E" for ester oil) |
| 3 | Motor version |

The standard motor versions presently existing for our condensing units are:

CAG	= 220 – 230 V / 1Ph / 50 Hz only with DK compressors
EWL	= Δ 220 - 240 V / 3Ph / 50 Hz Y 380 - 420 V / 3Ph / 50 Hz
AWM/D	= 380 - 420 V / 3Ph / 50 Hz 440 - 480 V / 3Ph / 60 Hz
EWK	= Δ 220 - 240 V / 3Ph / 60 Hz Y 380 - 420 V / 3Ph / 60 Hz

You might also come across other "exotic" motor versions like:

EWM	= Δ 380 - 420 V / 3Ph / 50 Hz	
EWN	= Δ 250 - 280 V / 3Ph / 60 Hz	Y 440 - 480 V / 3Ph / 60 Hz
EWY	= Δ 500 - 550 V / 3Ph / 50 Hz	
AWY	= 500 - 550 V / 3Ph / 50 Hz	TWY = 500 - 550 V / 3Ph / 50 Hz
AWC	= 208 - 230 V / 3Ph / 60 Hz	AWX = 380 V / 3Ph / 60 Hz

4 Delivery

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

Standard Scope of Delivery:

- Compressor
- Condenser
- Single phase fan (s)
- Receiver with Rotalock valve
- Pipe connections
- HP/LP pressure switch
- Differential oil pressure control (when needed)
- Terminal box
- Neutral gas holding charge

4.1 Packaging

Condensing units are individually packed on a baseboard and a carton is fitted over.

Accessories are mounted.

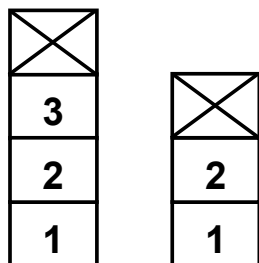
In the unlikely event that the packaging box is damaged, the condenser might be damaged.

The W99 condensing units are delivered in 2 pieces, one box contains the condensing unit with 1 condenser, and the other box contains the second condenser.

4.2 Transport

Condensing units should only be moved with equipment appropriate for the weight involved.

In order to avoid any damage, the condensing unit should not be lifted by the compressor service valves, the tubing or other accessories.



B, D, H, M P, S, R, V, W, Z

Condensing units starting with the letters B, D, H or M can be stacked three high.

Other condensing units can be stacked 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.

4.3 Standard Delivery

4.3.1 The compressor

The single-phase compressors are equipped with the single-phase equipment (start capacitor, run capacitors and a relay).

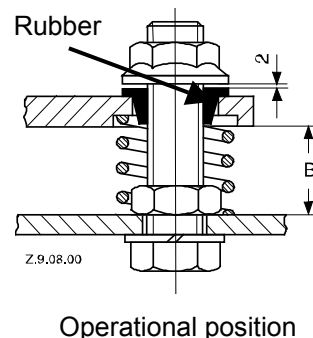
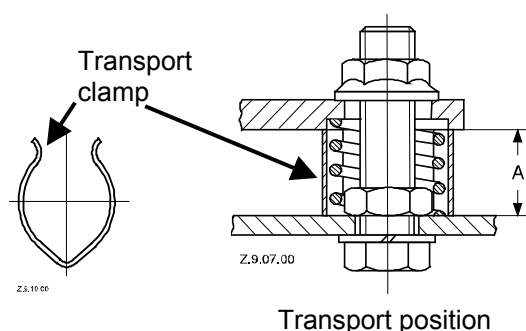
The semi-hermetic compressors are equipped with a motor protection (a Klaxon overcurrent thermal protection for single phase and a Kriwan thermistor protection for 3 phase).

Compressors DLHA, Discus and 2 stages are lubricated by an internal oil pump and are equipped with a compact electronic oil pressure switch: OPS1

Other DK and DL: lubrication is achieved by a splasher with the mineral oil compressors while the "ester" oil models incorporate an internal oil pump that does not need an oil pressure safety switch.

Each compressor is delivered with four coloured mounting springs that are already installed between the feet and the condensing unit base-plate, they are clamped to avoid transport damage. It is necessary to adjust vibration dampers to operating position before starting up the condensing units.

The adjustment for the springs is described below.



Compressor	Size A mm	Size B mm	Colour of Springs		Compressor	Size A mm	Size B mm	Colour of Springs		
			motor end	cyl. end				motor end	cyl. end	
DKM	22	25	2 x blue	2 x maroon	D3DC - 100X / 1000	30	35	2 x maroon	2 x white	
DKJ - 7X / 75	22	25			D3SS - 100X	30	35			
DKJ - 10X / 100	22	25			D3DS - 100X / 1000	30	35			
DKSJ - 10X / 100	22	25	2 x maroon	2 x green	D3DS - 150X / 1500	34	44	2 x yellow	2 x green	
DKJ - 15X / 150	22	25			D3SS - 1500	34	44			
DKSJ - 15X / 150	22	25			D4DA	34	44			
DKL	22	25			D4DF	34	44			
DKSL	22	25			D4DH - 150X / 1500	34	44			
DLE	30	35	2 x blue	2 x blue	D4DL	34	44	2 x black		
DLF	30	35			D4DH - 250X / 2500	34	44			
DLJ	30	35			D4DJ	34	44			
DLL - 30X / 301	30	35			D4DT	34	44			
DLL - 40X / 401	30	44	2 x maroon	2 x maroon	D6TA	34	44	2 x blue		2 x red
DLSG	30	44			D6TH	34	44			
DLHA	30	44			D6DH - 200X / 2000	34	44			
D2S	30	44			D6DL	34	44			
D2D	30	35			D6DH - 350X / 3500	34	44			
D3DA	30	35			D6DT	48	44			
D3SC - 75X / 1000	30	35			D6DJ	48	44			
D3DC - 75X / 750	30	35			D6TJ	34	44			

The R22 low temperature Discus condensing units are including the Demand Cooling (D.C.) installed on the compressor

Further technical information can be found in the following documentation:

Discus compressor application Guidelines D6.3.2/0901-1202/E

Standard compressor application Guidelines D6.3.3/0103-1003/E

4.3.2 The 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 on DWM Copeland condensing units since 1994:

Condenser designation	number of		Fin Length mm	Fin Height mm	Fin Spacing mm	Internal volume l	Fan			Air flow m ³ /s
	Rows	Tubes					number of	model	diameter	
B7	2	14	430	350	2.1	1.1	1	75	300	0.4
B8	3	14	430	350	2.1	1.6	1	71 (75)	300	0.36
D7	3	16	430	400	2.1	1.9	1	120	350	0.48
D8	4	16	430	400	2.1	2.5	1	121 (120)	350	0.44
H7	3	19	625	475	2.1	3.2	1	120	350	0.61
H2	3	19	625	475	3.2	3.2	1	270	420	0.98
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
K7	2	16	820	400	2.1	2.4	2	120	350	1.06
K8	3	16	820	400	2.1	3.5	2	121 (120)	350	0.94
K9	4	16	820	400	2.1	4.7	2	121 (120)	350	0.86
M9	5	25	625	625	2.1	7.0	1	611 (610)	500	1.27
P7	3	23	820	575	2.1	5.1	2	120	350	1.12
P8	4	23	820	575	2.1	6.8	2	121 (120)	350	1.05
R4	3	23	1000	575	2.5	6.2	2	270	420	1.85
R7	3	23	1000	575	2.1	6.2	2	271 (270)	420	1.79
S7	3	26	1000	650	2.1	7.0	2	271 (270)	420	1.89
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
Z9	5	48	1503	1200	2.1	32.4	4	611 (610)	500	5.41

75, 120, 270 and 610 are "old" fans replaced with 71, 121, 271 and 611 in November 2002.

The condenser W99 is twice the condenser W9.

If you have an "old" condensing unit manufactured before 1994, the condensers are not anymore supplied but you can replace them with the present condensers, you can find the equivalent in the following cross reference table:

Old condensor	Number of		Finned Length	Hole ϕ	Present condenser	Number of		Finned Length	Blade ϕ
	Rows	Tubes				Rows	Tubes		
Q 2	2	16	430	364 mm	D8	4	16	430	350 mm
Q 3	3	16	430	364 mm					
Q 4	3	16	430	364 mm					
Q 5	4	16	430	364 mm					
Q 6	5	16	430	364 mm	H7	3	19	625	350 mm
Q 7	3	19	625	364 mm	H8	3	19	625	420 mm
Q 8	3	19	625	435 mm	H9	4	19	625	420 mm
Q 10	4	19	625	435 mm	K8	3	16	820	350 mm
Q 12	5	19	625	435 mm	K9		16	820	350 mm
T 42	3	16	820	364 mm	P8	4	23	820	350 mm
T 43, T5	4	16	820	364 mm	R7	3	23	1000	420 mm*
T 71	4	23	820	364 mm	S9	5	26	1000	420 mm
T 81, T 82	5	23	820	364 mm	V5	4	31	1200	420 mm
T 93	3	23	1000	364 mm	V6	5	31	1200	500 mm
T 94	4	23	1000	364 mm	W9	5	33	1503	500 mm
T 101	4	26	1000	435 mm					
T 121	5	26	1000	435 mm					
T 151	5	31	1200	435 mm					
T17	5	31	1200	515 mm					
U 61	6	32	1503	515 mm					

* necessity to change the fans

4.3.3 The fan(s)

The present condensing units are equipped with 1, 2 or 4 fans.

The complete fan is made of and an external rotor motor with the fan blades permanently fixed to the rotor and the fan guard. The grid has 4 feet to mount it on the condenser.

The fan is positioned in order to blow the air from the condenser to the compressor, so the compressor additional fan is not any more necessary.

All the fan **presently** used on the condensing units are **single-phase** fans.

The fans protection is IP 54 and its insulation class is "F".

As described in the condenser table, various fan models are used.

Fan model	Blade diameter mm	Power input W	Voltage V ($\pm 10\%$) / Ph / Hz	Run capacitor μF / V	Motor current A	Winding resistance Ω ($\pm 10\%$), 25°C	
						Main	Auxiliary
71	300	95	220 - 240 / 1 / 50	3 / 400	0,44	115	129
121	350	117	220 - 240 / 1 / 50	4 / 400	0,54	72	108
271	420	300	220 - 240 / 1 / 50	5 / 400	1,35	25	88
611	500	570	220 - 240 / 1 / 50	10 / 400	2.4	8,5	20.5

Since January 2003:

- fan 71 is replacing 75
- fan 121 is replacing 120
- fan 211 is replacing 210
- fan 611 is replacing 610

Fan model	Blade diameter mm	Power input W	Voltage V ($\pm 10\%$) / Ph / Hz	Run capacitor μF / V	Motor current A	Winding resistance Ω ($\pm 10\%$), 25°C
75	300	80	220 - 240 / 1 / 50	5 / 400	0,36	102
			220-240 Δ / 380-420Y / 3 / 50		0,33/0,19	104 ± 3 / 218 ± 6
			500 - 550 / 3 / 50		0,15	574 ± 37
120	350	135	220 - 240 / 1 / 50	8 / 400	0,63	54,7
			220-240 Δ / 380-420Y / 3 / 50		0,55/0,32	57 ± 3 / 172 ± 10
			500 - 550 / 3 / 50		0,25	325 ± 24
270	420	280	220 - 240 / 1 / 50	16 / 400	1,30	20
			220-240 Δ / 380-420Y / 3 / 50		1,10/0,65	20 / 60
			500 - 550 / 3 / 50		0,52	51
610	500	630	220 - 240 / 1 / 50	25 / 400	3,6	6,2
			220-240 Δ / 380-420Y / 3 / 50		2,95/1,70	6,2 / 18,6
			500 - 550 / 3 / 50		1,1	9,3

It is possible to convert the "old" three-phase fan into a single-phase motor by mean of a capacitor, the characteristics of this run capacitor are given in the above table.

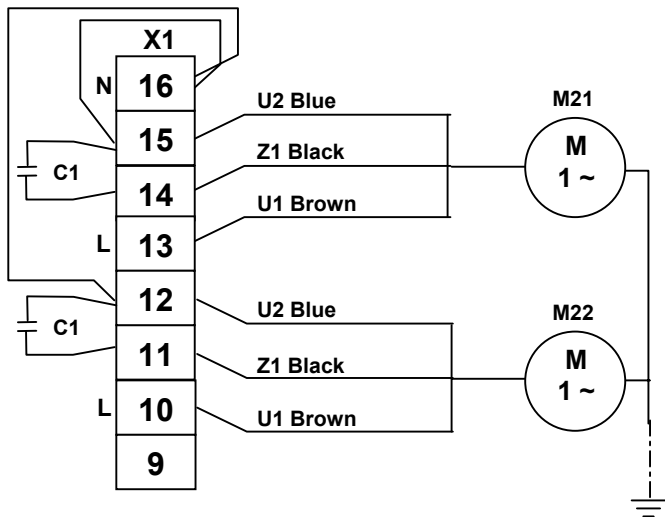
The fan motors are protected by a thermostatic switch. A single-pole bimetallic-element switch protects the motor against damage from:

- Motor overload
- Over-voltage and under-voltage
- Electrical and mechanical blockages
- Inadequate cooling.

After connecting the condensing unit electrically, check the rotational direction. The fan must blow from the condenser to the compressor.

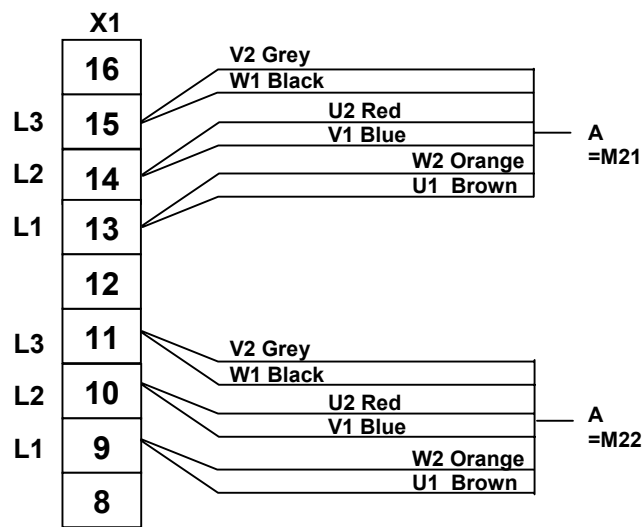
The condensing units we are presently delivering are equipped with single-phase fans.

230V ±15% / 1 ~ / 50-60 Hz

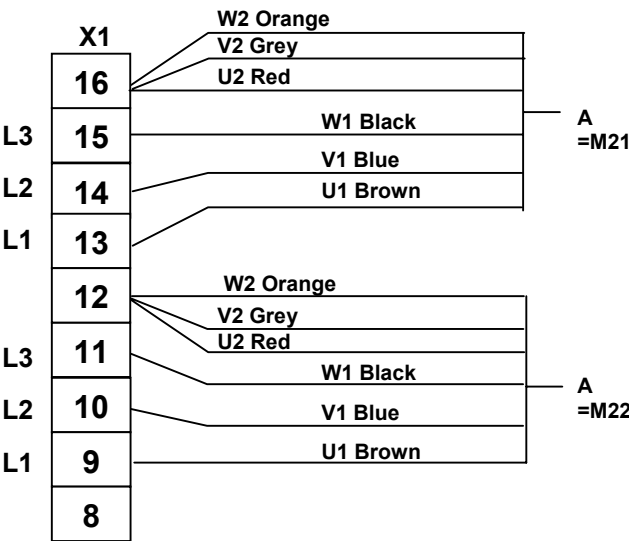


The old condensing units (before January 2003) were originally equipped with three-phase fans.

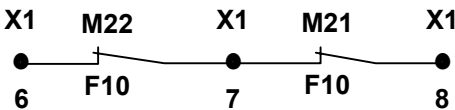
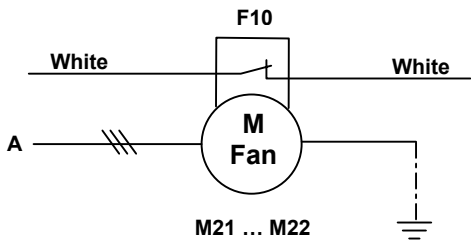
Δ 230V ±15% / 3 ~ / 50-60 Hz



Y 400V±15% / 3 ~ / 50-60 Hz
Y 500V±15% / 3 ~ / 50-60 Hz



Fan motor protection = F10



If you have an "old" unit manufactured before 1994, some fans are not anymore supplied, but you can replace them with the present fans.

You can find the equivalent in the following cross reference table:

Old condensor	Fan characteristics			Replacement fan
	Blade ϕ mm	Motor		
Q2 Q3	350	25W	1 Ph	still supplied
Q3 Q4 T42 T43 T81	350	60W	3 Ph	model 120/121
Q5 Q6 Q7 T5 T71 T82	356	60W	3 Ph	model 120/121
Q8 Q10 Q12 T93 T94 T101 T121 T151	420	200W	3 Ph	model 270/270
T17 U61 U121	500	700W	3 Ph	still supplied

4.3.4 The liquid receiver

The semi-hermetic condensing units are equipped with CE liquid receivers.

The liquid receivers are equipped with:

a Rotolock service valve

sweat connection 1/2" on 3,1 l, 3,7 l and 7,5 l

sweat connection 5/8" on 11,5 l

sweat connection 3/4" on 14 l

sweat connection 7/8" on 18 l and 44 l

a 3/8"-14 NPTF connection for relief valve.

The fitting of a pressure relief device according to the norm EN378-2 is the responsibility of the installer.

The receivers starting from 11,5 litres have a maximum level gauge (sight glass).

It is possible to order the condensing units with a large receiver instead of the standard one.



4.3.5 Safety Pressure Switch

Most of the semi-hermetic condensing units are equipped with a dual pressure switch (high and low pressure) with an automatic reset: ALCO PS2 W7A.

Except the condensing units with a compressor displacement higher than 50 m³/h in 50 Hz (with D4D and D6D compressors), which are delivered with a HP-HP pressure switch ALCO PS2 G8A instead of the HP/LP.



HP/LP dual pressure switch ALCO PS2 W7A

The PS2 W7A is an adjustable pressure switch for application in refrigeration and heat pump systems.

In these systems, pressure controls serve various functions, which may be divided into control and protection functions.

Examples for control functions are compressor cycling, pump-down or defrost control. Protection functions include, pressure limiting and cut out against excessive pressures, against loss of charge or for freeze protection. 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 PS2 W7A has the following characteristics:

- Automatic Dual Pressure Controls
Combined Pressure Limiter for low pressure / high pressure protection.
- Adjustable dual pressure switch
Set-point 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.

- Electrical contacts
Type of contacts: 2 x SPDT contacts
Contact material: CuAg3
Heating load (AC1): 24 A / 230 V AC
Motor rating UL (FLA): 24 V AC
Locked rotor UL (LRA)/Startup (AC3): 144 A / 230 V AC
- Environmental conditions
Ambient temperatures and medium temperature range at pressure connector: -50 °C to +70 °C.
Dust and water protection EN 60529 / IEC 529: IP44.
Vibration resistance: 4 g @ 10 ... 1000 Hz
- Approvals
PED approved: class 4
DIN and TÜV approved: TÜV DIN 32733(EN 12263) required by DIN 8901 and DIN 8975(EN 378).
Low Voltage Directive 73/23/EEG 93/68/EEG: EN 60947-1, EN 60947-5-1, CE-Label.
Germanic Lloyd
UL / CSA
- Pressure Connector: 7/16"-20 UNF male.
Pressure Connector bellows: brass /bronze
- Leakage Test Pressure: LP = 25 bar, HP = 36 bar.
- Housing materials cover: Polycarbonate (PC)
frame: Steel, yellow chromated

Dual High Pressure Switch PS2 G8A

The units with a compressor displacement higher than 50 m³/h were fitted with ALCO FBS 215 S8 BRSA HP-HP pressure switch until December 2002.

From June 2002 the PS2 G8A replaces the ALCO FBS 215 S8 BRSA.

The PS2 G8A characteristics are the same as the PS2 W7A ones except for the following:

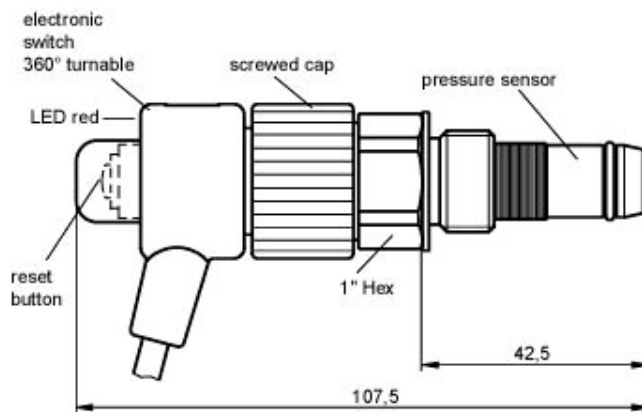
- Manual Reset Dual Pressure Controls
Combined Pressure Cut Out / Safety Pressure Cut Out for high pressure / high pressure protection
Left side: external manual reset
Right side: internal manual reset
 - Leakage Test Pressure on both sides: 36 bar.
- Adjustable dual pressure switch
Set-point adjustment range on both sides: 6 to 31bar.
Differential adjustment range: ~4 bar.
Factory Setting: left side = 20 bar, right side = 21 bar.

4.3.6 Oil Pressure Switch

Such as indicated in chapter 5.3.2, the compressors DLHA, Discus and 2 stages are equipped with the compact electronic oil pressure switch OPS1.

Application:

Monitoring the oil differential pressures in refrigeration compressors. The pressure sensor of the oil differential switch is directly screwed into the pump housing of the compressor. Internal channels link the switch to the suction and discharge ports of the oil pump. No capillary connections are necessary. The electronic switch can be fitted or removed without opening the refrigeration circuit.



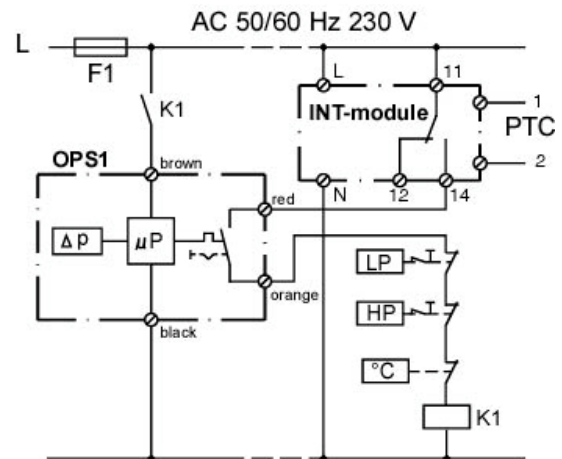
Functional description:

The differential pressure monitor is activated when the supply voltage is applied via an auxiliary contact of the motor contactor K1. A red LED signals insufficient differential oil pressure immediately. Once the pre-set value has been reached, the LED is extinguished. The output contact remains closed when the set value is reached/ exceeded. If the oil differential pressure remains or drops below the set value for longer than the time delay time, the output contact opens and locks out mechanically. Depressing the reset button can reactivate the switch. Shorter periods of insufficient differential pressure are also recognised by the internal microprocessor circuitry and lead to a trip and lockout after correspondingly extended delay time (integration).

The oil differential switch needs no maintenance.

Technical data:

Supply voltage	AC 50/60 Hz 230V +/- 10% 10VA
Ambient temperature range	-30.....+60°C
Time delay	120 s
Cut-in pressure (fixed)	0,95 bar +/- 0,15 bar
Cut-out pressure (fixed)	0,63 bar +/- 0,15 bar
Switching capacity	AC 250 V, max. 2,5A, 720 VA ind.
Refrigerant compatibility	yes (brass)
Protection class according EN 60529	IP54
Reset	manual
Connection cable	4xAWG20 (0,5 mm ²), L=1m colour coded cores
Weight	ca. 200 g



Commissioning:

1. Switch on the compressor and wait until the achieved stable operating conditions have been obtained.
2. If insufficient oil differential pressure is built up during start up, or during operation and, after the time delay expires, the output contact switches off and mechanically locks out. The power supply to the contactor coil is interrupted and the compressor is switched off.
3. Restart is possible after approximately 3 minutes allowing cool down and manual reset.

4.3.7 Fan Speed Control

An electronic speed control is available to control the speed of the fans based on condenser pressure.

One or two fans can be 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 and the control is mounted on the liquid valve with a Schrader 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.
- Efficiency increase of the compressor by controlling the head pressure. This leads to improved efficiency of the compressor
- The noise level of fan motors can be kept at a minimum by avoiding the permanent on/off cycling of the fan motor.

The ALCO fan speed control can be delivered with the DWM Copeland condensing units or as a separated accessory.

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

The fan speed controller **FSF42S** = nominal current between 0.25 A and **4 A** for R404A, R507, R407C, R22

Single fans: model 75, 120, 270, 610

Double fans: model 75, 120, 270

The fan speed controller **FSF41S** = nominal current between 0.25 A and **4 A** for R134a

Single fans: model 75, 120, 270, 610

Double fans: model 75, 120, 270

The fan speed controller **FV142-T30A** = nominal current up to **8 A**, all refrigerants

Double fan model 610

Fan Speed Controller FSF 4 ..

In order to ensure compliance with the latest electromagnetic compatibility requirements of the European Community the fan speed controller we are using have a filter installed. With this filter the FSF fulfils the requirement of the European standards EN 55022, EN 50081 and EN 50082 and is conform to the EC-Directive 89/336/EC

Description of control behaviour of the FSF 4 ..

The FS control behaviour can be described by dividing it into *maximum range*, *proportional range* and *minimum range*, depending on the input pressure (see figure on the right side).

In the *maximum range* the FS provides a constant output voltage of approximately 1% below the supply voltage. The fan runs at maximum speed.

Along the *proportional range* the output voltage varies between maximum and minimum voltage. The minimum voltage is approximately 50% of the supply voltage.

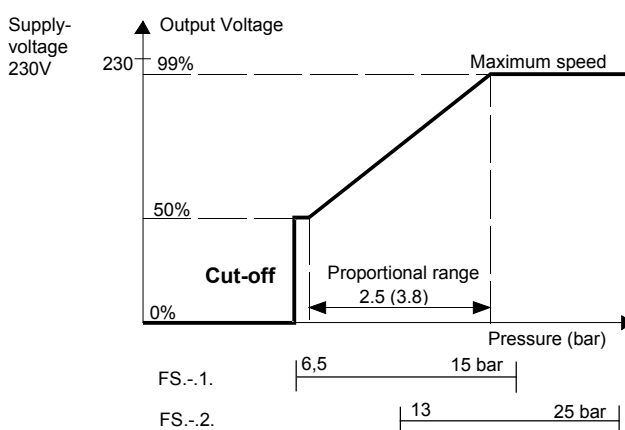
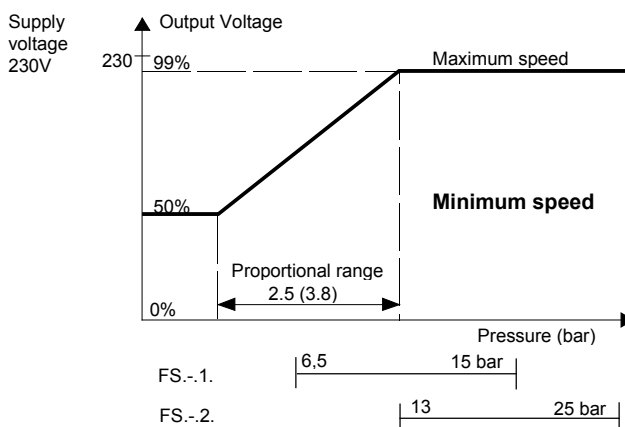
This means that with decreasing pressure the fan slows down from maximum speed to minimum speed.

For the *minimum range* the FS has two operating modes:

- **Minimum speed mode:** for pressure values below the minimum speed setting the fan runs according to the minimum output Voltage of appr. 50% of the supply Voltage (speed depends on the motor characteristics).
- **Cut-off mode:** for pressure values below the minimum speed setting the fan motor is switched off.

The fan speed controller is originally delivered set for the cut-off mode (position "0").

The pressure from which the FS operates in maximum range is adjustable and depends also on the model. The proportional range is fixed at approximately 2.5 bar or 3.8 bar, depending on the model. The minimum range is determined by the setting for the maximum range and the proportional range.



Technical Data of the FSF 4 ..

Supply voltage: 230V/AC +15%, -20%

Temperature range:

Nominal current: 0,5 - 4 (3) Ampère

Starting current: max. 8 Ampère/5 sec

Storage and transportation -30 °C to 70 °C

Ambient -20 °C to 55 (40) °C

Medium -20 °C to 70°

Pressure range (bar)	Pressure changes per turn of adjusting screw		Proportionnal band	Factory setting	Max. proof pressure
	clockwise	counter clockwise			
1 6,5 ... 15	~ +1,4 bar	~ -1,4 bar	2,5 bar	11,0 bar	31,0 bar
2 13 ... 25	~ +2,5 bar	~ -2,5 bar	3,8 bar	16,2 bar	36,0 bar

Fan Speed Controller FV 142

In order to ensure full compliance with the latest electromagnetic compatibility requirements of the European Community an electronic filter FV EMC-10 is available. When wired in series with the FV142 the requirements of the European standards (EN 55022, EN 50081 and EN 50082) can be met. The FV142 is then conform with the EC-directive 89/336.

Description and control behaviour of the FV 142-T30

The FV 142-T30 control behaviour can be described by dividing it into *maximum speed*, *proportional range* and *minimum speed*.

When condensing pressure is above setting the fan runs with *maximum speed*. The FV142-T30 provides a constant output voltage of approximately 2% below the supply voltage.

Along the *proportional range* the output voltage varies between maximum and minimum voltage. The minimum voltage is approximately 45% of the supply voltage. This means with decreasing pressure the fan slows down from maximum speed to *minimum speed*.

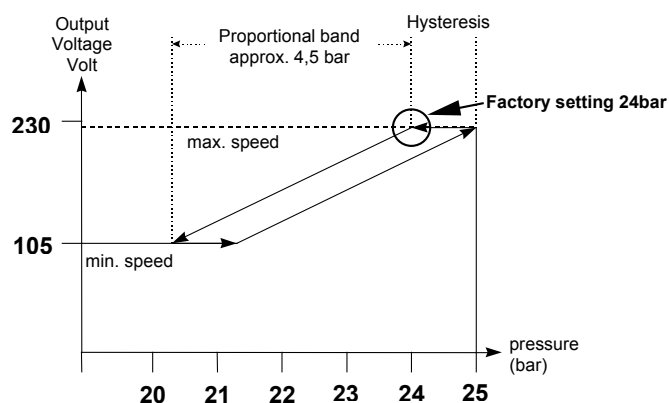
Besides the pressure setting there is an additional setting screw to vary the proportional range. For motors with recommended minimum speed of >45% *the minimum speed can be adjusted* from 45-100% (i.e. min. speed 60% instead of 45%).

The *hysteresis* has the advantage that small pressure peaks has no effect on the speed of the fan.

Short term speed alteration therefore is avoided.



Factory setting FV142-T30



Technical Data of the FV 142-T30

Supply voltage: 230V/AC +15%, -20%

Temperature range:

Nominal current: 0,5 - 8 Amp.

Storage and transportation +20 °C to 55 °C

Ambient +20 °C to 55 °C

Medium -20 °C to 70°

Pressure range: 10 ... 30 bar

Proportional band: ~3,5 - 5 bar

Factory setting: 24 bar

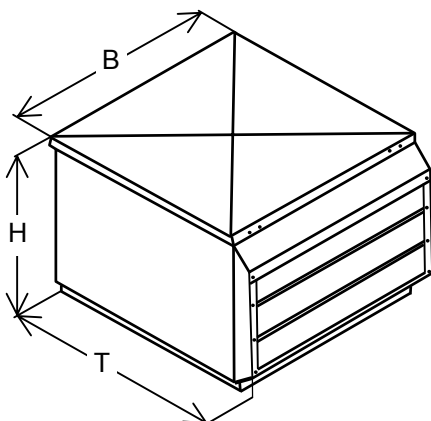
Max. proof pressure: 35 bar

4.3.8 Weather Housing

For the outdoor application of semi-hermetic condensing units, Copeland offers a range of housing with the following features:

- Galvanized
- Painted with rust resistant paint RAL 7032
- Delivered has a flat pack
- Easy to mount
- Easy access for maintenance

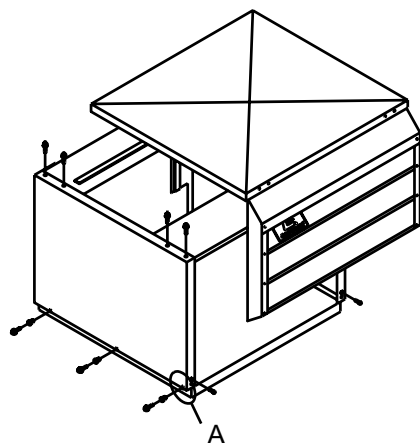
The different weather sizes are related to the condenser and compressor sizes.



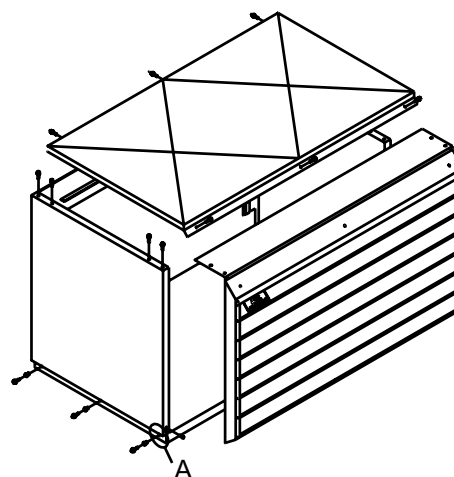
Model	Condensor	Compressor	Dimensions in mm			Weight (net) kg
			B	T	H	
B / D	B7, B8, D7, D8	DK	610	640	485	18.1
D-L	D7, D8	DL	610	785	485	19.3
H	H2, H7, H8, H9	DL	785	750	570	23.4
M	M4, M8, M9	DL, D2S	785	800	745	29.3
F / K	K7, K8, K9	DL	1000	710	495	25.8
P-CR	P7, P8,	DL	1000	710	670	30.4
P-QR	P8	D2D	1000	810	670	32.3
R/S-QR	R4, R7	D2D, D2S, D3D, D3S	1180	890	745	44.6
V	V5, V6, V9	D3D, D3S	1380	890	910	52.6
W	W9	D3D, D3S	1690	890	910	58.0

Copeland is not offering weather housings for the units equipped with D4 and D6 compressors.

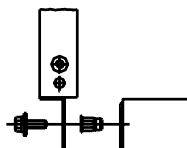
Weather housing Type B/D/H/M/F/K/P



Weather housing type R/S



Detail A



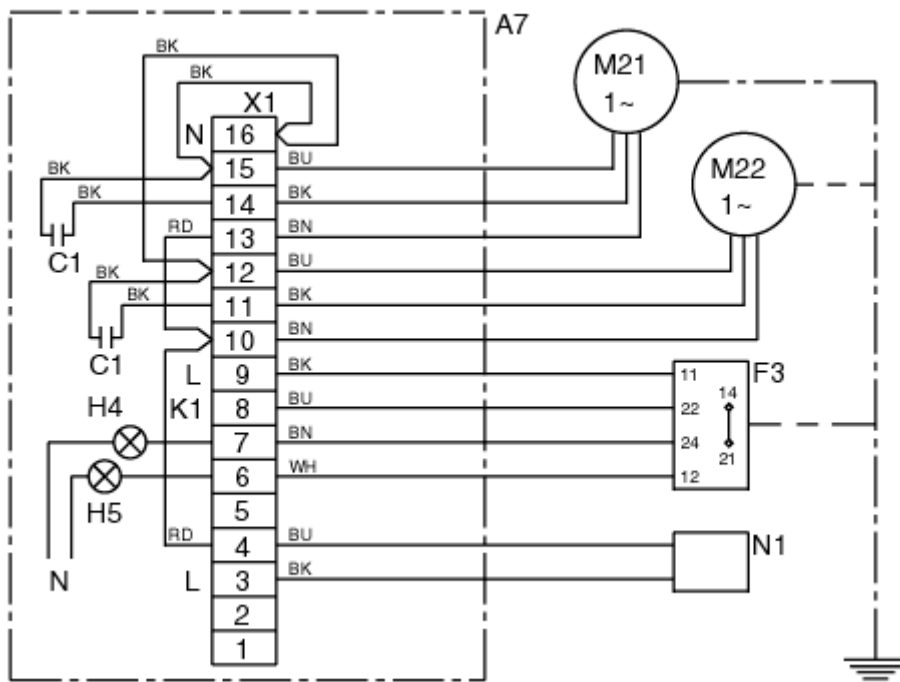
Assembly instructions:

Torque for the bottom screw (M6) $M_A = 8-10 \text{ Nm}$

5 Electrical Diagrams

Each condensing unit is delivered with an electrical diagram for the fan connection.
The compressor has its own electric diagram on the compressor terminal box cover.

Fans in single phase (220-240 $\pm 10\%$ V / 1Ph / 50 Hz)



Nomenclature

A7 = Condensing unit terminal box
C1 = Fan run capacitor, M21/M22
F3 = HP/LP pressure switch
H4 = Signal lamp F3. Discharge pressure to high (if fitted).
H5 = Signal lamp F3. Suction pressure to low (if fitted).
K1 = Contactor M1
M21 = Fan motor (condenser)
M22 = Fan motor (condenser)
N1 = Speed control fan (if fitted)
X1 = Terminal block

Cable colours

WH = white
GY = grey
BK = black
BN = brown
BU = blue
RD = red
OG = orange
G/Y = green/yellow

6 Sound Data

Sound data is given in our Selection software: SELECT.

The value published is the A-Weighted average Sound Pressure Level at 1 meter, with a free sound propagation under availability of a firm floor and for a defined operating point (ref./evap./cond./superheat).

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 meter
D = distance

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

7 PED Compliance

- 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 harmonized 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. Conformity certificates are available.

8 Protection Class

Please find under the protection class of the different element of the unit.

- Compressors are IP54 according to IEC 34
- OPS1 Oil pressure safety switch is IP54 according to EN 60529
- Fan is IP54 according to IEC 34
- HP-LP safety pressure switch ALCO PS2 W7A is IP44 according to IEC 529/EN 60529
- Fan seep controller FSF are IP 65 according to IEC529/DIN 40050
- Fan seep controller FV 142-T30 is IP 55 according to IEC 529/DIN 40050

9 Installation and Service

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.

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

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