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# T2 / TE2, Thermostatic expansion valves

T2 / TE2 thermostatic expansion valves are used for liquid injection into evaporators on both refrigeration and air conditioning systems using fluorinated refrigerants e.g. R407C / R22, R134a, R404A / R507, R407C, R407F and R407A.

T2 / TE2 valves are supplied as a parts programme, with separate thermostatic element/valve body and orifice assembly. Available as angleway valves with flare x flare or flare x solder connection, with internal and external equalisation.



## Laser-welded power element in stainless steel

- long diaphragm life
- high pressure tolerance and working pressure
- high corrosion resistance

## Stainless steel capillary tube and bulb:

- high corrosion resistance
- high strength and vibration resistance

Flare or solder outlet

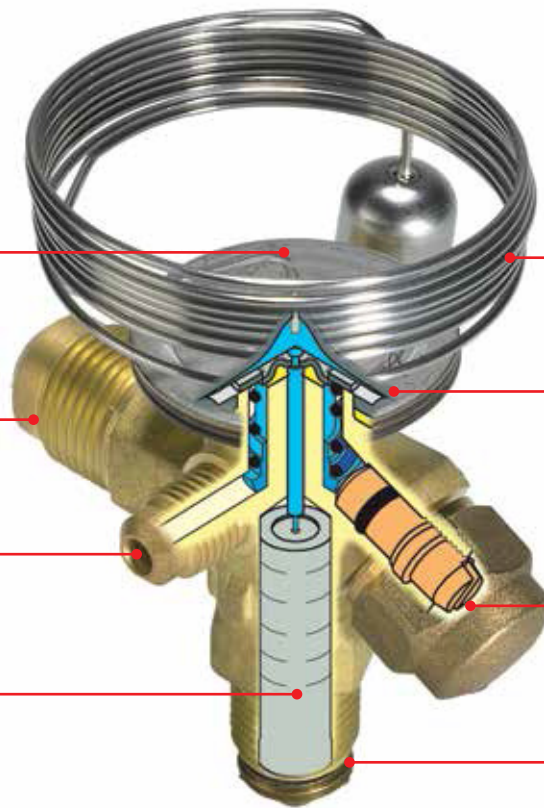
Laser-engraved label

Flare or solder pressure equalization

Easy adjustment of superheat setting

Interchangeable orifice assembly with dirt protection strainer

Flare inlet  
Solder adaptor available as an option



## Facts

### Applications:

- Traditional refrigeration
- Heat pump systems
- Air conditioning units
- Liquid coolers
- Transport refrigeration

### Maximum working temperature:

- -60 to 10 °C / -76 to 50°F

### Refrigerants:

- R22
- R134a
- R513A
- R448A
- R449A
- R404A
- R507

### Capacity range:

- 0.18 – 6.51 TR / 0.64 – 22.9 kW

### Benefit:

- Interchangeable orifice assembly
- Easy stocking
- Easy capacity matching
- Better service
- Can be supplied with MOP(Max. Operating Pressure)
- Protects the compressor motor against excessive evaporating pressure during normal operation

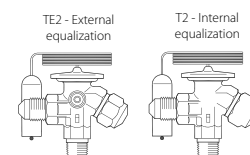
# Technical data and ordering



Thermostatic element + Orifice

## T2 / TE2

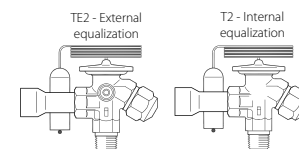
Thermostatic element with: bulb strap, without: orifice, strainer cone and nuts  
Flare x flare connection



Refrigerant	Valve type	Pressure equalization Flare	Capillary Tube (m)	Connection Inlet x outlet		Code no.			
						Range N		Range NL	Range B
				-40 to +10°C		-40 to -15°C	-60 to -25°C		
				in. x in.	mm x mm	Without MOP	MOP +15°C	MOP -10°C	MOP -20°C
R22	T 2	Int.	1.5	$\frac{3}{8} \times \frac{1}{2}$	10 x 12	068Z3206	068Z3208	-	-
	TE 2	Ext.				068Z3209	068Z3211	068Z3227	068Z3229
R134a	T 2	Int.				068Z3346	068Z3347	-	-
	TE 2	Ext.				068Z3348	068Z3349	-	-
R404A / R507	T 2	Int.				068Z3400	068Z3402	068Z3408	068Z3410
	TE 2	Ext.				068Z3403	068Z3405	068Z3409	-
R448A / R449A	T2	Int.				068Z3727	-	-	-
	T2	Ext.				068Z3728	-	-	-

## T2 / TE2

Thermostatic element with: bulb strap, without: orifice,  
Flare x solder connection

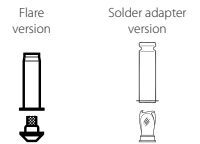


Refrigerant	Valve type	Pressure equalization Solder	Capillary Tube (m)	Connection		Code no.			
						Range N		Range NL	Range B
				-40 to +10°C		-40 to -15°C	-60 to -25°C		
				Inlet Flare	Outlet ODF/solder	Without MOP	MOP +15°C	MOP -10°C	MOP -20°C
R22	T 2	-	1.5	$\frac{3}{8}$ in.	$\frac{1}{2}$ in.	068Z3281	-	-	-
	TE 2	$\frac{1}{4}$ in.				068Z3284	-	-	-
R134a	T 2	-				068Z3383	068Z3387	-	-
	TE 2	$\frac{1}{4}$ in.				068Z3385	068Z3389	-	-
R404A / R507	T 2	-				068Z3414	068Z3416	-	068Z3420
	TE 2	$\frac{1}{4}$ in.				068Z3415	068Z3417	068Z3430	-
R448A / R449A	T 2	-				068Z3729	-	-	-
	TE 2	$\frac{1}{4}$ in.				068Z3730	-	-	-

# Technical data and ordering

## T2 / TE2

### Orifice assembly (Flare version)



Orifice no.	Rated capacity in kW																Code no.
	R22		R407C		R134a		R404A/R507		R407A		R407F		R448A		R449A		
	MT	LT	MT	LT	MT	LT	MT	LT	MT	LT	MT	LT	MT	LT	MT	LT	
0X	0.95	0.9	0.95	0.86	0.7	0.6	0.67	0.59	0.89	0.81	1.04	0.96	0.93	0.86	0.92	0.84	068-2002
0	1.79	1.37	1.76	1.32	1.14	0.78	1.3	0.95	1.65	1.24	1.96	1.5	1.75	1.36	1.71	1.34	068-2003
1	3.23	2.08	3.2	2.04	1.83	1.1	2.48	1.5	2.99	0.9	3.65	2.34	3.23	2.13	3.14	2.11	068-2010
2	4.11	2.43	4.04	2.36	2.17	1.25	3.28	1.76	3.78	2.21	4.7	2.73	4.12	2.49	4.02	2.47	068-2015
3	6.96	4.12	6.86	3.98	3.65	2.1	5.61	2.98	6.34	3.71	8.01	4.59	7.01	4.19	6.82	4.16	068-2006
4	10.52	6.06	10.15	5.83	5.37	3.1	8.61	4.38	9.5	5.44	11.88	6.72	10.47	6.15	10.22	6.12	068-2007
5	14.17	7.92	13.43	7.62	7.08	4	11.36	5.76	12.58	7.12	15.75	8.81	13.69	8.05	13.35	8.02	068-2008
6	16.53	9.25	16.07	9	8.46	4.84	13.58	6.82	15.05	8.39	18.87	10.4	16.58	9.57	16.16	9.53	068-2009

Rated capacity at:

MT rated condition: Evaporating Temp.  $t_e = -5\text{ }^\circ\text{C}$ , Condensing Temp.  $t_c = +40\text{ }^\circ\text{C}$ , superheat=8K, Subcooling=4K

LT rated condition: Evaporating Temp.  $t_e = -25\text{ }^\circ\text{C}$ , Condensing Temp.  $t_c = +40\text{ }^\circ\text{C}$ , superheat=8K, Subcooling=4K

Out of the box, factory settings:

On systems charged with R134a; SSH = 5.0  $^\circ\text{C}$  (9.0  $^\circ\text{F}$ )

On systems charged with R513A; SSH = 6.1  $^\circ\text{C}$  (11  $^\circ\text{F}$ )

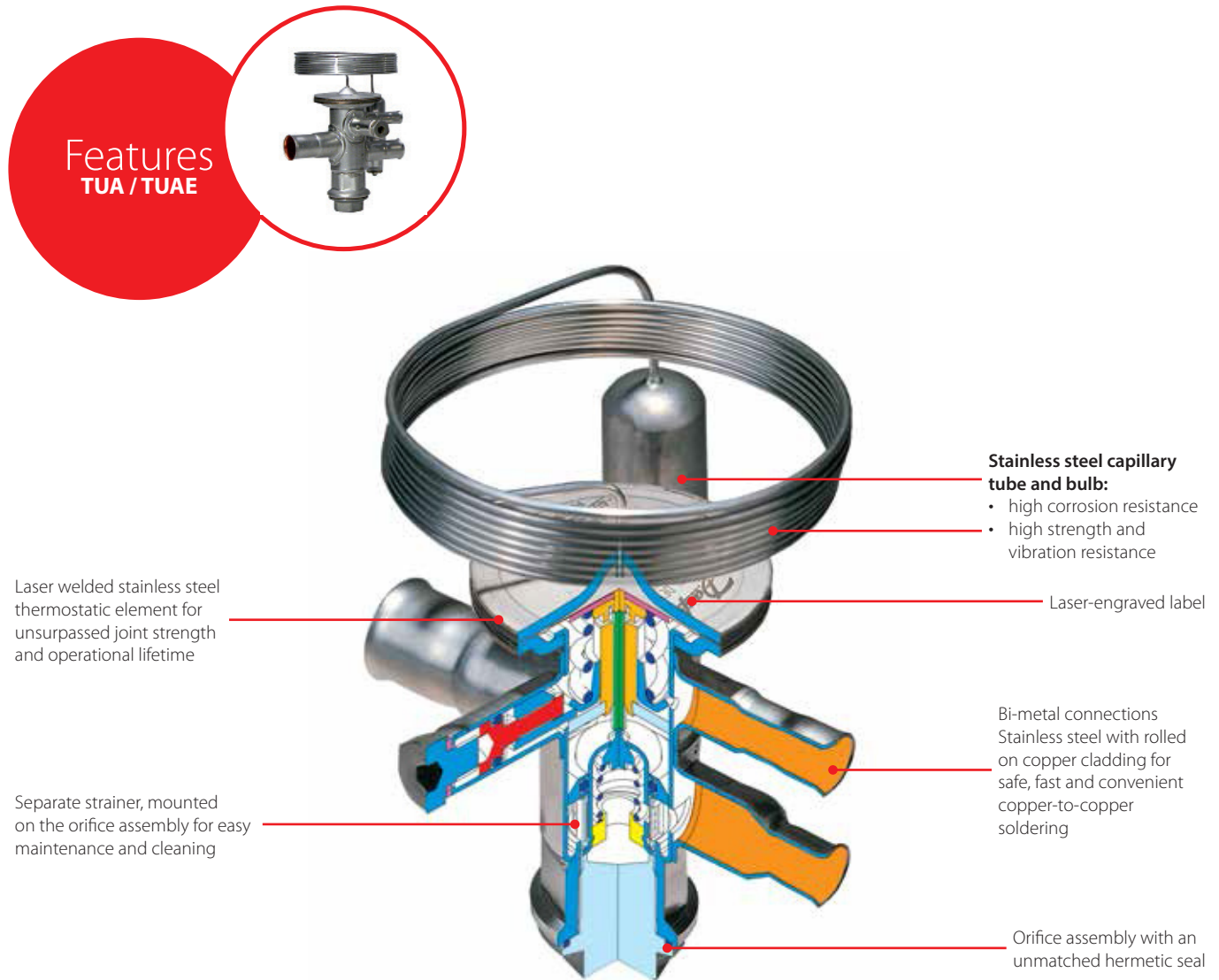
Note: For capacity of other refrigerant please refer datasheet of the valve or Coolselector.



# TUA / TUAE, Thermostatic expansion valves

TUA / TUAE stainless steel thermostatic expansion valves are used for liquid injection into evaporators on both refrigeration and air conditioning systems using fluorinated refrigerants e.g. R134a, R404A, R407C, R22, R507 and R410A. TUA / TUAE valves are compact in design, light weight and have steel / copper bi-metal connections for fast soldering.

TUA / TUAE valves are supplied as parts programme, with separate thermostatic element / valve body, and orifice assembly. TUA has internal equalization, TUAE external equalization. TUA / TUAE are straightway valves, and have adjustable superheat setting.



## Facts

### Applications:

- Traditional refrigeration
- Heat pump systems
- Air conditioning units
- Liquid coolers
- Ice cube machines
- Transport refrigeration

### Maximum working temperature:

- -40 to 10 °C / -40 to 50 °F

### Refrigerants:

- R22
- R134a
- R513A
- R404A
- R507
- R407C
- R410A

### Capacity range:

- 0.11 – 6.56 TR / 0.42 – 23.1 kW

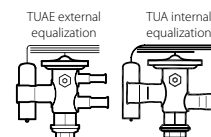
### Benefit:

- The use of stainless steel makes the valves light and strong
- Bi-metal connections for safe, fast and convenient soldering
- Bi-flow function (TUAE: only orifice 1 – 8)

# Technical data and ordering

## TUA / TUAE

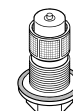
Thermostatic element, without orifice or strainer, with bulb strap



Refrigerant	Type	Pressure equalization	Capillary Tube (m)	Connections Inlet x outlet	Code no.		
					Range N		Range
					-40 to +10°C		-40 to
					in.	Without MOP	MOP +15°C
R22	TUA	Int.	1.5	3/8 x 1/2	068U2235	-	-
	TUAE	Ext.			068U2237	-	-
R134A/R513A	TUA	Int.			068U2205	-	-
	TUAE	Ext.			068U2207	-	-
R404/R507	TUA	Int.			068U2285	-	-
	TUAE	Ext.			068U2287	068U2295	068U2303
R407C	TUA	Int.			068U2325	-	-
	TUAE	Ext.			068U2327	-	-
R410A	TUAE	Ext. 1/4 in.			068U1714	-	-

## TUA / TUAE

Orifice assembly with filter and gasket



Valve type/ Orifice	R134A		R404A/R507		R407C		R22		R410A		Code no.
	MT	LT	MT	LT	MT	LT	MT	LT	MT	LT	
TU Orif. 0	0.36	0.21	0.43	0.25	0.58	0.36	0.57	0.36	0.94	0.61	068U1030
TU Orif. 1	0.53	0.31	0.64	0.37	0.82	0.51	0.84	0.53	1.25	0.81	068U1031
TU Orif. 2	0.61	0.35	0.75	0.42	0.96	0.57	0.98	0.6	1.52	0.93	068U1032
TU Orif. 3	0.81	0.47	0.99	0.57	1.27	0.78	1.29	0.81	1.95	1.25	068U1033
TU Orif. 4	1.34	0.75	1.7	0.92	2.13	1.24	2.18	1.3	3.51	2.02	068U1034
TU Orif. 5	1.79	1.01	2.27	1.24	2.85	1.67	2.91	1.75	4.67	2.72	068U1035
TU Orif. 6	2.79	1.58	3.55	1.92	4.43	2.59	4.54	2.72	7.34	4.21	068U1036
TU Orif. 7	3.69	2.09	4.69	2.53	5.85	3.42	6	3.59	9.68	5.56	068U1037
TU Orif. 8	5.47	3.1	6.86	3.73	8.6	5.03	8.82	5.29	13.99	8.17	068U1038
TU Orif. 9*	7.48	4.32	9.37	5	11.6	6.72	11.98	7.21	19.37	10.85	068U1039

Rated capacity at:

MT rated condition: Evaporating Temp.  $t_e = -5^\circ\text{C}$ , Condensing Temp.  $t_c = +40^\circ\text{C}$ , superheat=8K, Subcooling=4K

LT rated condition: Evaporating Temp.  $t_e = -25^\circ\text{C}$ , Condensing Temp.  $t_c = +40^\circ\text{C}$ , superheat=8K, Subcooling=4K

\*TUAE with orifice no. 9 can't be used for Biflow operation.

Out of the box, factory settings:

On systems charged with R134a; SSH =  $5.0^\circ\text{C}$  ( $9.0^\circ\text{F}$ )

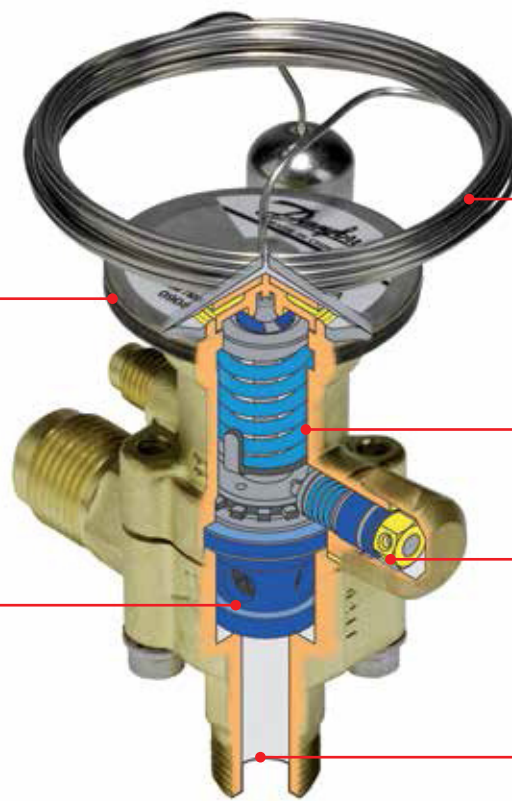
On systems charged with R513A; SSH =  $6.1^\circ\text{C}$  ( $11^\circ\text{F}$ )

Note: For capacity of other refrigerant please refer datasheet of the valve or Coolselector.

# TE 5 - TE 55, Thermostatic expansion valves

TE 5 - TE 55 thermostatic expansion valves regulate the injection of refrigerant liquid into evaporators for medium sized plants. Injection is controlled by the refrigerant superheat. Therefore the valves are especially suitable for liquid injection in "dry" evaporators where the superheat at the evaporator outlet should always be kept constant.

TE 5 - TE 55 valves are supplied as parts programme, built up of three main components - thermostatic element, orifice assembly, and valve body with connections, and have external pressure equalization. Refrigerants: R22, R134a, R404A, R507, R407A, R407F and R407C.



**Laser-welded power element in stainless steel**

- longer diaphragm life
- high pressure tolerance and working pressure
- high corrosion resistance

To ensure long operating life, the valve cone and seat are made of a special alloy with particularly good wear qualities

**Stainless steel capillary tube and bulb**

- high corrosion resistance
- high strength and vibration resistance

Large parts programme ensures minimal stocks

Easy adjustment of superheat setting

**More connection possibilities**

- solder x solder
- flare x flare
- flanges
- straightway or angleway

## Facts

**Applications:**

- Traditional refrigeration
- Air conditioning units
- Water chillers

**Maximum working pressure:**

- 46 bar / 667 psig

**Refrigerants:**

- R410A
- R22
- R134a
- R407F
- R407A
- R404A
- R507
- R407C
- R32
- R290

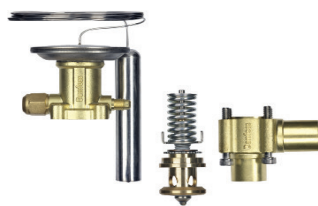
**Capacity range:**

- 2.3 – 71 TR / 8.17 – 250 kW

**Benefit:**

- Balance port design
- Biflow with expansion in both directions
- Cylindrical bulb and patented bulb strap design

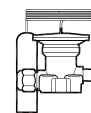
# Technical data and ordering



Thermostatic element + Orifice + Valve body

## TE5 - TE 55

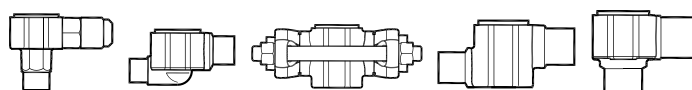
Thermostatic element - including bulb strap, Capillary Tube - 3M



Valve type	Refrigerant	Code no.
		Range N -40 to +10°C Without MOP
TE 5	R407C	067B3278
TE 12		067B3366
TE 55		067G3240
TE 5	R134a	067B3297
TE 12		067B3232
TE 5		067B3342
TE 12	R404A / R507	067B3347
TE 20		067B3352
TE 55		067G3302
TE 5	R22	067B3250
TE 12		067B3210
TE 20		067B3274
TE 55	R448 / R449	067G3205
TE 5		067B3252
TE 12		067B2512
TE 20		067B3294
TE 55		067G3219

## TE5 - TE 55

Body selection



Type	Connection Inlet x Outlet		Code no.	
	in.	Flare angleway	Solder angleway	Solder straightway
TE 5	1/2 x 5/8	067B4013	067B4009 <sup>1)</sup>	067B4007 <sup>1)</sup>
	1/2 x 7/8	-	067B4010 <sup>1)</sup>	067B4008 <sup>1)</sup>
	5/8 x 7/8	-	067B4011 <sup>1)</sup>	-
TE 12	7/8 x 1 1/8	-	067B4034 <sup>2)</sup>	-
TE 12	7/8 x 1 1/8	-	067B4023 <sup>2)</sup>	067B4021 <sup>2)</sup>
TE 20	7/8 x 1 1/8	-	067B4023 <sup>2)</sup>	-
TE 55	1 1/8 x 1 3/8	-	067G4004 <sup>3)</sup>	067G4003 <sup>3)</sup>

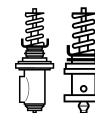
1) ODF x ODF, 2) ODF x ODM, 3) ODM x ODM

ODF = Internal Diameter, ODM = External Diameter

# Technical data and ordering

## TE5 - TE 55

### Orifice assembly



Valve type	Orifice no.	(kW)														Code no.
		R407F		R407A		R448A / R449A		R404A / R507		R22		R134a		R407C		
		MT	LT	MT	LT	MT	LT	MT	LT	MT	LT	MT	LT	MT	LT	
TE 5	05	10.02	6.67	9.03	5.94	9.37	6.14	7.57	4.95	9.71	10.4	6.02	3.88	9.6	6.36	067B2788
	1	18.47	12.27	16.61	10.93	17.26	11.31	13.9	9.12	17.85	19.1	11.05	7.14	17.7	11.71	067B2789
	2	25.88	17.24	23.21	15.36	24.18	15.9	19.3	12.82	24.88	26.3	15.43	10.02	24.7	16.46	067B2790
	3	32.54	21.65	29.39	19.19	30.47	19.86	24.52	16.03	31.65	33.8	19.73	12.74	31.37	20.57	067B2791
TE 12	4	44.54	29.01	40.06	25.75	41.7	26.61	33.43	21.64	43.19	46	26.83	17.14	42.77	27.6	067B2792
	5	60.72	37.55	44.89	27.39	47.71	30.46	45.07	27.35	51.8	57.2	33.52	21.7	47.93	29.35	067B2708
	6	80.02	47.55	58.72	34.85	62.77	38.89	56.41	33.33	68.54	76.3	44.12	28.02	62.69	37.35	067B2709
TE 20	7	100.3	64.15	73.4	43.2	77.82	48.85	69.42	40.2	86.17	97.8	57.36	36.63	78.3	46.31	067B2710
	8	122	75.12	96.9	61.23	109.4	68.52	78.59	48.04	118.2	128	69.13	43.88	103.6	65.63	067B2771
TE 55	9	134.6	79.47	108.5	65.92	120.9	72.53	88.81	51.89	133.9	150	80.09	49.39	115.8	70.65	067B2773
	10	149.6	90.13	128.1	77.23	133.1	77.9	110.3	62.84	149.2	169	95.09	56.9	136.8	82.77	067G2701
	11	163	98.43	139.4	84.21	144.7	84.83	119.4	68.22	162.5	184	104.7	62.75	148.8	90.25	067G2704
	12	174	103	150.5	89.88	155.9	90.23	129.2	72.72	176.7	202	114.2	67.71	160.7	96.33	067G2707
	13	209.8	123.1	181.8	107.6	188.2	107.6	155.2	86.57	214.4	245	141	82.99	194	115.3	067G2710

Rated capacity at:

MT rated condition: Evaporating Temp.  $t_e = -5\text{ }^\circ\text{C}$ , Condensing Temp.  $t_c = +40\text{ }^\circ\text{C}$ , superheat=8K, Subcooling=4K

LT rated condition: Evaporating Temp.  $t_e = -25\text{ }^\circ\text{C}$ , Condensing Temp.  $t_c = +40\text{ }^\circ\text{C}$ , superheat=8K, Subcooling=4K

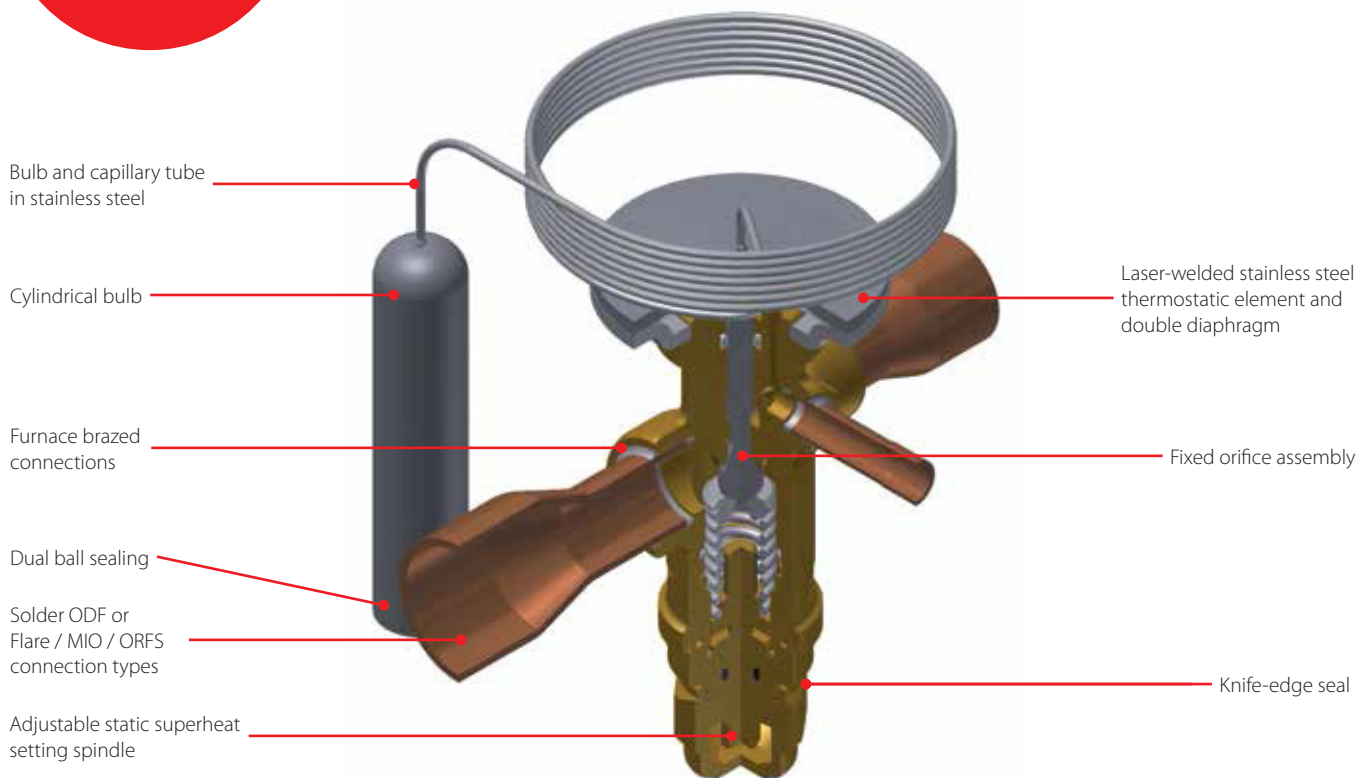
Note: For capacity of other refrigerant please refer datasheet of the valve or Coolselector.



# TGE, Thermostatic expansion valve

TGE is an innovatively designed series of thermostatic expansion valves for fluorinated refrigerants. TGE has copper connections upgraded for high-pressure applications with tight soldering, and is available with a wide variety of

connection types such as solder, flare, MIO, and ORFS, and a wide variety of connection sizes.



## Facts

### Applications:

- Water chillers
- Bus A/C
- Rooftop units
- Heat pumps
- Refrigerated containers and others A/C and other refrigeration system

### Maximum working pressure:

- 46 bar / 667 psig

### Refrigerants:

- R410A
- R22
- R134a
- R407F
- R407A
- R404A
- R507
- R407C
- R32
- R290

### Capacity range:

- 2.2 – 52 TR / 8 – 182 kW

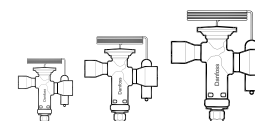
### Benefit:

- Balance port design
- Biflow with expansion in both directions
- Cylindrical bulb and patented bulb strap design

# Technical data and ordering

## TGE

Thermostatic Expansion Valve with fixed Orifice



Refrigerant	Valve type	no.	Nominal capacity Q nom.		Inch version	
			MT	LT	Connection Solder ODF × ODF (in.)	Code no.
R407C	TGE 10	6	17.11	11.06	5/8 × 7/8	067N4155
	TGE 10	8	22.86	14.82	5/8 × 7/8	067N4156
	TGE 10	11	34.39	22.37	5/8 × 7/8	067N4157
	TGE 20	12.5	36.98	22.64	5/8 × 7/8	067N4159
	TGE 20	16	46.14	27.98	7/8 × 1 3/8	067N4162
	TGE 20	20	55.13	34.13	7/8 × 1 3/8	067N4163
	TGE 40	26	73.56	44.98	7/8 × 1 3/8	067N4165
R22	TGE 10	3	9.6	6.57	3/8 × 5/8	067N2150
	TGE 10	4	13.1	8.8	1/2 × 7/8	067N2152
	TGE 10	6	19.15	12.85	1/2 × 5/8	067N2153
	TGE 10	6	19.15	12.85	1/2 × 7/8	067N2154
	TGE 10	6	19.15	12.85	5/8 × 7/8	067N2155
	TGE 10	8	25.5	17.2	5/8 × 7/8	067N2156
	TGE 10	11	37.78	26.13	5/8 × 7/8	067N2157
	TGE 20	12.5	38.68	24.39	5/8 × 7/8	067N2159
	TGE 20	16	48.54	30.13	7/8 × 1 1/8	067N2162
	TGE 20	20	57.83	36.95	7/8 × 1 1/8	067N2163
	TGE 40	26	81.63	49.81	7/8 × 1 3/8	067N2165
R410A	TGE 10	4	15.44	10.46	1/2 × 7/8	067N3152
	TGE 10	6	22.51	15.2	1/2 × 7/8	067N3154
	TGE 10	6	22.51	15.2	5/8 × 7/8	067N3155
	TGE 10	8	29.92	20.32	5/8 × 7/8	067N3156
	TGE 10	11	44.52	30.92	5/8 × 7/8	067N3157
	TGE 20	20	72.55	46.89	7/8 × 1 1/8	067N3163
R134A	TGE 40	30	110.6	68.25	7/8 × 1 3/8	067N3168
	TGE 10	4	7.48	4.8	1/2 × 7/8	067N5152
	TGE 10	6	11.13	7.15	1/2 × 5/8	067N5153
	TGE 10	8	15.11	9.75	5/8 × 7/8	067N5156
R404/R507	TGE 10	11	22.39	14.45	5/8 × 7/8	067N5157
	TGE 10	6	12.75	8.186	1/2 × 7/8	067N6151
	TGE 10	8	17.03	10.99	5/8 × 7/8	067N6150
	TGE 10	11	25.17	16.56	5/8 × 7/8	067N6154
	TGE 20	12.5	27.86	16.96	5/8 × 7/8	067N6158
TGE 20	16	34.92	21.08	7/8 × 1 1/8	067N6155	

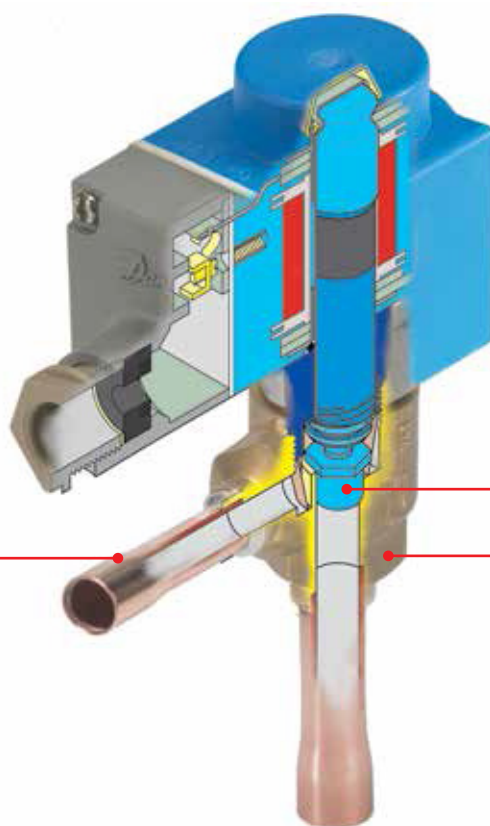
Range N = -40 → +10°C OS = 4 K

# AKV, Electric expansion valves

AKV are electrically operated expansion valves designed for refrigeration plants. The AKV valves are designed for use with a controller from Danfoss' range of ADAP-KOOL® controllers.

The AKV valves are supplied as a parts programme with separate valve body and coil (with terminal box, cable or DIN plug). AKV has an exchangeable orifice. Refrigerants: R744, R22 / R407C, R404A / R507, R410A, R134a, R407A, R23.

## Features AKV



Available with ODF solder connections (AKV 15 and AKV 20 – straightway,

The orifice assembly is replaceable

Both expansion valve and solenoid valve

## Facts

### Applications:

- Traditional refrigeration
- Cold rooms
- water chiller

### Maximum working pressure:

- AKV 10–1–6 PS / MWP = 52 bar / 754 psig
- AKV 10–7 PS / MWP = 42 bar / 610 psig
- AKV 15–1,2,3 PS / MWP = 42 bar / 610 psig
- AKV 15–4 PS / MWP = 28 bar / 400 psig
- AKV 20 PS / MWP = 28 bar / 400 psig

### Refrigerants:

- R134a
- R22
- R23
- R404A
- R507
- R407A
- R407F
- R410A
- R422B
- R422D
- R448A
- R449A
- R452A
- R513A
- R744
- R449B
- R450A

### Capacity range:

- 0.2 – 114 TR / 0.8 – 404 kW

### Benefit:

- The AKV valves are supplied as a parts programme, as follows:
- Separate valve incl. exchangeable orifice
- Separate coil
- The valve requires no adjustment

# Technical data and ordering

## AKV

### Valve excluded coil

Valve type	Rated capacity kW				kv value	Connections	
	R22/ R407C	R134a	R404A/ R507	R407C		Solder ODF	
					m <sup>3</sup> /h	Inlet × outlet (in.)	Code no.
AKV 10-1	1	0.9	0.8	1.1	0.01	3/8 × 1/2	068F1161
AKV 10-2	1.6	1.4	1.3	1.7	0.017	3/8 × 1/2	068F1164
AKV 10-3	2.6	2.1	2	2.5	0.025	3/8 × 1/2	068F1167
AKV 10-4	4.1	3.4	3.1	4	0.046	3/8 × 1/2	068F1170
AKV 10-5	6.4	5.3	4.9	6.4	0.064	3/8 × 1/2	068F1173
AKV 10-6	10.2	8.5	7.8	10.1	0.114	3/8 × 1/2	068F1176
AKV 10-7	16.3	13.5	12.5	17	0.162	1/2 × 5/8	068F1179
AKV 15-1	25.5	21.2	19.6	25.2	0.25	3/4 × 3/4	068F5000
AKV 15-2	40.8	33.8	31.4	40.4	0.4	3/4 × 3/4	068F5005
AKV 15-3	64.3	53.3	49.4	63.7	0.63	7/8 × 7/8	068F5010
AKV 15-4	102	84.6	78.3	101	1	1 1/8 × 1 1/8	068F5015
AKV 20-1	102	84.6	78.3	101	1	1 3/8 × 1 3/8	042H2020
AKV 20-2	163	135	125	170	1.6	1 3/8 × 1 3/8	042H2022
AKV 20-3	255	212	196	252	2.5	1 5/8 × 1 5/8	042H2024
AKV 20-4	408	338	314	404	4	2 1/8 × 2 1/8	042H2027

Rated capacities are based on:

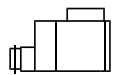
Condensing temperature  $t_c = 32^\circ\text{C}$

Liquid temperature  $t_l = 28^\circ\text{C}$

Evaporating temperature  $t_e = 5^\circ\text{C}$

## AKV

### Coil



Type	Description	Code no.
Coil	240 V a.c. 12 W, 50 Hz with Terminal Box	018F6802
	230 V a.c. 10 W, 50 Hz with Terminal Box	018F6701
	24 V a.c. 10 W, 50 Hz with Terminal Box	018F6707

## AKV

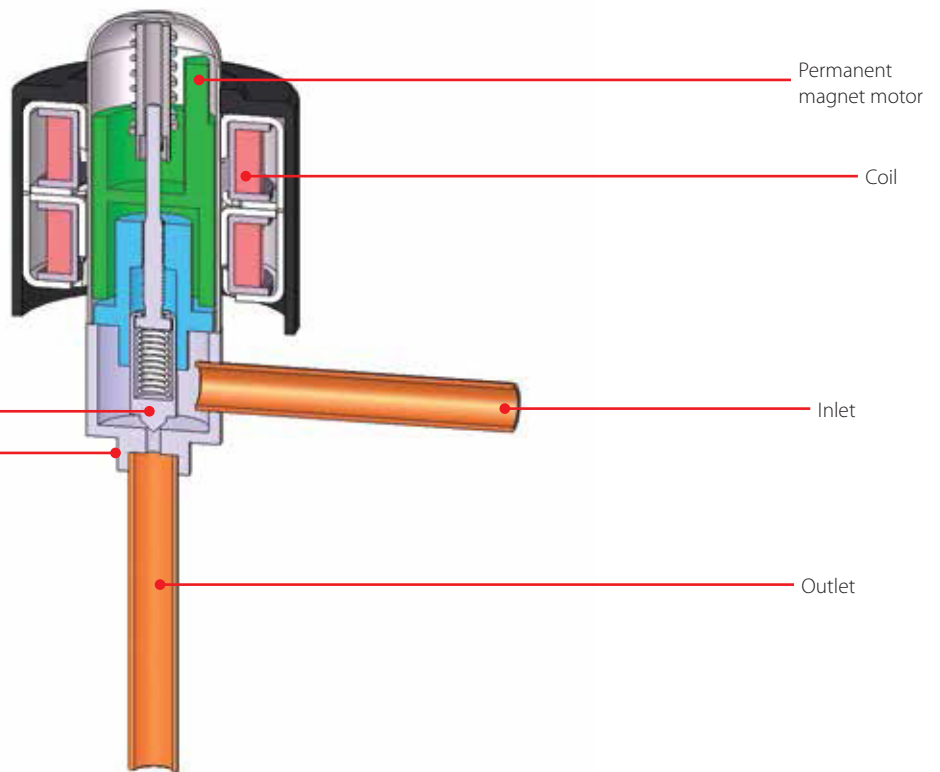
### Orifice kit

Type	Description	Code no.
Orifice kit	Orific.kit AKV(H)10-0,1,2,3 multi 10/180	068F5283
	Orifice Kit AKV(H) 10-4,5,6 multi 10/180	068F5284
	Orifice kit AKV-10-7,8 multi 10/180	068F5285

# ETS 6, Electric expansion valve

ETS 6 are compact and lightweight electric expansion valves. Bi-flow operation is possible for heat pump systems. The valve operation is by means of a unipolar motor, which can be controlled by a number of controllers from Danfoss or third party vendors.

With a Danfoss EKE 1A, EKE 1B, EKE 1C and EIM 336 (current drivers) and an AKS sensor, an accuracy better than  $\pm 0.5$  K can be obtained.



Cross section diagram of ETS 6 series  
\* Refers to refrigerant flow in cooling mode

## Facts

### Applications:

- Heat pumps
- Modular air-cooled chillers
- VRF
- Multi split
- Inverter mini split
- Bus air conditioning
- IT cooling

### Maximum working pressure:

- 47 bar / 681 psig

### Refrigerants:

- R134a
- R22
- R407C
- R404A
- R507
- R410A

### Capacity range:

- 0.11 – 6.56 TR / 0.42 – 23.1 kW

### Benefit:

- Compact and lightweight hermetic design with removable coil
- Bi-flow operation for reversible systems
- Power saving design that enables energy efficiency with precision flow control

# Technical data and ordering

01

## ETS 6

Valve excl. coil



02

Type	Rated capacity (kW)					Connection (ODF X ODF)		Code no.
	R410A	R407C	R22	R134a	R404A/ R507	in.	mm	Straight away
ETS 6-10	3.1	2.7	2.6	2	1.8	-	7.94 X 7.94	034G5005
ETS 6-14	6.8	5.9	5.8	4.5	4.1	-	7.94 X 7.94	034G5015
ETS 6-18	12.1	10.6	10.3	8.1	7.3	-	6.35 X 6.35	034G5026
ETS 6-25	23	20.1	19.6	15.3	13.8	-	7.94 X 7.94	034G5035
ETS 6-32	29.6	29.6	28.8	22.5	20.3	-	7.94 X 7.94	034G5055

03

ETS 6 rated capacity on:

Evaporating temperature  $t_e$ : 5°C (40°F), Condensing temperature  $t_c$ : 38°C (90°F), Subcooling=0°C, superheat=0°C

04

## ETS 6

Coil



05

Type	Description	Code no.
Coil	12 VDC (0.26A / phase) with JST XHP-6 connector	034G5105
	12 VDC (0.26A / phase)with JST XHP-5 connector	034G5115

06

07

08

09

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12

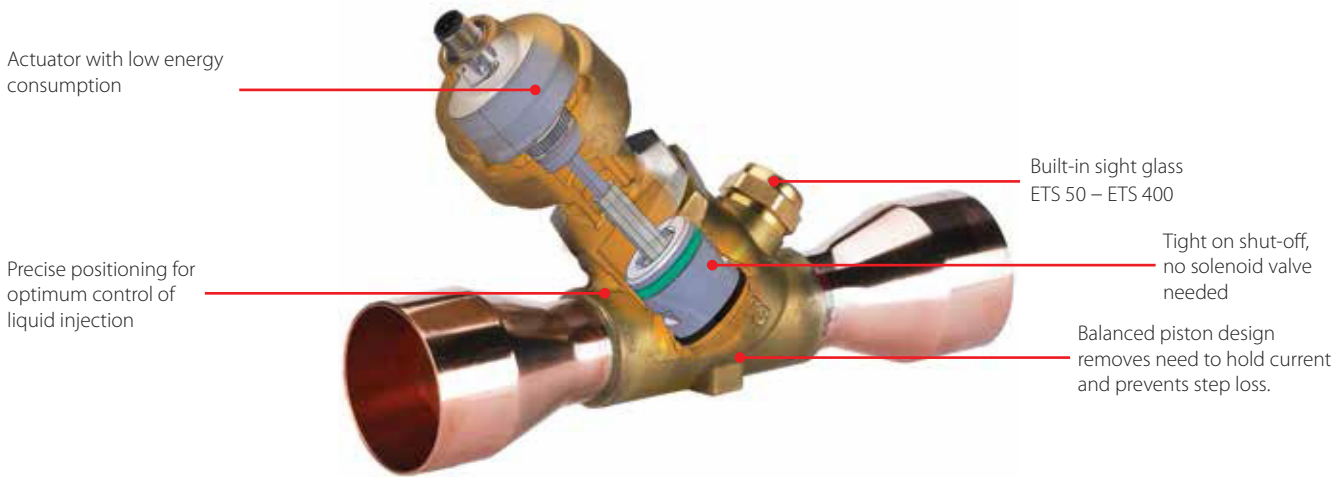
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# ETS 12.5 – ETS 400, Electric expansion valves

ETS 12.5 - ETS 400 are electric expansion valves for precise liquid injection in evaporators for air conditioning and refrigeration applications. The valve piston and linear positioning design is fully balanced, providing bi-flow feature as well as solenoid tight shut function in both flow directions.

ETS valves are operated with a current or voltage driver such as Danfoss Controllers EKE 1A, EKE 1B, EKE 1C. ETS valve is compatible with all common refrigerant such as R410A, R407C, R404A, R134a, R22 and R507. Special ETS versions for systems with R744 (CO<sub>2</sub>) are available.



## Facts

### Applications:

- Heat pumps
- Refrigeration
- Air conditioning
- Chillers

### Maximum working pressure:

- ETS 12.5, ETS 25, ETS 50, ETS 100: 45.5 bar / 660 psig
- ETS 250, ETS 400: 34 bar / 493 psig

### Refrigerants:

- R1234ze
- R134a
- R22
- R404A
- R407A
- R407C
- R407F
- R410A
- R422B
- R422D
- R438A
- R448A
- R449A
- R450A
- R452A
- R507
- R513A

### Capacity range:

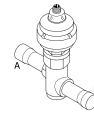
- 12.2 – 556 TR / 43 – 1933 kW

### Benefit:

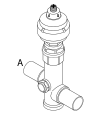
- Balanced design (ETS 12.5 - ETS 400) providing bi-flow operation as well as solenoid tight shut-off function in both flow directions
- Precise positioning for optimum control of liquid injection
- Equipped with M12 connector for cable connection (cable and connector assemblies as accessories)

# Technical data and ordering

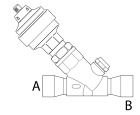
ETS 12.5 / ETS 25  
without sight glass



ETS 50 / ETS 100  
with sight glass



ETS 250 / ETS 400  
with sight glass



## ETS 12.5 - ETS 400

Valve included actuator

Type	Rated capacity (kW)					Connection (ODF X ODF)		Code no.
	R410A	R407C	R22	R134a	R404A/ R507	in.	mm	Straight away
ETS 12.5	70	63	57	45	43	1/2 x 1/2	-	034G4209
	70	63	57	45	43	5/8 x 5/8	16 x 16	034G4210
	70	63	57	45	43	7/8 x 7/8	22 x 22	034G4211
ETS 25	144	129	117	93	88	5/8 x 5/8	16 x 16	034G4202
	144	129	117	93	88	7/8 x 7/8	22 x 22	034G4203
ETS 50	262.3	240.5	215	170	161.4	7/8 x 7/8	22 x 22	034G1708
	262.3	240.5	215	170	161.4	7/8 x 7/8	22 x 28	034G1705
	262.3	240.5	215	170	161.4	1 1/8 x 1 1/8	28 x 28	034G1706
	262.3	240.5	215	170	161.4	1 1/8 x 1 3/8	28 x 35	034G1704
ETS 100	488.4	447.8	400.4	316.5	300.5	1 1/8 x 1 1/8	28 x 28	034G0507
	488.4	447.8	400.4	316.5	300.5	1 3/8 x 1 3/8	35 x 35	034G0508
	488.4	447.8	400.4	316.5	300.5	1 5/8 x 1 5/8	-	034G0505
ETS 250	-	1212	1106	874	828	1 1/8 x 1 1/8	28 x 28	034G2600
	-	1212	1106	874	828	1 3/8 x 1 3/8	35 x 35	034G2601
	-	1212	1106	874	828	1 5/8 x 1 5/8	-	034G2602
ETS 400	-	1933	1764	1394	1320	1 5/8 x 1 5/8	-	034G3500
	-	1933	1764	1394	1320	2 1/8 x 2 1/8	54 x 54	034G3501

ETS 12.5 - ETS 400 Rated capacity is based on:

Evaporating temperature  $t_e$ : 5°C (40°F), Liquid temperature  $t_l$ : 28°C (82°F), Condensing temperature  $t_c$ : 32°C (90°F)

Full stroke opening in normal flow direction

ETS 50, 100, 250, 400 have integrated sight glass.

## ETS 12.5 - ETS 400

Cable



Type	Cable quality	Temperature range	Cable length (L)		Design	Code no.
						Single pack
Cable	-50 / +80°C	-50 / +80°C	2 m	6.6 ft	M12 actuator connector to 4 flying wires for driver connection	034G2201
			8 m	26.2 ft		034G2323

# EVR version 2, Solenoid valves

EVR solenoid valves are direct or servo operated solenoid valves for liquid, suction and hot gas lines with most refrigerants, including flammable refrigerants. They are suitable for condensing units and power packs in all refrigeration, freezing and air conditioning applications and are compatible with fluorinated refrigerants R22/ R407C, R134a, R404A/R507, R410A, R407A, R32, R290, R600, R600a, R1234yf, R1234ze, R404A, R407F, R152A, R448A, R449A, R452A and R450A.

EVR 2 - EVR 22 with solder connections and without manual stem are suitable for the flammable refrigerants R152A, R32, R290, R600, R600a, R1234yf and R1234ze.

The valves can be delivered as normally open or normally closed valves and with or without manual operation.

EVR valves are available with flare, solder or flange connections.

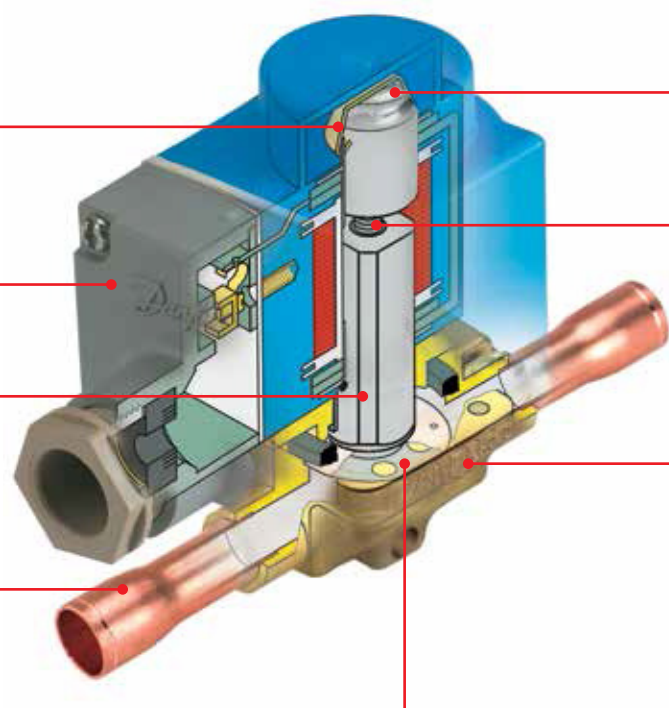


"Clip on" coil system for quick and easy mounting

Coil with terminal box, 1 m cable or DIN plug

Stainless steel armature

Extended ends for soldering make installation easy



Drawn stainless steel tube with internal armature top for maximum external tightness

Spring damping to increase the lifetime of the seat plate

Forged brass body for maximum external tightness

Teflon seat plate with cardan effect to secure maximum internal tightness

## Facts

### Applications:

- Traditional refrigeration
- Heat pump systems
- Air conditioning units
- Liquid coolers
- Transport refrigeration

### Maximum working pressure:

- EVR solder and flare connections 45.2 bar / 655 psi

### Refrigerants:

- R22
- R407C
- R134a
- R404A
- R507
- R410A
- R407A
- R32
- R290
- R600
- R600a
- R404A
- R407F
- R125
- R152A
- R448A
- R449A
- R452A
- R450A
- R1234yf
- R1234ze

### Temperature range:

- -40 – 105 °C / -40 – 221 °F

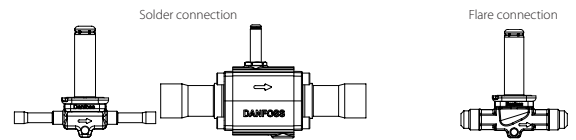
### Benefit:

- High reliability and durability due to maximum internal and external tightness.
- MOPD up to 38 bar / 550 psi

# Technical data and ordering

## EVR version 2

Normally Closed (NC) - separate valve bodies

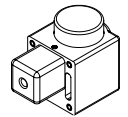


Type	Coil voltage	Connection size (in.)	Code no.		Manual operation Solder	Kv value (m <sup>3</sup> /h)	Code no.	
			Solder Normally Close (NC)				Flare Normally Close (NC)	
EVR 2	AC / DC	1/4	032F1201		No	0.15	032F8056	
EVR 3	AC / DC	1/4	032F1206		No	0.26	032F8107	
	AC / DC	3/8	032F1204		No	0.26	032F8116	
EVR 6	AC / DC	3/8	032L1212		No	1	032L8072	
	AC / DC	-	032L1213		No	1	-	
	AC / DC	-	032L1236		No	1	-	
EVR 10	AC / DC	1/2	032L1209		No	1	032L8079	
	AC / DC	3/8	032L7125		No	1.47	-	
	AC / DC	-	032L1218		No	2.2	-	
	AC / DC	1/2	032L1217		No	2.2	032L8095	
EVR 15	AC / DC	5/8	032L1214		No	2.2	032L8098	
	AC / DC	5/8	032L1228		No	3.3	-	
	AC / DC	5/8	032L1227		Yes	3.3	032L8101	
EVR 20	AC / DC	7/8	032L1225		No	3.3	-	
	AC / DC	7/8	032L1240		No	6	-	
	AC / DC	7/8	032L1254		Yes	6	-	
EVR 22	AC / DC	1 1/8	032L1244		No	6	-	
	AC / DC	1 1/8	032L7145		No	6	-	
	AC / DC	1 3/8	032L3267		No	6	-	
EVR 25	AC / DC	1 3/8	032L2200		Yes	9.8	-	
	AC / DC	1 1/8	032L2201		No	9.8	-	
	AC / DC	1 3/8	032L2207		Yes	9.8	-	
	AC / DC	1 3/8	032L2208		No	9.8	-	
EVR 32	AC / DC	1 3/8	032L1105		Yes	16.7	-	
	AC / DC	1 3/8	032L1106		No	16.7	-	
	AC / DC	1 5/8	032L1103		Yes	16.7	-	
	AC / DC	1 5/8	032L1104		No	16.7	-	
	AC / DC	2 1/8	032L1181		Yes	16.7	-	
EVR 40	AC / DC	1 5/8	032L1109		Yes	24.2	-	
	AC / DC	1 5/8	032L1110		No	24.2	-	
	AC / DC	2 1/8	032L1111		Yes	24.2	-	
	AC / DC	2 1/8	032L1112		No	24.2	-	

# Technical data and ordering

## Solenoid coils

BE solenoid coil with terminal box IP67



Type	Valve type	Tambient (°C)	Supply voltage (V)	Voltage variation (%)	Frequency (Hz)	Power consumption		Code no.
						W	VA	
BE012AS	EVR 2 – EVR 40 (NC) EVR 6 – EVR 22 (NO) EVRH 10 – EVRH 40 EVR EVRAT EVRST EVM (NC)	-40T80	12	-15, +10	50	10	18	018F6706
BE024AS		-40T80	24	-15, +10	50	12	21	018F6707
BE042AS		-40T80	42	-15, +10	50	10	21	018F6708
BE048AS		-40T80	48	-15, +10	50	10	21	018F6709
BE115AS		-40T80	115	-15, +10	50	11	19	018F6711
BE230AS		-40T80	230	-15, +10	50	12	22	018F6701
BE230AS		-40T80	220	-15, +10	50	11	19	018F6701
BE240AS		-40T80	240	-15, +10	50	11	19	018F6702
BE440CS		-40T80	380 - 400	-15, +10	50	13	23	018F6703
BE440CS		-40T80	380 - 400	-15, +10	50 / 60	14	24	018F6703



# EV220B, Solenoid valves

EV220B 15 – EV220B 50 is a universal indirect servo-operated 2/2-way solenoid valve program. Valve body in brass, dezincification resistant brass and stainless steel ensures that a broad variety of application can be covered.

Built-in pilot filter as standard, adjustable closing time and enclosures up to IP67 ensures optimal performance even under critical working conditions.

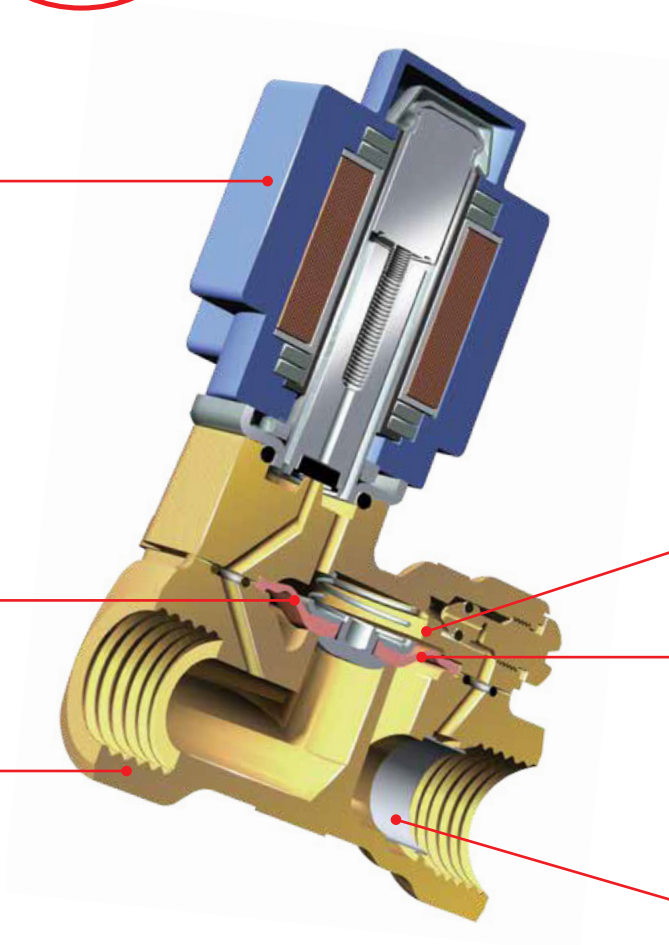
## Features EV220B



Wide coil range up to IP67

High capacity across the entire pressure range

Broad temperature and material range



Effective against water hammer

High capacity across the entire pressure range

Insensitive to dirt

## Facts

### Benefit:

- 2/2-way
- Servo-operated
- DN 15 – DN 50
- Valve body available in brass, DZR brass, gun metal or stainless steel
- NC and NO versions
- ISO 228/1 or NPT thread connection (EVSI and EVSI-U)

- Built in filter for protection of pilot system
- Water hammer damped
- Adjustable closing time available
- Nominal pressure PN 16
- Wetted parts: brass, stainless steel, copper, tin, EPDM, FKM or NBR rubber

# Technical data and ordering

## EV220B

### Servo-operated 2/2-way solenoid valves

Connection ISO228/1	Seal material	Orifice size	Kv - value (m <sup>3</sup> /h)	Differential pressure	Media temperature	Code no.
G ½	EPDM	10	1.5	0.1 - 20	-30 - 100	032U1251
	EPDM	12	2.5	0.3 - 10	-30 - 100	032U1256
	EPDM	15	4	0.3 - 16	-30 - 120	032U7115
	NBR	15	4	0.3 - 16	-10 - 90	032U7170
G ¾	EPDM	20	8	0.3 - 16	-30 - 120	032U7120
	NBR	20	7.5	0.3 - 16	-10 - 90	032U7171
G 1	EPDM	25	11	0.3 - 16	-30 - 120	032U7125
G 1 ¼	EPDM	32	18	0.3 - 16	-30 - 120	032U7132
G 1 ½	EPDM	40	24	0.3 - 16	-30 - 120	032U7140
G 2	EPDM	50	40	0.3 - 16	-30 - 120	032U7150

EPDM is recommended for water.

NBR is suitable for oil, water and air.

## EV220B

### Coils & accessories

Type	Description	Code no.
Coil	BA024A 24V 50HZ	042N7508
	BB024D 24V DC	042N7457
	BB230CS 230V 50/60HZ	018F7363
	BA024D 24V DC	042N7551
	BA240A 240V 50HZ	042N7502
Cable Plug	PG11	042N0156

## EV220B

### Spares

Type	Seal Material	Code no.
EV220B 15	EPDM	032U1071
EV220B 15	FKM	032U1072
EV220B 25	EPDM	032U1075

Contents for Kit:

Locking button and nut for the coil

Armature with valve plate and spring

O-ring for the armature tube

2 O-rings for the equalizing orifice

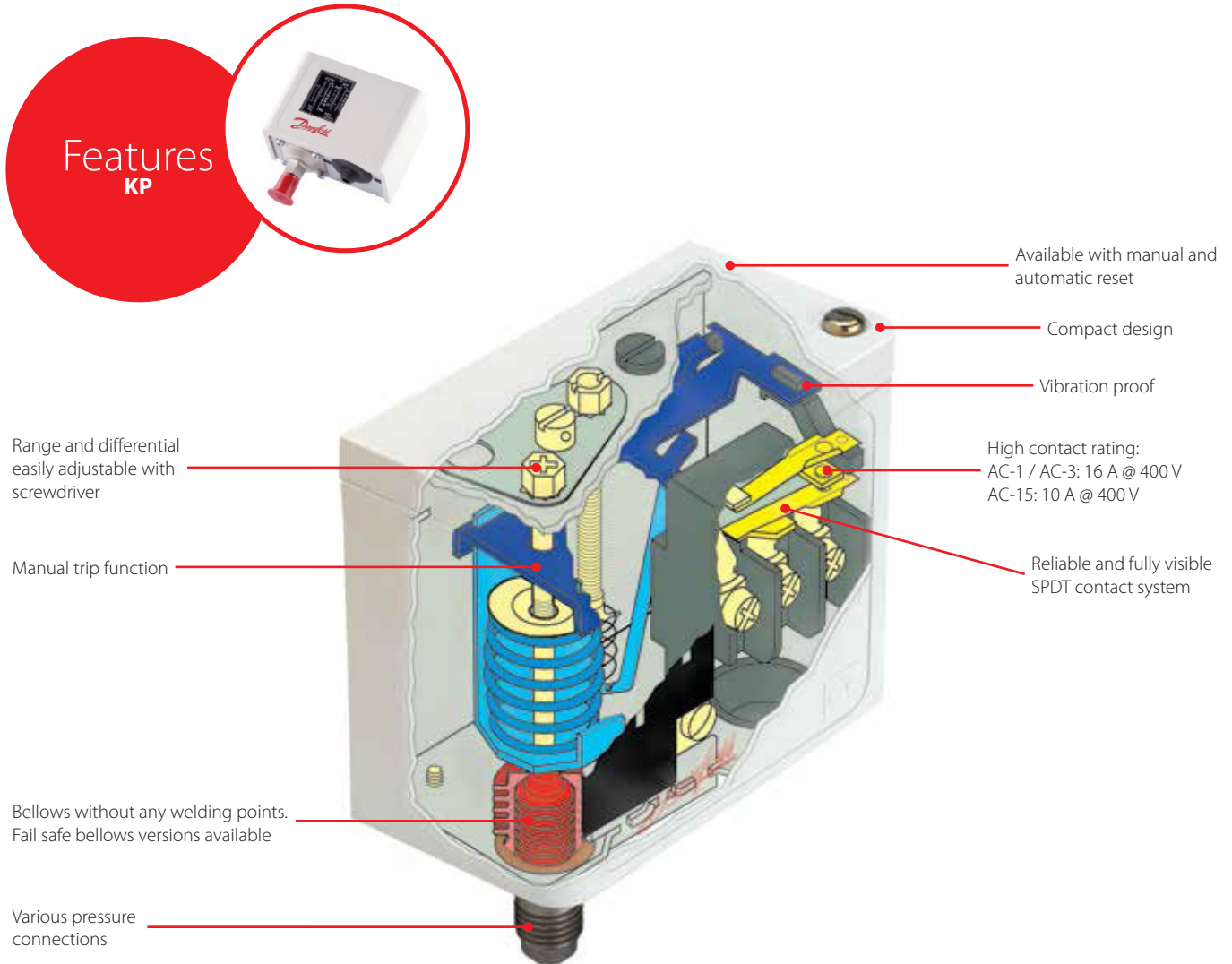
Spring and diaphragm

2 O-rings for the pilot system

# KP, Pressure switch

KP pressure switches are designed to protect refrigeration systems from excessively high discharge pressures, excessively low suction pressures, to start / stop compressors or to operate fans of aircooled condensers.

The enhanced contact system for 16 A makes it possible to operate electrical motors up to 2 kW directly, without the use of contactors. KP pressure switches are available in IP30 and IP44 enclosures. Versions of KP are available for applications with HCFC and non-flammable HFC refrigerants, ammonia or hydrocarbons.



## Facts

### Applications:

- Food Retail
- Heavy Commercial Refrigeration
- Light Commercial Refrigeration
- Commercial Air Conditioning
- Food Processing
- Storage

### Refrigerants:

- R All HCFC and non-flammable HFC refrigerants

### Working range:

- -0.9 – 46.5 bar / -1.3 – 674 psi

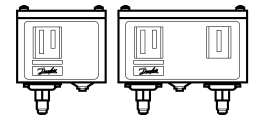
### Benefit:

- High reliability both electrically and mechanically-a KP switch can be connected directly to a single-phase AC motor of up to approximately 2 kW or installed in the control circuit of DC motors and large AC motors
- Versions with IP30 enclosure rating can be updated to IP44 or IP55 enclosure rating using top plate (IP44) or IP55 enclosure (IP55), available as accessories

# Technical data and ordering

## KP

### Pressure Control for Fluorinated refrigerants



Pressure	Type	Low pressure (LP)		High pressure (HP)		Reset		Contact system	Code no.
		Regulating range (bar)	Differential Δp (bar)	Regulating range (bar)	Differential Δp (bar)	Low pressure (LP)	High pressure (HP)		1/4 in. 6 mm Flare
Low	KP 1	-0.2 - 7.5	0.7 - 4	-	-	Aut.	-	SPDT	060-110191
Low	KP 1	-0.9 - 7	0.7	-	-	Man.	-	SPDT	060-110366
High	KP 5	-	-	8 - 32	1.8 - 6.0	-	Aut.	SPDT	060-117191
High	KP 5	-	-	8 - 32	3	-	Man.	SPDT	060-117391
Dual	KP 15	-0.2 - 7.5	0.7 - 4	8 - 32	4	Aut.	Aut.	SPDT + LP	060-124191
Dual	KP 15	-0.2 - 7.5	0.7 - 4	8 - 32	4	Aut.	Man.	SPDT + LP	060-124391
Dual	KP 15	-0.2 - 7.5	0.7 - 4	8 - 32	4	Aut.	Man.	SPDT + LP+HP	060-126491
Dual	KP 15	-0.2 - 7.5	0.7 - 4	8 - 32	4	Conv.	Conv.	SPDT + LP+HP	060-115491

## KP

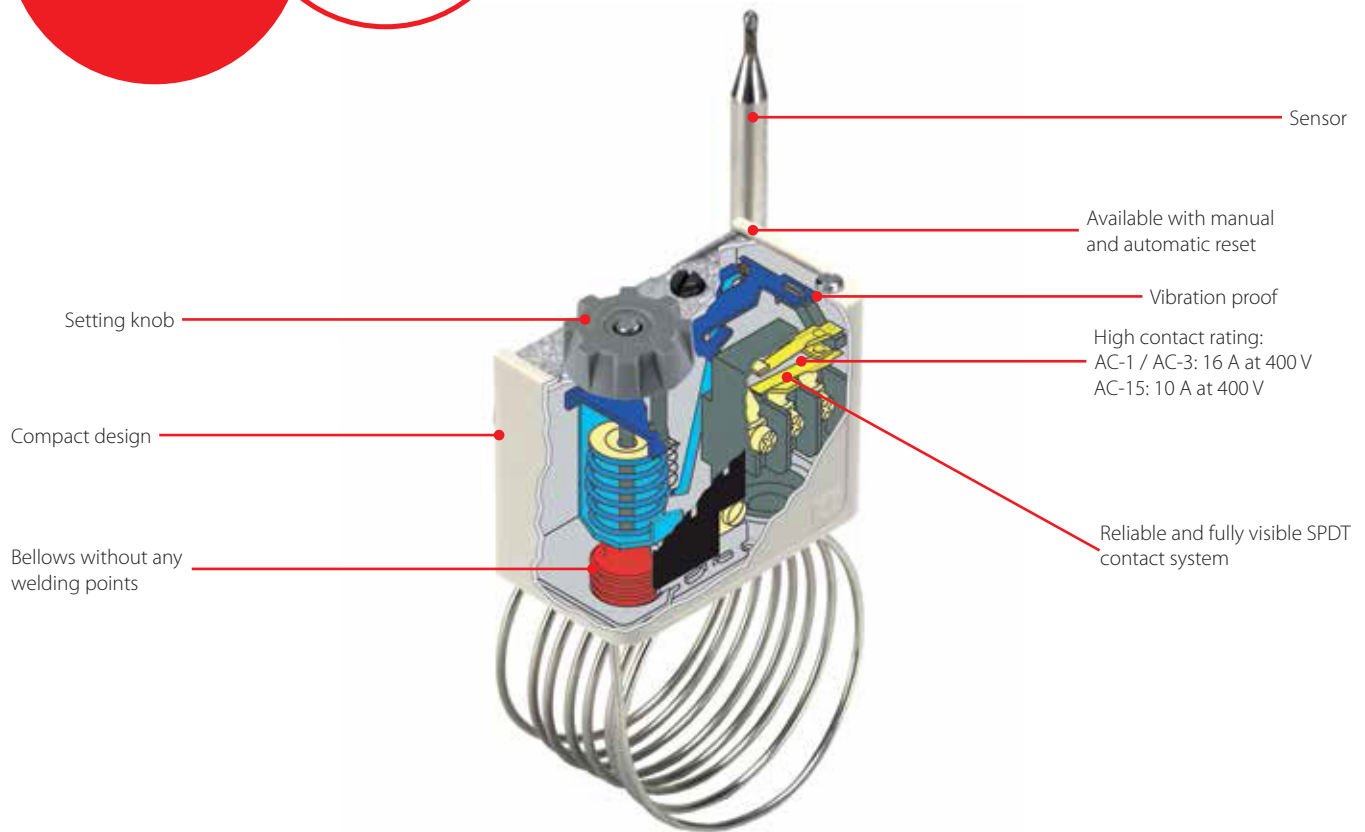
### Parts & accessories

Type	Description	Code no.
Mounting Brackets	Wall Bracket Flat	060-105566
	Angle Bracket	060-105666
Capillary (inc 1/4" flare nuts)	1 metre capillary with flare nuts	060-019166
IP55 Enclosure	Single for KP1, KP5, KPR5	060-033066
	Double for KP15, KP17	060-035066
OEM KP Controls (including capillary and bracket)	KP1 Auto incl. capillary and angle bracket	060-110566
	KP5 Auto incl. capillary and angle bracket	060-001891
	KP15 A/Auto incl. capillary and angle bracket	060-119991
	KP15 A/Auto incl. capillary and angle bracket	060-000791
KPR5 HP Control (condensor fan control)	KPR5 Auto 1/4 flare	060-117466
KP6W 8- 42 bar range (CO2 & R410A)	KP6W Auto 1/4 flare 8 – 42 bar, IP44	060-519091
	KP6B Manual 1/4 flare 8 – 42 bar, IP30	060-519191

# KP, Thermostat

KP thermostats are single-pole, double-throw (SPDT) temperature-operated electric switches. KP thermostats can be connected directly to a single-phase AC motor of up to approximately 2 kW or installed in the control circuit of DC motors and large AC motors.

KP thermostats are used primarily for regulation, but also for safety monitoring systems, and are available with vapour charge or with adsorption charge. With vapour charge the differential is very small. KP thermostats with adsorption charge are widely used to give frost protection.



## Facts

### Applications:

- Frost protection
- Defrost control
- Case and Room control

### Benefit:

- Available with capillary sensor, air sensor or cylindrical pocket sensor
- Different sensing elements - As experts in charging technologies Danfoss offers temperature switches that operate in a wide temperature range
- Available with vapour charge or with adsorption charge

# Technical data and ordering


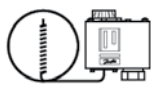



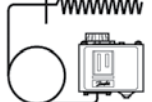
## KP

### Temperature Control - Thermostats

Charge	Type	Sensor type	Setting range (°C)	Differential Δt		Reset	Max. Sensor temp. HP (°C)	Capillary tube length (m)	Code no.
				Lowest temp. (°C)	Highest temp. (°C)				
Vapour	KP 61	A	-30 – 15	5.5 – 23	1.5 – 7	Aut.	120	2	060L110066
	KP 63	B	-50 – -10	10 – 70	2.7 – 8	Aut.	120	2	060L110866
	KP 68	C 1	-5 – 35	4.5 – 25	1.8 – 7	Aut.	120	-	060L111166
	KP 69	B	-5 – 35	4.5 – 25	1.8 – 7	Aut.	120	2	060L111266
Absorbion	KP 71	E 2	-5 – 20	3 – 10	2.2 – 9	Aut.	80	2	060L111366
	KP 73	E 1	-25 – 15	12 – 70	8 – 25	Aut.	80	2	060L111766
	KP 73	D 1	-25 – 15	3.5 – 20	3.25 – 18	Aut.	80	2	060L114366
	KP 75	F	0 – 35	3.5 – 16	2.5 – 12	Aut.	110	2	060L112066
	KP 77	E 3	20 – 60	3.5 – 10	3.5 – 10	Aut.	130	2	060L112166

## KP

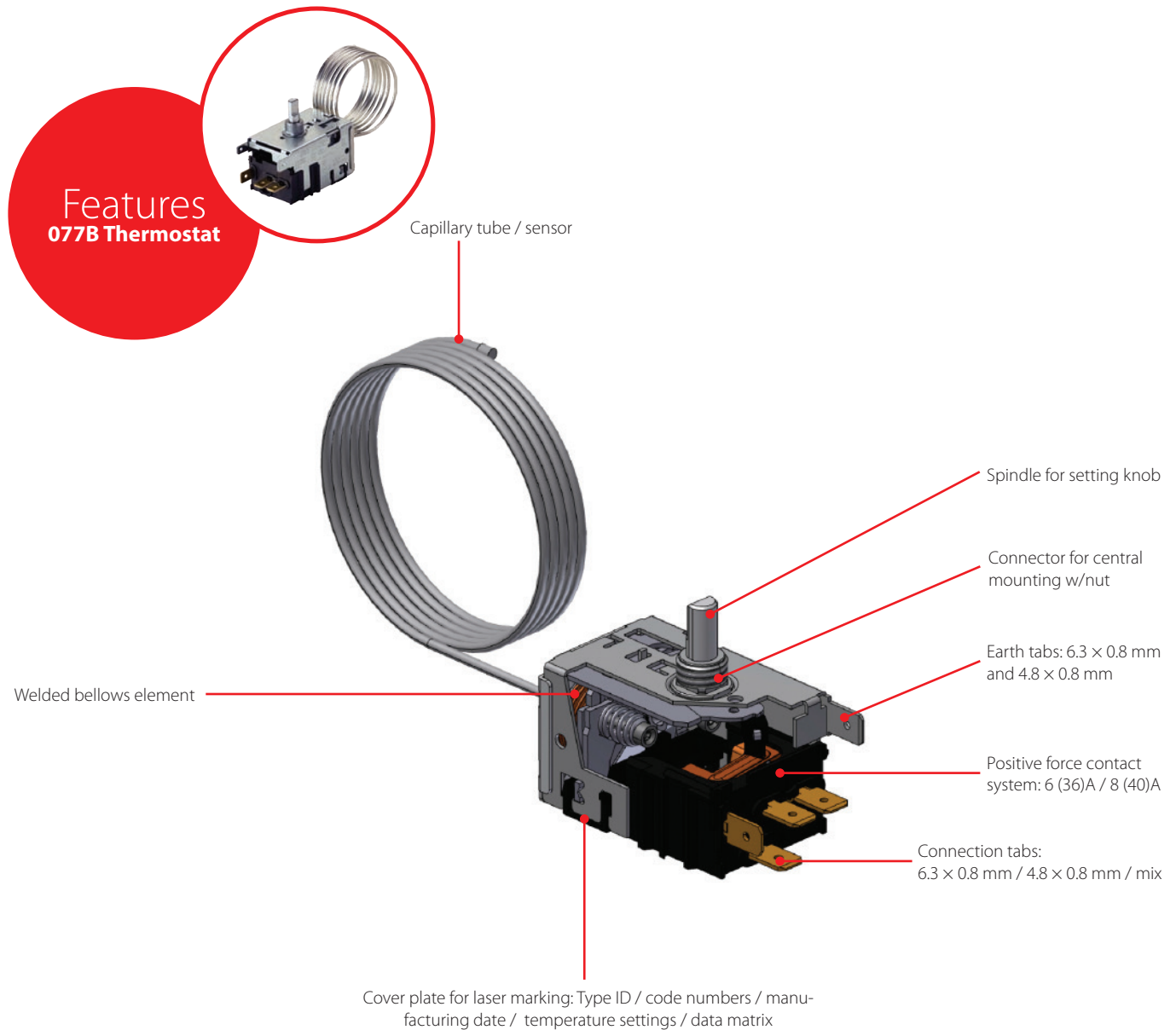
### Thermostat sensor types

A	B	C	D	E	F
					
Straight capillary tube	ø9.5 × 70 mm remote air coil	C1: ø40 × 30 mm air coil C2: ø25 × 67 mm air coil (integral with thermostat)	D1: ø10 × 85 mm double contact remote sensor D2: ø16 × 170 mm double contact remote sensor Note! Cannot be used in sensor pocket	E1: ø6.4 × 95 mm remote sensor E2: ø9.5 × 115 mm remote sensor E3: ø9.5 × 85 mm remote sensor	ø25×125 mm remote duct coil

# 077B, Thermostat

077B thermostats have NC (Normally Closed) main contacts; i.e. they cut out the compressor current circuit on decreasing temperature. 077B thermostats are designed to operate at least 300,000 cycles at full load (6/36A and 8/40A respectively); internal quality audits

reinforced product performance by metering over 1,000,000 cycles. 077B thermostats are designed for temperature control in refrigerators and freezers and can be used as an evaporator or a room thermostat.



## Facts

### Application:

- Refrigerators
- Upright and chest freezers
- Liquid and bottle coolers
- Small commercial refrigeration

- World class quality with high CpK values that ensures a long and trouble-free lifetime
- Available with Enclosed Brake Device (EBD) for use in household appliances charged with hydrocarbon gases such as R600a or R290
- Available with a wide range of standard functions, various extra functions and accessories
- Available with 6.3 × 0.8 mm, 4.8 × 0.8 mm terminals or a combination
- Approved by recognized authorities for

specific applications and geographical markets

- Danfoss Appliance Controls are certified by Bureau Veritas in ISO14001, ISO9001 and OHSAS18001

# Technical data and ordering

## 077B

### Service thermostats

Application	No.	Temperatures (°C)				Accessories						Capillary tube length (m)	Remarks	Code no.
		Warm pos. cut-in / cut out	Cold pos. cut-in / cut out	Signal	Defrosting	Washer	Small knob	Push-button	Mounting bracket	Seal cap	Small parts			
Refrigerators	1	2 / -5.5	-13.5 / -25 *)	-	-	x	x	-	x	-	x	1.3	-	077B7001 <sup>1)</sup>
Refrigerators with pushbutton defrost	2	0 / -7.5 *)	-11 / -21	-	6	x	x	x	x	-	x	1.3	-	077B7002
Refrigerators with automatic defrost	3	3.5 / -11	3.5 / -27.5 *)	-	-	x	x	-	x	-	x	1.6	With auxillary switch	077B7003 <sup>1)</sup>
Absorption refrigerators	4	3.5 / -1 *)	-5 / -11	-	-	x	x	-	x	-	x	1.5	With auxillary switch	077B7004 <sup>1)</sup>
Ice-cream cabinets and freezers without signal	5	-7.5 / -15	-21 / -32.5 *)	-	-	-	x	-	x	x	x	2.3	-	077B7005 <sup>1)</sup>
Freezers with active signal	6	-10 / -17 *)	-24 / -34.5	-6 *)	-	-	x	-	x	x	x	2.3	With active signal	077B7006 <sup>1)</sup>
Freezers with passive signal	7	-10 / -17 *)	-24 / -34.5	-6 *)	-	-	x	-	x	x	x	2.3	With passive signal	077B7007
Bottle and liquid coolers	8	11.5 / 6 *)	-1 / -8.5	-	-	x	x	-	x	x	x	2.0	-	077B7008 <sup>1)</sup>

\*) Adjustment position

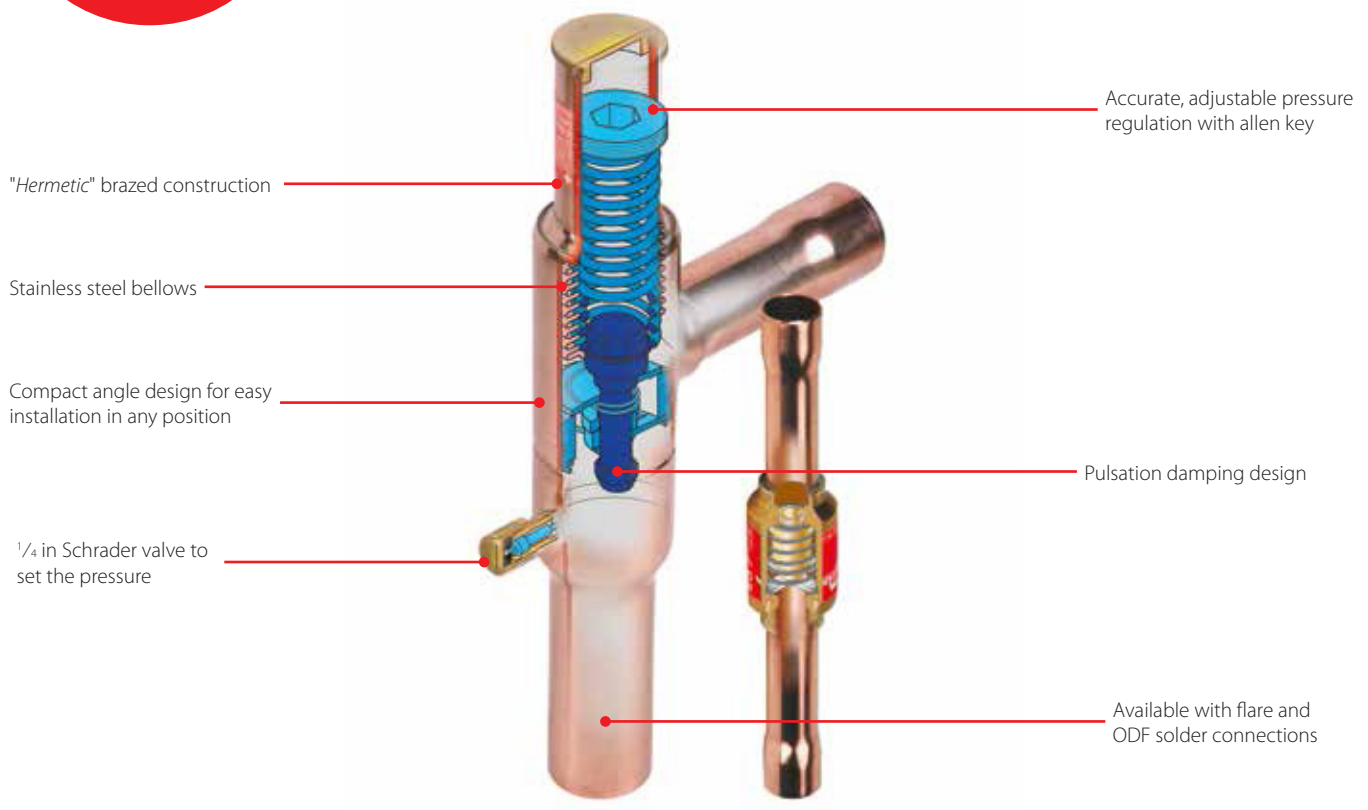
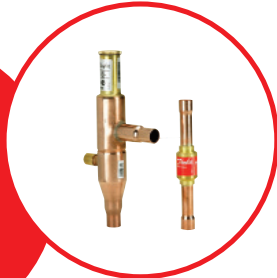
<sup>1)</sup> With EBD (from January 2017)

# KVR / NRD, Condensing pressure regulator / Differential pressure valve

KVR condensing pressure regulator valves can be mounted on either the gas or liquid side of the condenser in refrigeration and air conditioning systems.

They are used to maintain a constant and sufficiently high condensing pressure with systems using air-cooled condensers. KVR condensing pressure regulators can also be used with valve types NRD or KVD to assure that adequate pressure is maintained on the receiver.

## Features KVR / NRD



## Facts

### Applications:

- Traditional refrigeration
- Air conditioning units
- transport refrigeration

### Maximum working pressure:

- KVR: PS / MWP = 28 bar / 406 psig
- NRD: PS / MWP = 46 bar / 667 psig

### Refrigerants:

- R1270
- R134a
- R22
- R290
- R404A
- R407A
- R407C
- R407F
- R422B
- R422D
- R448A
- R449A
- R450A
- R452A
- R507A
- R513A
- R600
- R600a
- R1234ze

### Capacity range:

- 3.4 – 40 TR / 12 - 140 kW based on liquid or hot gas

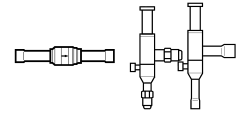
### Benefit:

- The regulators are the most compact on the market
- Reliable design and very easy to adjust
- KVR can be installed either in discharge line or liquid line

# Technical data and ordering

## KVR / NRD

Condensing pressure regulator / Differential pressure valve



Type	Evaporator capacity								Solder, ODF connection <sup>3)</sup>		Code no.
	Rated liquid capacity in kW <sup>1)</sup>				Rated hot gas capacity in kW <sup>1)</sup>				in.	mm	
	R22	R134a	R404A / R507	R407C	R22	R134a	R404A / R507	R407C			
KVR 12	50.4	47.3	36.6	54.4	13.2	11.6	12	14.3	1/2	-	034L0093
KVR 15	50.4	47.3	36.6	54.4	13.2	11.6	12	14.3	5/8	16	034L0097
KVR 22	50.4	47.3	36.6	54.4	13.2	11.6	12	14.3	7/8	22	034L0094
KVR 28	129	121	93.7	139.3	34.9	30.6	34.9	37.7	1 1/8	-	034L0095
KVR 35	129	121	93.7	139.3	34.9	30.6	34.9	37.7	1 3/8	35	034L0100
NRD	-	-	-	-	-	-	-	-	1/2	-	020-1132

1) Rated capacity is based on:

- evaporating temperature  $t_e = -10\text{ }^\circ\text{C} / 14\text{ }^\circ\text{F}$

- condensing temperature  $t_c = 30\text{ }^\circ\text{C} / 110\text{ }^\circ\text{F}$

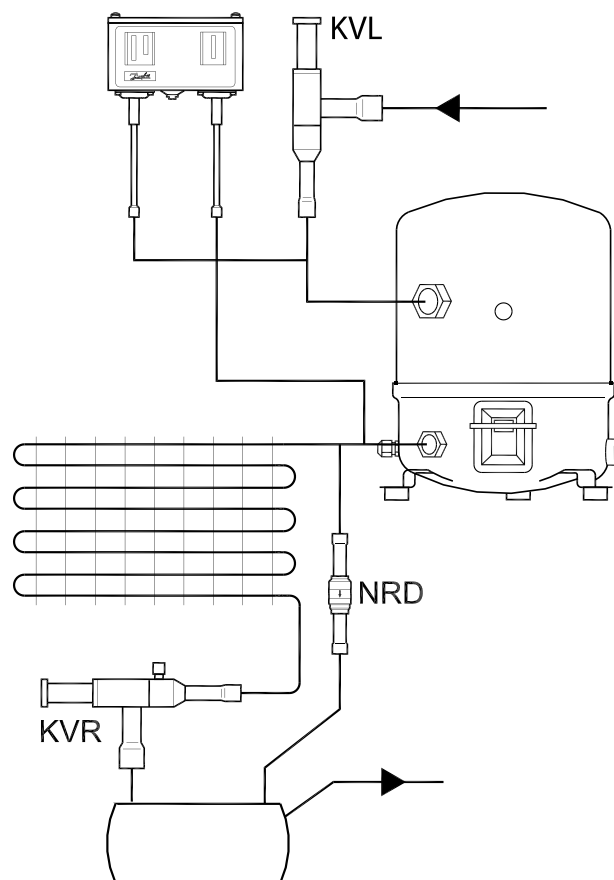
- pressure drop across the valve  $\Delta p = 0.2\text{ bar} / 3\text{ psi}$  for liquid capacity,  $\Delta p = 0.4\text{ bar} / 6\text{ psi}$  for hot gas capacity, offset =  $3\text{ bar} / 45\text{ psi}$

2) KVR are delivered without flare nuts. Separate flare nuts can be supplied: 1/2 in / 12 mm - code no. 011L1103, 3/8 in / 16 mm - code no. 011L1167.3

3) The connection dimensions chosen must not be too small, as gas velocities in excess of 130 ft/s at the inlet of the regulator can give flow noise.

To select the product for other conditions or refrigerants, use Danfoss Coolselector\*2.

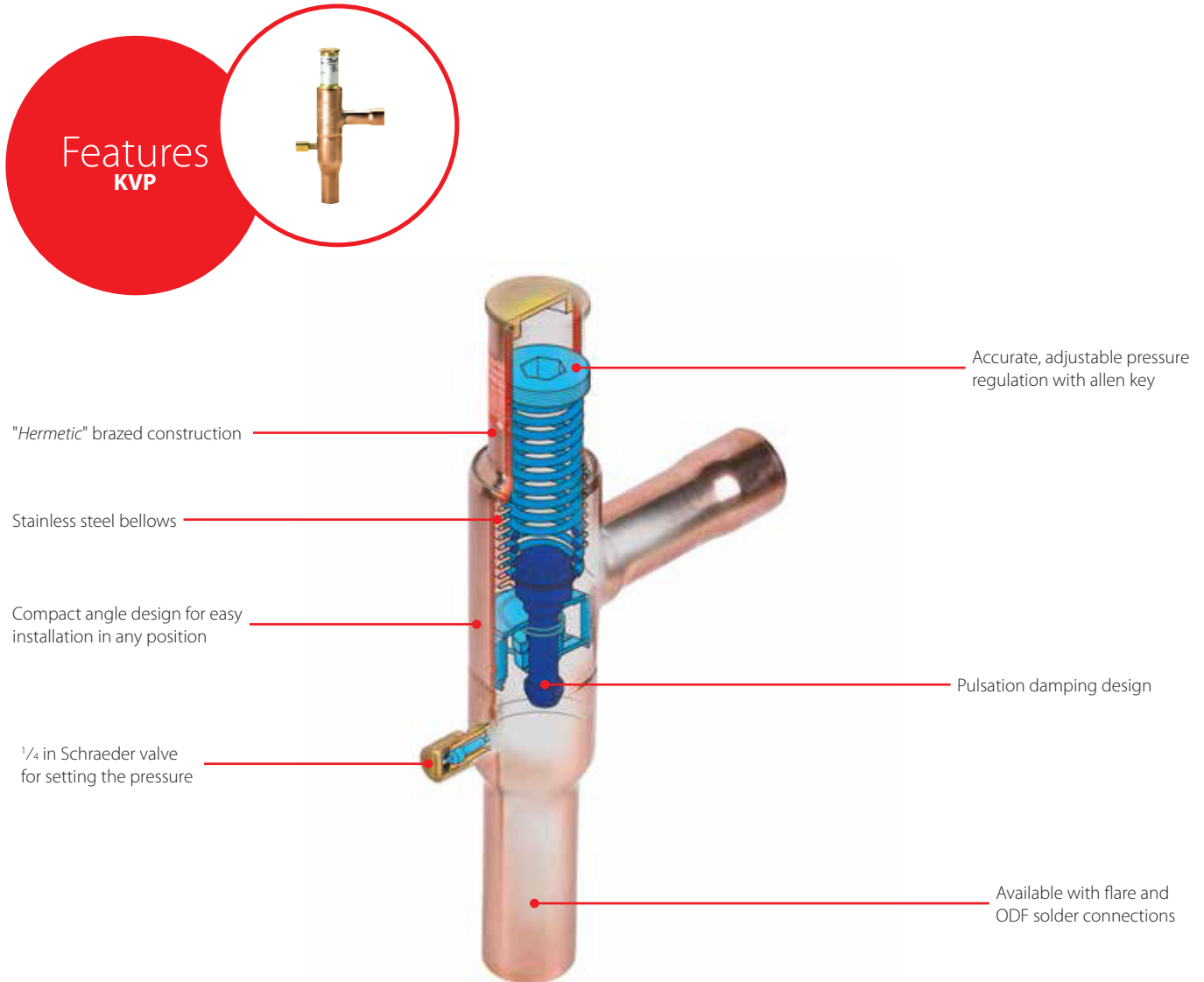
## Application example



# KVP, Evaporator pressure regulator

KVP evaporating pressure regulators are mounted in the suction line of refrigeration and air conditioning systems. They are used to maintain a constant pressure corresponding to a constant temperature on the evaporator.

They also protect against too low an evaporating pressure by throttling down when the pressure falls below the set value.



## Facts

### Applications:

- Traditional refrigeration
- Air conditioning units
- Cold rooms
- Display cabinets

### Maximum working pressure:

- 18 bar / 260 psig

### Refrigerants:

- R1270
- R134a
- R22
- R290
- R404A
- R407A
- R407C
- R407F
- R422B
- R422D
- R448A
- R449A
- R450A
- R452A
- R507A
- R513A
- R600
- R600a
- R1234ze

### Capacity range:

- 0.9 – 2.6 TR / 2.8 – 7.9 kW

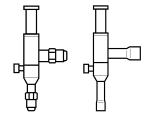
### Benefit:

- Wide capacity and operating range.
- Protection against a too low evaporating pressure: the regulator closes when the pressure in the evaporator falls below the set value
- The KVP can be used to differentiate the evaporating pressures in two or more evaporators in systems with one compressor

# Technical data and ordering

## KVP

### Evaporator pressure regulator



Type	Rated capacity in kW <sup>1)</sup>				Rated hot gas capacity in kW <sup>1)</sup>		Code no.	Solder, ODF connection		Code no.
	R22	R134a	R404A/R507	R407C	in.	mm		in.	mm	
KVP 12	4	2.8	3.6	3.7	1/2	12	034L0021	1/2	-	034L0023
	4	2.8	3.6	3.7	-	-	-	-	12	034L0028
KVP 15	4	2.8	3.6	3.7	5/8	16	034L0022	5/8	16	034L0029
KVP 22	4	2.8	3.6	3.7	-	-	-	7/8	22	034L0025
KVP 28	8.6	6.1	7.7	7.9	-	-	-	1 1/8	-	034L0026
KVP 35	8.6	6.1	7.7	7.9	-	-	-	1 3/8	35	034L0032

1) Rated capacity is the capacity of the regulator at

- Evaporating temperature  $t_e = -10\text{ }^\circ\text{C}$ ,

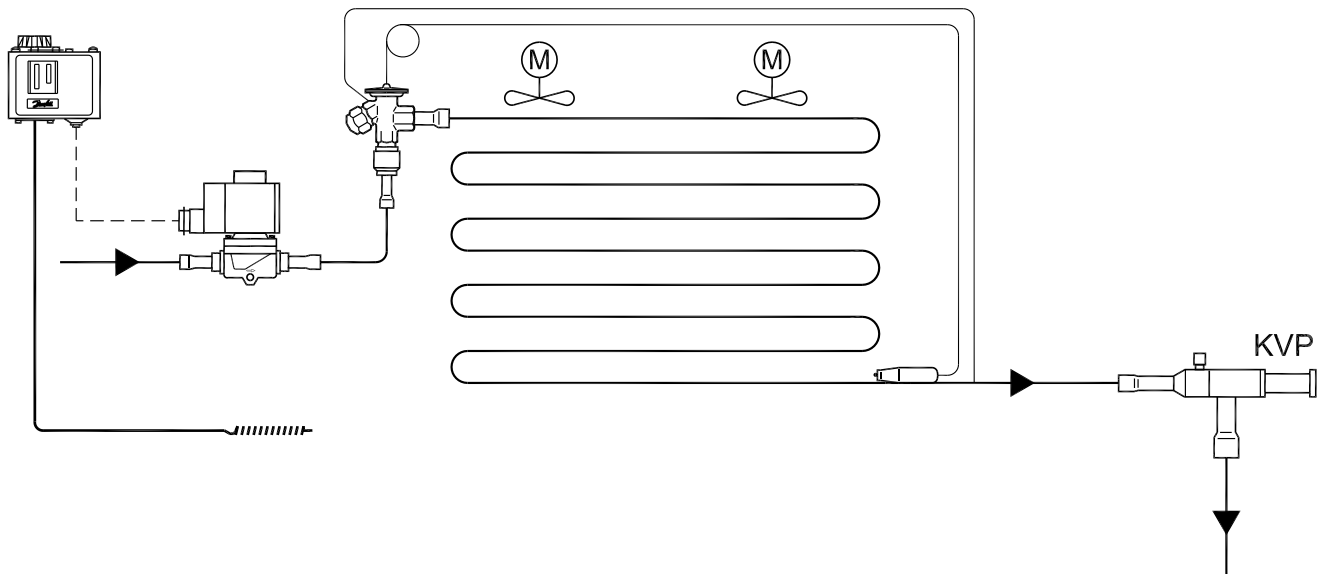
- Condensing temperature  $t_c = +25\text{ }^\circ\text{C}$

- Pressure drop in regulator  $\Delta p = 0.2\text{ bar}$ , offset = 0.6 bar

2) Supplied without flare nuts. Separate flare nuts can be supplied:

1/2 in./12 mm, code no. 011L1103, 5/8 in./16 mm, code no. 011L1167.

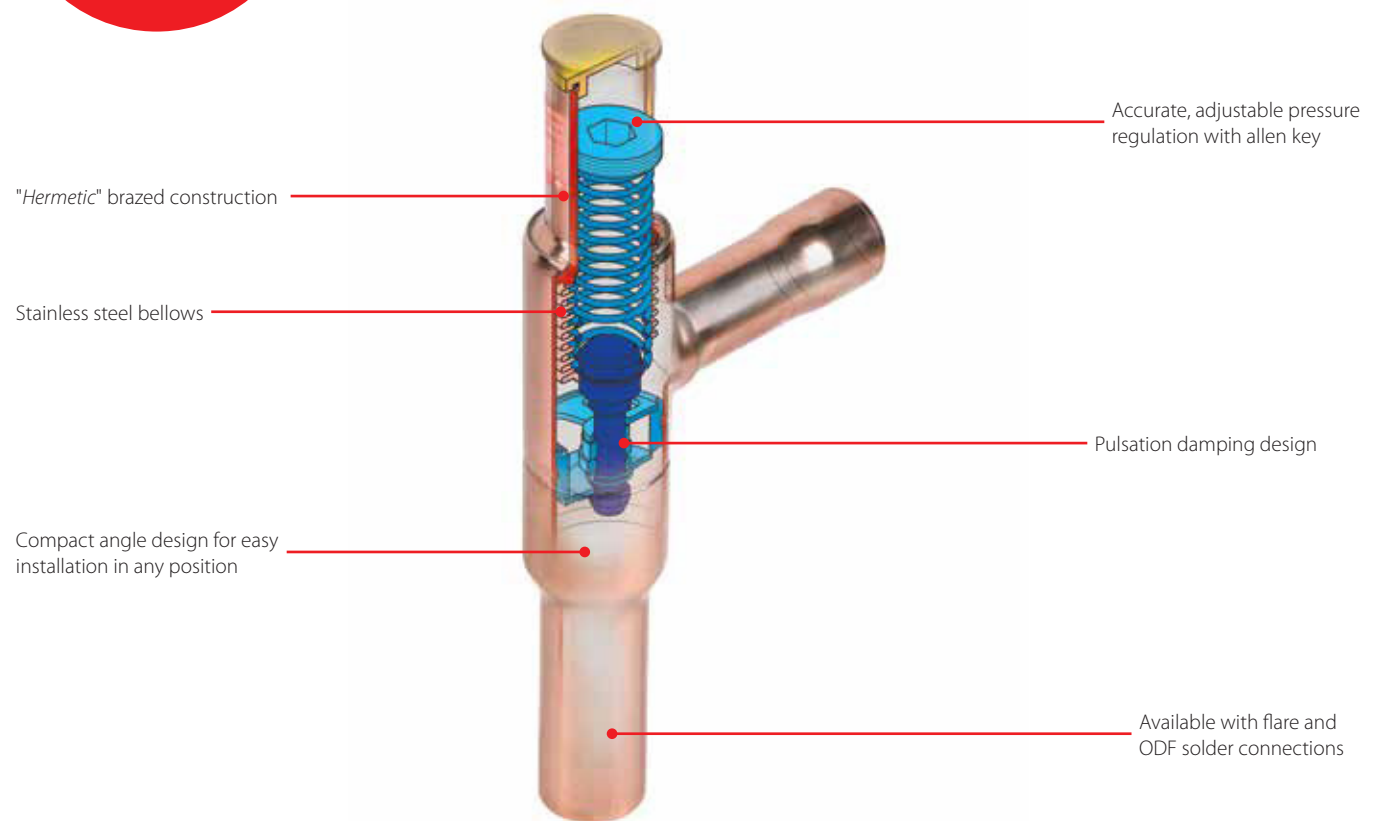
### Application example



# KVL, Crankcase pressure regulator

KVL crankcase pressure regulators valves are installed in the suction line ahead of the compressor.

KVL protects the compressor motor against overload during start-up after long standstill periods or after defrost periods (high pressure in evaporator).



## Facts

### Applications:

- Traditional refrigeration
- Air conditioning units
- Transport refrigeration

### Maximum working pressure:

- 18 bar / 260 psig

### Refrigerants:

- R1270
- R134a
- R22
- R290
- R404A
- R407A
- R407C
- R407F
- R407H
- R422B
- R422D
- R448A
- R449A
- R449B
- R450A
- R452A
- R507A
- R513A
- R600
- R600a
- R1234ze
- R454C
- R455A
- R515B
- R516A

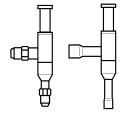
### Capacity range:

- 5.3 – 16.4 kW

### Benefit:

- Wide capacity and operating range
- Protects the compressor against electrical motor overloading

# Technical data and ordering



## KVL

### Crankcase pressure regulator

Type	Rated capacity in kW <sup>1)</sup>				Flare connection <sup>2)</sup>	Code no.	Solder, ODF connection	Code no.
	R22	R134a	R404A/R507	R407C			in.	
KVL 12	7.1	5.3	6.3	6.4	1/2	034L0041	1/2	034L0043
KVL 15	7.1	5.3	6.3	6.5	5/8	034L0042	5/8	034L0049
KVL 22	7.1	5.3	6.3	6.5	-	-	7/8	034L0045
KVL 28	17.8	13.2	15.9	16.4	-	-	1 1/8	034L0046
KVL 35	17.8	13.2	15.9	16.4	-	-	1 3/8	034L0052

1) Rated capacity is the capacity of the regulator at

- Evaporating temperature  $t_e = -10\text{ }^\circ\text{C}$ ,

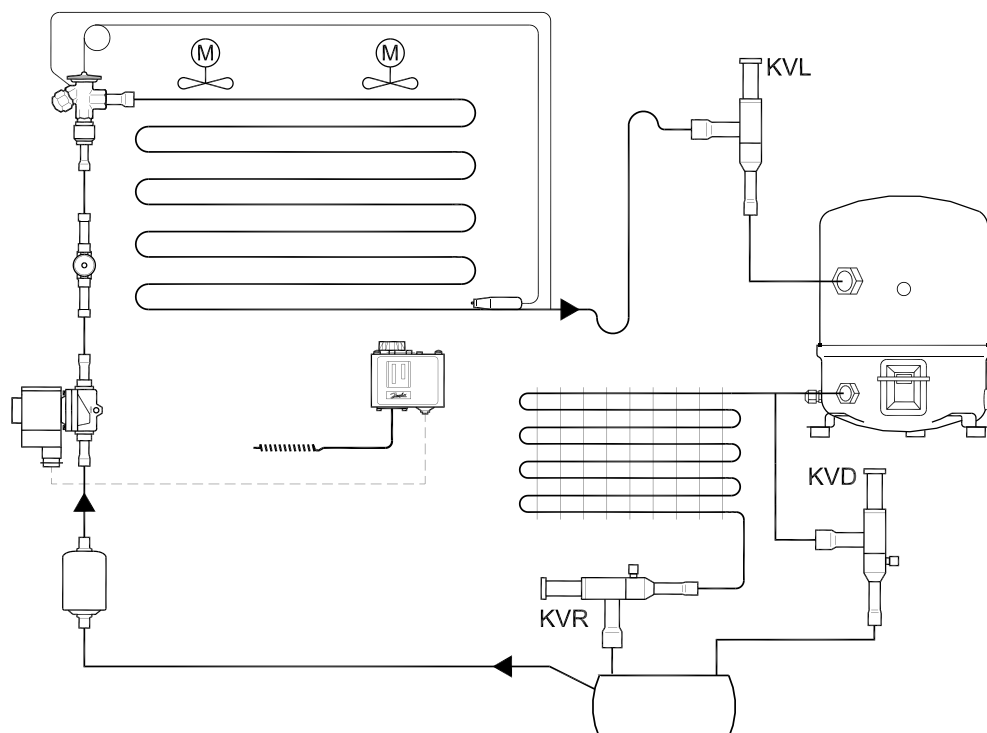
- Condensing temperature  $t_c = +25\text{ }^\circ\text{C}$

- Pressure drop in regulator  $\Delta p = 0.2\text{ bar}$ , offset = 0.6 bar

2) Supplied without flare nuts. Separate flare nuts can be supplied:

1/2 in. / 12 mm, code no. 011L1103, 5/8 in. / 16 mm, code no. 011L1167.

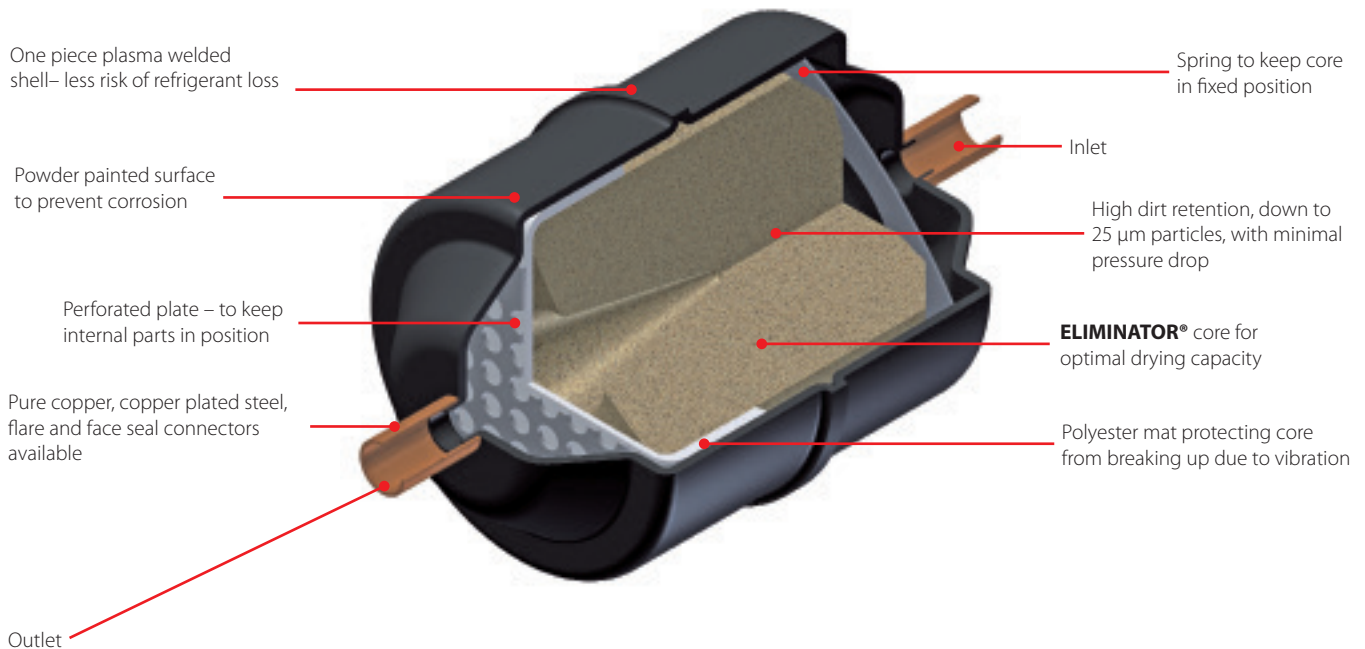
### Application example



# DML, Hermetic filter drier (Liquid line filter)

DML hermetic filter driers are optimised for refrigerants with mineral or benzene oils. The filter driers are hermetic and approved for up to 46 bar, depending on type.

The filter driers are delivered with flare or copper / copper plated steel connections.



## Facts

### Applications:

- Traditional refrigeration
- Air conditioning units

### Maximum working pressure:

- Up to 46 bar / 667 psig

### Size:

- Wide range from 1.5 - 75 cubic inches

### Refrigerants:

- R22
- R32
- R134a
- R404A
- R410A
- R407C
- R23
- R600
- R600a
- R744
- R1234yf
- R1234ze
- R407f
- R290
- R452A
- R444B
- R449A
- R448A
- R450A

### Connections:

- Available in flare, solder

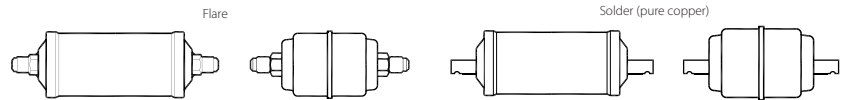
### Benefit:

- Corrosion resistant powder-painted finish

# Technical data and ordering

## DML

### Hermetic filter drier

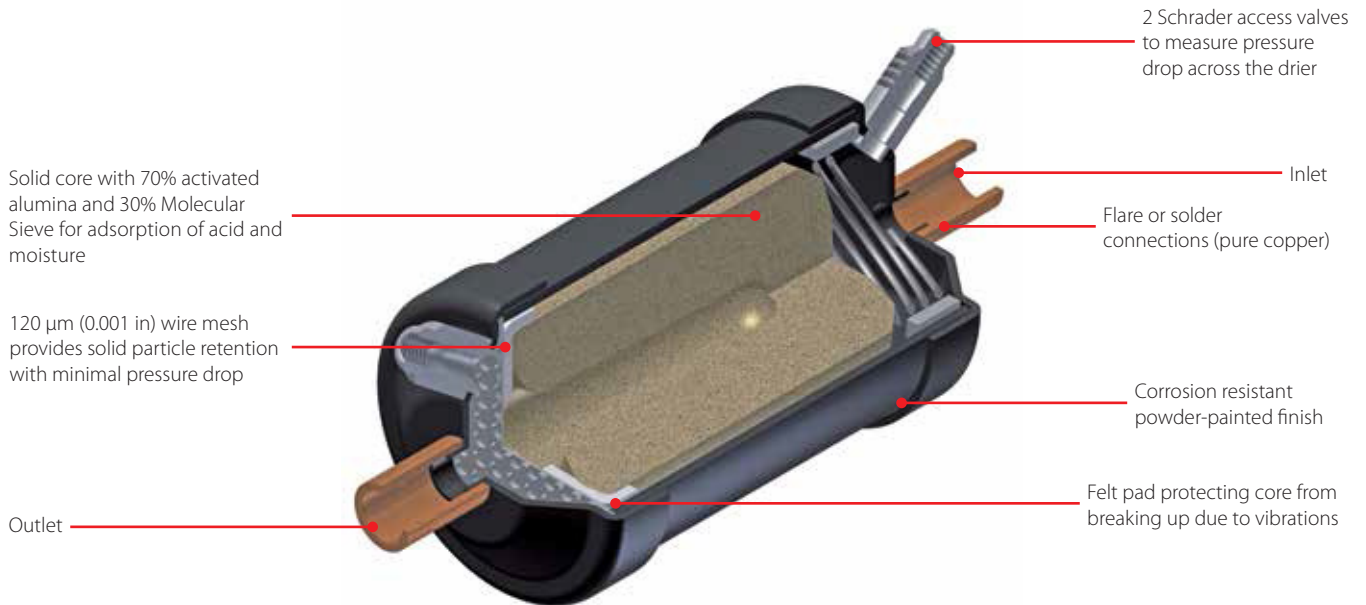


Type	Size (in.)	Size (mm)	Liquid capacity (kW)							Code no.	
			R134a	R404A	R507	R22	R407C	R410A	R32	Flare	Solder
DML 032/032s	1/4	6	6.7	5.01	4.86	7.45	7.09	7.43	10.86	023Z503591	023Z504891
DML 033/033s	3/8	10	12.85	9.86	9.57	14.46	13.84	14.67	21.4	023Z503691	023Z505091
DML 052/052s	1/4	6	7.67	5.62	5.45	8.45	8.02	8.32	12.18	023Z503791	023Z505391
DML 053/053s	3/8	10	12.87	9.81	9.52	14.44	13.8	14.58	21.28	023Z503891	023Z505491
DML 082/082s	1/4	6	7.68	5.44	5.27	8.32	7.85	8.02	11.77	023Z503991	023Z505791
DML 083/083s	3/8	10	14.19	10.98	10.66	16.03	15.37	16.35	23.85	023Z504091	023Z505891
DML 084/084s	1/2	12	28.61	21.33	20.68	31.76	30.24	31.63	46.24	023Z504191	023Z506191
DML 085/085s	5/8	16	43.81	35.32	34.33	50.47	48.71	52.83	76.81	023Z507391	023Z507291
DML 162/162s	1/4	6	7.68	5.43	5.26	8.31	7.85	8.01	11.75	023Z504291	023Z506391
DML 163/163s	3/8	10	16.33	11.18	10.82	17.41	16.33	16.43	24.16	023Z504391	023Z506491
DML 164/164s	1/2	12	32.19	23.54	22.81	35.4	33.6	34.83	50.99	023Z504491	023Z506791
DML 165/165s	5/8	16	44.64	36.59	35.59	51.82	50.16	54.83	79.63	023Z504591	023Z506891
DML 166/166s	3/4	19	45.53	37.37	36.35	52.89	51.2	56.01	81.33	023Z504691	023Z507191
DML 303/303s	3/8	10	15.7	10.56	10.2	16.59	15.52	15.48	22.79	023Z0049	023Z0067
DML 304/304s	1/2	12	32.51	25	24.26	36.63	35.06	37.19	54.26	023Z0050	023Z0068
DML 305/305s	5/8	16	45.71	36.96	35.93	52.72	50.91	55.29	80.38	023Z0051	023Z0069
DML 306/306s	3/4	19	43.73	39.89	38.95	53.22	52.49	60.57	87.22	023Z0193	023Z0070
DML 414/414s	1/2	12	33.39	26.45	25.7	38.15	36.7	39.48	57.48	023Z0109	023Z0111
DML 415/415s	5/8	16	55.48	41.84	40.58	61.92	59.08	62.11	90.74	023Z0110	023Z0112

# DAS, Hermetic burn-out filter drier

DAS **ELIMINATOR**® hermetic burn-out filter driers are used in the suction line to clean up refrigeration and air conditioning systems with fluorinated refrigerants after a compressor motor burn-out.

The solid core, which is composed of 70% activated alumina and 30% Molecular Sieve, adsorbs harmful acids as well as moisture, in order to protect the new compressor against failure.



## Facts

### Applications:

- Traditional refrigeration
- Air conditioning units

### Maximum working pressure:

- Up to 35 bar / 500 psig

### Size:

- Wide range from 8 - 60 cubic inches

### Refrigerants:

- R22
- R407C
- R410A
- R134a
- R404A
- R507

### Connections:

- Available in flare, solder

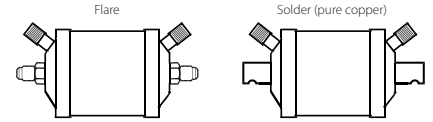
### Benefit:

- Corrosion resistant powder-painted finish

# Technical data and ordering

## DAS

Hermetic burn-out filter drier

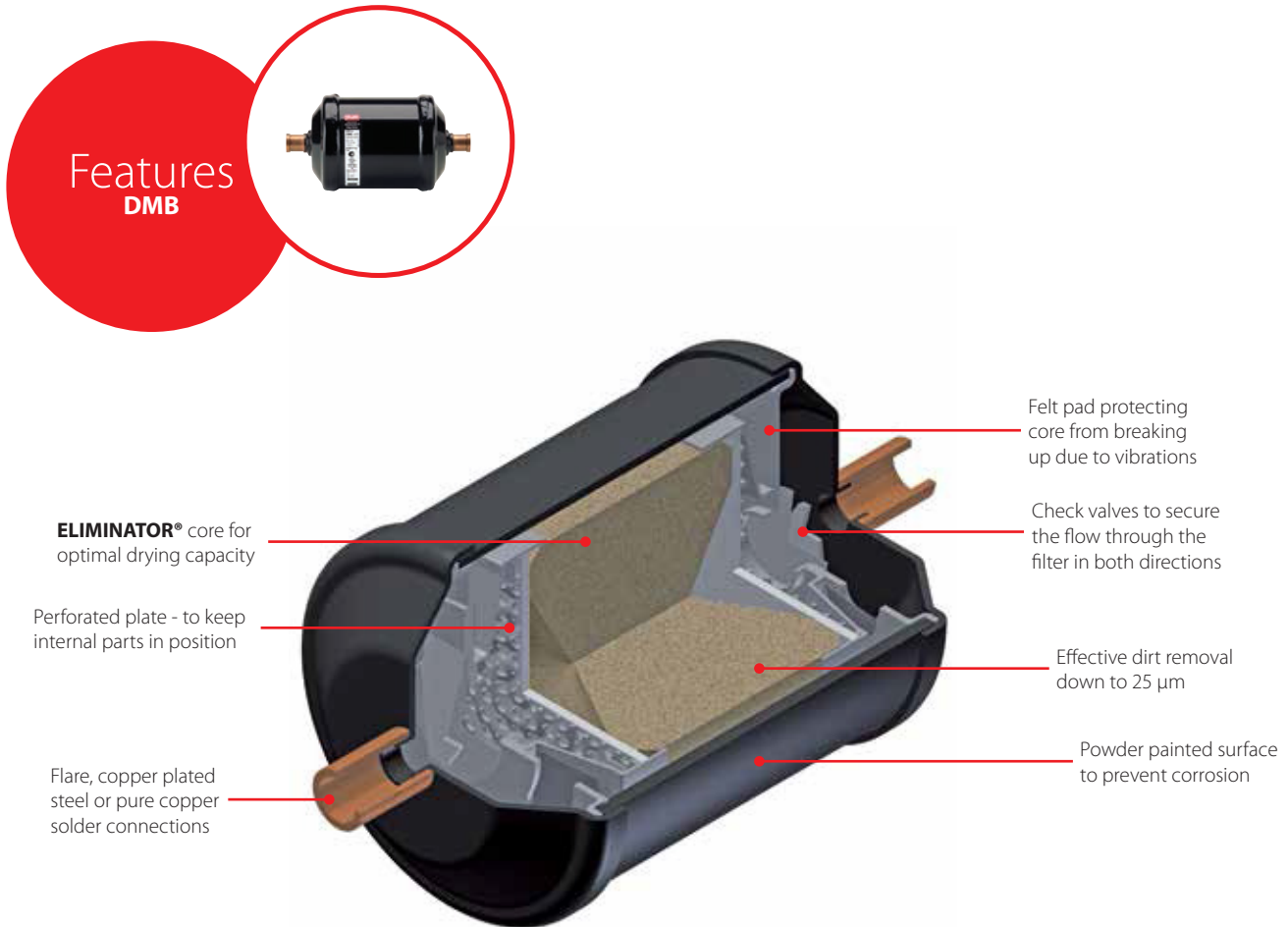


Type	Size (in.)	Rated capacity			Acid capacity (g)	Max Working Pressure PS (bar)	Code no.	
		R22/R407C/R410A	R134a	R404A / R507			Flare	Solder
		(kW)						
DAS 083	3/8	6	3.5	4.5	3.8	35	023Z1001	023Z1003
DAS 084	1/2	10	5.5	8	3.8	35	023Z1002	023Z1004
DAS 085	5/8	14.5	9	12.5	3.8	35	-	023Z1005
DAS 086	3/4	19	11.5	16.5	3.8	35	-	023Z1006
DAS 164	1/2	10.5	6	8.5	8.6	35	023Z1007	023Z1009
DAS 165	5/8	15	9.5	13	8.6	35	023Z1008	023Z1010
DAS 166	3/4	20	12	17	8.6	35	-	023Z1011
DAS 167	7/8	22	13.5	19	8.6	35	-	023Z1012
DAS 305	5/8	18	11	15	18.2	35	-	023Z1013
DAS 306	3/4	22	14	19	18.2	35	-	023Z1014
DAS 307	7/8	26	16	22	18.2	35	-	023Z1015
DAS 309	1 1/8	31	20	27	18.2	35	-	023Z1016
DAS 417	7/8	30	18	25	24.3	35	-	023Z1017
DAS 419	1 1/8	35	22	30	24.3	35	-	023Z1018
DAS 607	7/8	20	12	17	36.5	35	-	023Z1019
DAS 609	1 1/8	-	-	-	-	35	-	023Z1020

# DMB, Hermetic bi-flow filter drier

DMB **ELIMINATOR**® hermetic bi-flow filter drier series are for use in liquid lines on heat pumps, and have built-in check valves to ensure that refrigerant liquid flows through the filter drier from the outer side of the filter core towards the center. They ensure fast and effective adsorption of moisture as well as organic and inorganic acids, and all dirt particles are retained irrespective of flow direction.

DMB hermetic bi-flow filter driers contain a solid core consisting of 100% 3 Å Molecular Sieve, and are especially suitable for heat pumps with HFC refrigerants and polyolester oil with additives.



## Facts

### Applications:

- Traditional refrigeration
- Heat pumps
- Air conditioning units

### Maximum working pressure:

- 46bar

### Capacity range:

- 0.7 – 13.3 TR / 2.8 – 47 kW

### Refrigerants:

- R1234yf
- R1234ze
- R125
- R134a
- R22
- R407C
- R23
- R290
- R32
- R404A
- R407A
- R407F
- R410A
- R422B
- R422D
- R438A
- R444B
- R448A
- R449A
- R449B
- R450A
- R452A
- R452B
- R454B
- R455A
- R507A
- R513A
- R600

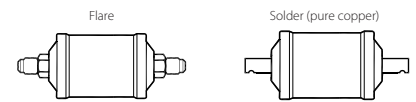
### Benefit:

- No dirt released by reversing the flow direction
- The check valves are not sensitive to dirt and give minimum restriction, irrespective of flow direction
- Use of hermetic bi-flow filter driers can save up to ten solder connections in heat pump systems. This reduces production costs and the number of potential leakage points

# Technical data and ordering

## DMB

Hermetic bi-flow filter drier



Type	Size		Liquid capacity (kW)						Code no.	
	in.	mm	R134a	R404A	R507	R22	R407C	R410A	Flare	Solder
DMB 082 / 82s	1/4	6	3.9	2.8	2.8	4.3	4.3	4.3	023Z1412	023Z1443
DMB 083 / 83s	3/8	10	7.4	5.3	5.3	8.2	8.2	8.2	023Z1411	023Z1442
DMB 084 / 84s	1/2	12	8.3	6	6	9.2	9.2	9.2	023Z1410	023Z1441
DMB 163 / 163s	3/8	10	18	13	13	20	20	20	023Z1415	023Z1446
DMB 164 / 164s	1/2	12	28	20	20	32	32	32	023Z1414	023Z1445
DMB 165 / 165s	5/8	16	37	29	29	40	40	40	023Z1413	023Z1444
DMB 304 / 304s	1/2	12	28	20	20	31	31	31	-	023Z1449
DMB 305 / 305s	5/8	16	38	28	28	42	42	42	023Z1417	023Z1448
DMB 307s	7/8	-	43	32	32	47	47	47	-	023Z1447

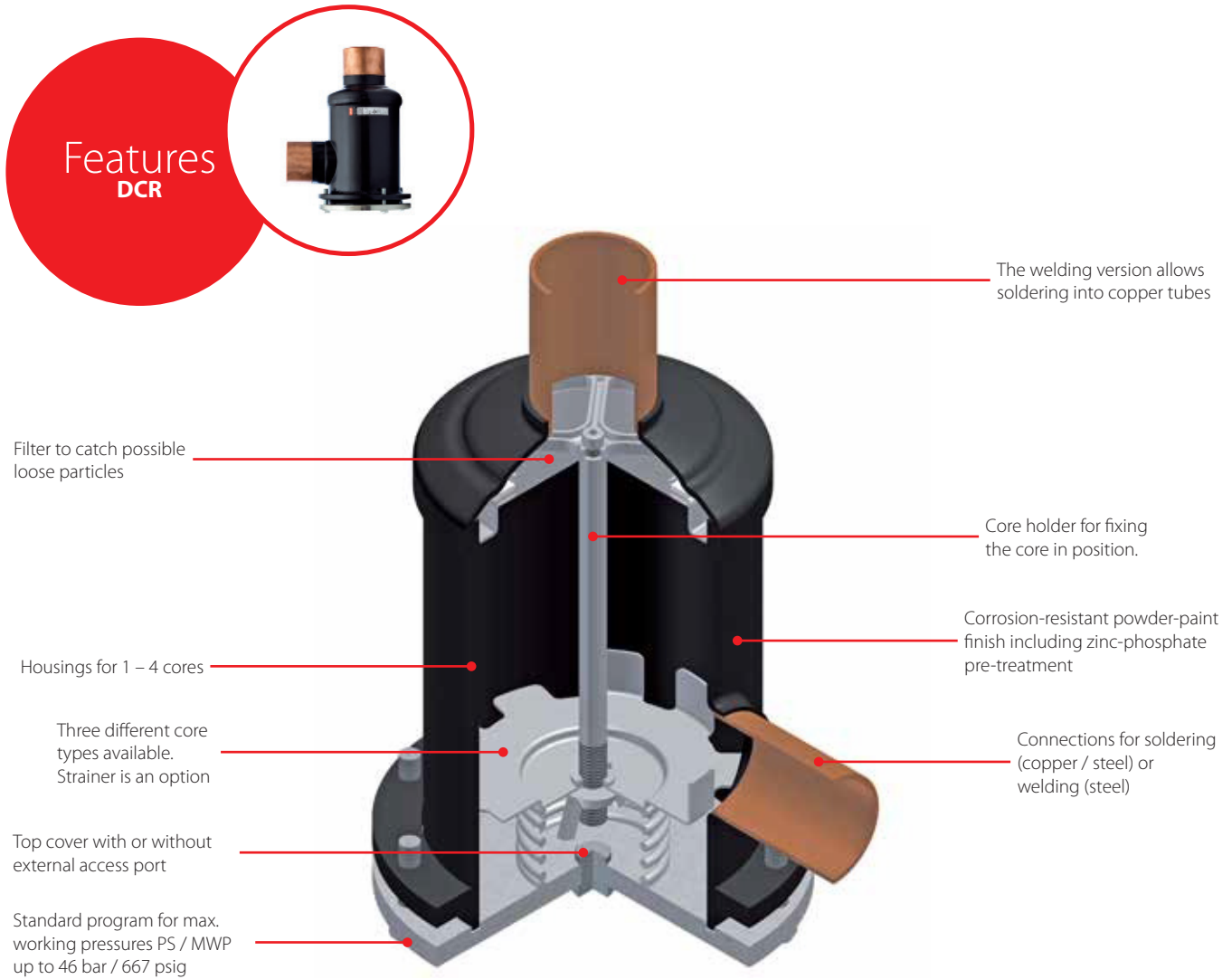
# DCR, Filter drier with replaceable solid core

DCR **ELIMINATOR**® filter driers with replaceable solid core protect refrigeration, freezing and air conditioning systems from moisture, acids and solid particles. Besides being able to meet the demanding requirements of high working pressure levels when operating with R410A thanks to replaceable solid cores the DCR programme offers flexibility with respect to different applications.

Core types:

- 48-DC for HFC, HCFC systems and mineral or AB oils
- 48-DM for HFC, HCFC systems and POE or PAG oils
- 48 DA for acid adsorption after burnout
- 48-F strainer for retaining dirt

Cores / inserts are ordered separately.



## Facts

### Applications:

- Traditional refrigeration
- Air conditioning units

### Maximum working pressure:

- 35 / 46 bar (receiver / drier application)

### Refrigerants:

- R22
- R32
- R134a
- R404A
- R410A
- R407C
- R23
- R600
- R600a
- R1234yf
- R1234ze
- R407f
- R290
- R452A
- R444B
- R449A
- R448A
- R450A depending on the core

### Connections:

- Solder

### Benefit:

- Highly efficient dirt retaining capabilities on both the suction and the liquid line

# Technical data and ordering

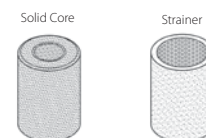
## DCR

Filter drier with replaceable solid core

Type	Number of core	Size		Max. working pressure PS (bar)	Code no.
		in.	mm		Solder
DCR 0485	1	5/8	16	46	023U7250
DCR 0487	1	7/8	22	46	023U7251
DCR 0489	1	7/8	22	46	023U7253
DCR 04811	1	–	28	46	023U7254
DCR 04813	1	1 1/8	–	46	023U7255
DCR 04817	1	–	28	46	023U7257
DCR 04821	1	1 3/8	35	46	023U7276
DCR 0969	2	–	42	46	023U7459
DCR 09611	2	–	42	46	023U7461
DCR 09617	2	2 5/8	–	46	023U7464
DCR 1449	3	7/8	22	35 / 46	023U7066

## DCR

Inserts with gasket



Type	Material / Description	Code no.
48-DM solid core	100% molecular sieve	023U1392
48-DC solid core	80% molecular sieve & 20% Al3 O2	023U4381
48-DA solid core	30% molecular sieve & 70% Al3 O2	023U5381
48-F strainer	Felt-gasket, 15 µm	023U1921

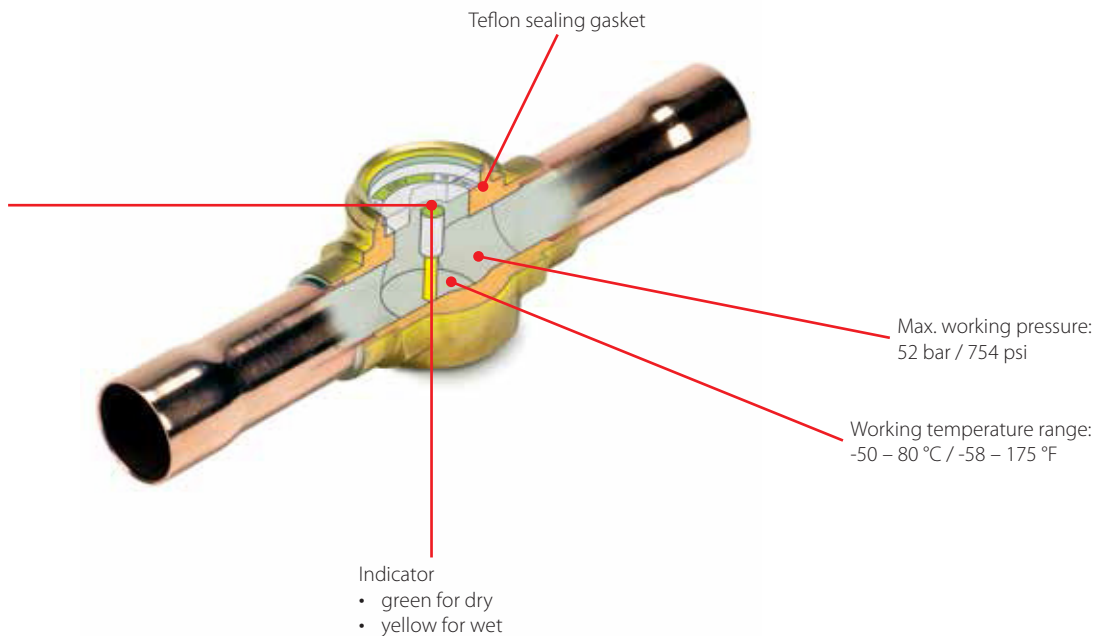
# SGP, Sight glass (high pressure)

SGP are sight glasses for high pressure applications (Max Working Pressure PS / MWP: 52 bar / 754 psi). SGP is available with flare, solder and socket connections, and with and without moisture indicators.

SGP N equipped with sensitive indicators that reflects a changes colour, depending on the moisture content in the refrigerant.



Reliable due to minimal dependancy on temperature



## Facts

### Applications:

- Traditional refrigeration
- Heat pump systems
- Air conditioning units
- Liquid coolers
- Transport refrigeration

### Refrigerants:

- R22
- R32
- R134a
- R404A
- R407C
- R507
- R410A
- R1270
- R407A
- R407F
- R448A
- R449A
- R450A
- R452A
- R452B
- R454B
- R513A
- R1234ze
- R744(CO2)

### Benefits:

- Indicates too high moisture content in the refrigeration system
- Indicates lack of subcooling
- Indicates refrigerant deficiency

### Connection:

- Solder ODF x ODF
- Solder ODF x ODM
- Flare ext. x ext.
- Flare int. x ext.

### Connection size:

- From 6 to 22 mm or ¼ to ¾ in.

# Technical data and ordering

## SGP N

Sight glass (high pressure)



Type	Connection type	Connection (in.)	Connection (mm)	Code no.
SGP 6 N	Flare ext. x ext.	1/4 x 1/4	6 x 6	014L0161
SGP 10 N	Flare ext. x ext.	3/8 x 3/8	10 x 10	014L0162
SGP 12 N	Flare ext. x ext.	1/2 x 1/2	12 x 12	014L0163
SGP 16 N	Flare ext. x ext.	5/8 x 5/8	16 x 16	014L0165
SGP 19 N	Flare ext. x ext.	3/4 x 3/4	19 x 19	014L0166
SGP 6 N	Flare int. x ext.	1/4 x 1/4	6 x 6	014L0171
SGP 10 N	Flare int. x ext.	3/8 x 3/8	10 x 10	014L0172
SGP 12 N	Flare int. x ext.	1/2 x 1/2	12 x 12	014L0173
SGP 16 N	Flare int. x ext.	5/8 x 5/8	16 x 16	014L0174
SGP 19 N	Flare int. x ext.	3/4 x 3/4	19 x 19	014L0175
SGP 6s N	ODF x ODF solder	1/4 x 1/4	–	014L0181
SGP 10s N	ODF x ODF solder	3/8 x 3/8	–	014L0182
SGP 12s N	ODF x ODF solder	1/2 x 1/2	–	014L0183
SGP 16s N	ODF x ODF solder	5/8 x 5/8	16 x 16	014L0184
SGP 19s N	ODF x ODF solder	3/4 x 3/4	19 x 19	014L0185
SGP 22s N	ODF x ODF solder	7/8 x 7/8	22 x 22	014L0186
SGP 22s N	ODF x ODF solder	1 1/8 x 1 1/8	–	014L0187
SGP 6s N	ODF x ODM solder	1/4 x 1/4	–	014L0201
SGP 10s N	ODF x ODM solder	3/8 x 3/8	–	014L0202
SGP 12s N	ODF x ODM solder	1/2 x 1/2	–	014L0203
SGP 16s N	ODF x ODM solder	5/8 x 5/8	16 x 16	014L0204
SGP 22s N	ODF x ODM solder	7/8 x 7/8	22 x 22	014L0206



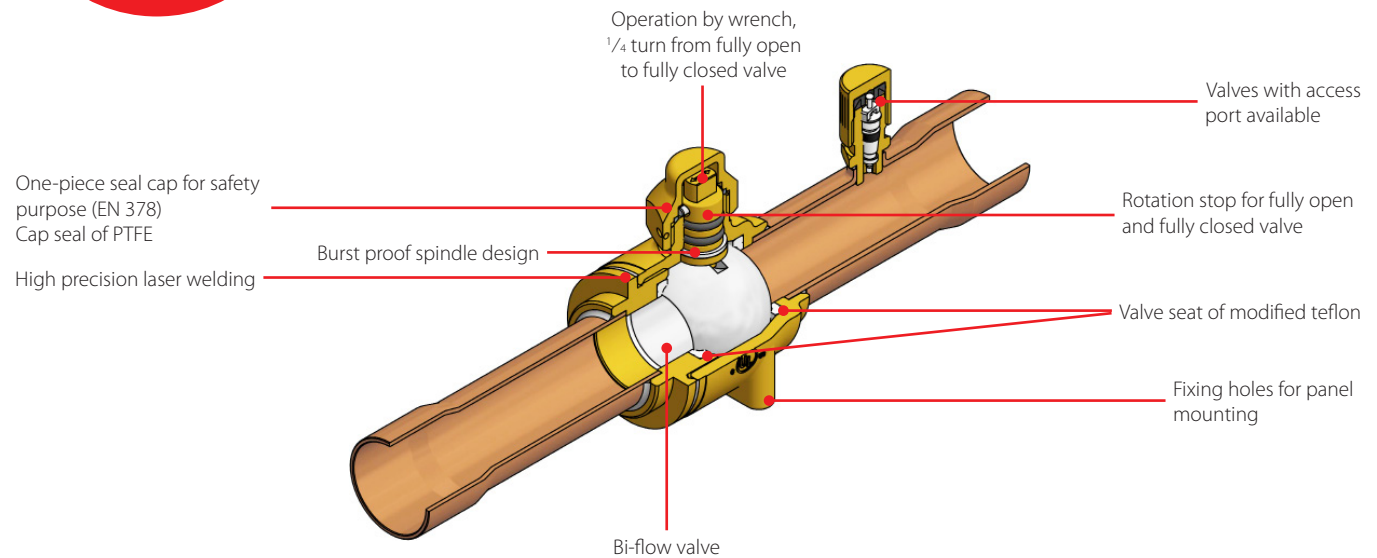
**Note**

Only solder versions are allowed for flammable refrigerants.

# GBC version 2, Shut-off ball valve

SGP are sight glasses for high pressure applications (Max Working Pressure PS / MWP: 52 bar / 754 psi). SGP is available with flare, solder and socket connections, and with and without moisture indicators.

SGP N equipped with sensitive indicators that reflects a changes colour, depending on the moisture content in the refrigerant.



## Facts

### Applications:

- Liquid, suction and hot gas lines in all refrigeration and air-conditioning systems with fluorinated refrigerants

### Refrigerants:

- R134a      GBC 6s – GBC 28s
- R22        can be used with
- R407C     • R32
- R404A     • R454B
- R507       • R452B
- R407A     • R290
- R407F
- R410A
- R448A
- R449A
- R450A
- R452A
- R513A
- R1234ze

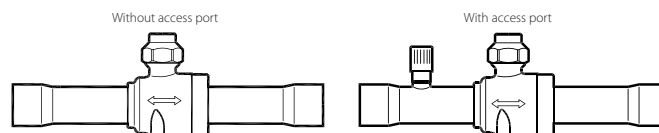
### Benefits:

- Full flow with minimum pressure drop
- Bi-directional flow
- 1/4 turn from fully open to fully closed
- Burst proof spindle design
- Selected Teflon and O-ring material to secure the best tightness and long lifetime
- Versions with access port helps in reducing cost if service of the system is necessary
- One-piece seal cap for safety purpose  
Complies with European Safety Directive EN 378
- Ball status indicator on spindle top indicating open or closed position
- Laser welded construction
- Drilled and tapped for panel mounting
- Double O-ring stem seal design
- Customized brass material ensures consistent performance under aggressive environment

# Technical data and ordering

## GBC version 2

### Shut-off ball valve

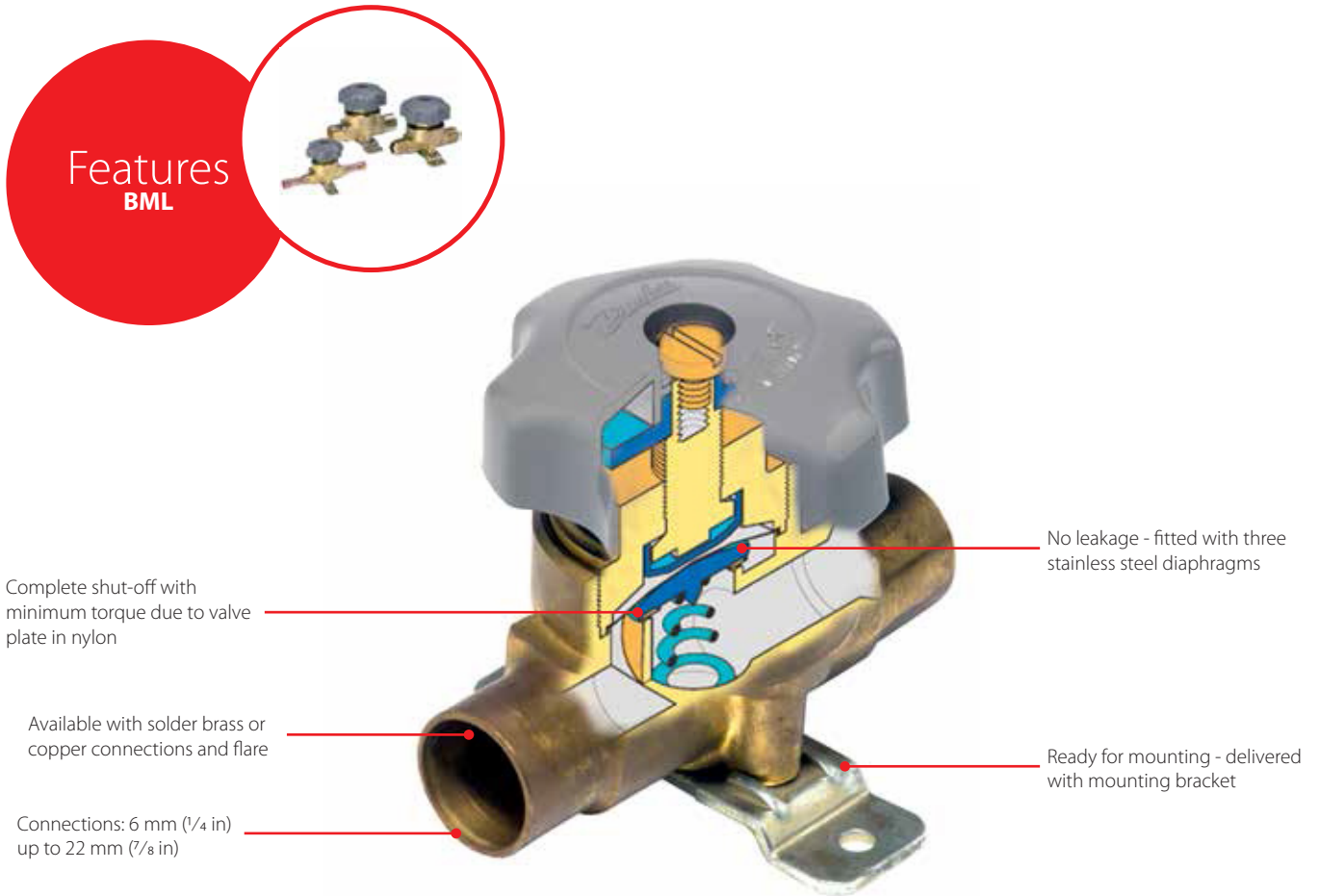


Type	Size		Kv Value (m <sup>3</sup> /h)	Code no.	
	in.	mm		Without Access Port	With Access Port
GBC 6s	1/4	6	1.96	009L7020	009L7050
GBC 10s	3/8	10	5.68	009L7021	009L7051
GBC 12s	1/2	12	10.58	009L7022	009L7052
GBC 16s	5/8	16	14.11	009L7023	009L7053
GBC 18s	3/4	18	20.42	009L7024	009L7054
GBC 22s	7/8	22	28.17	009L7025	009L7055
GBC 28s	1 1/8	28	51.95	009L7026	009L7056
GBC 35s	1 3/8	35	80.89	009L7027	009L7057
GBC 42s	1 5/8	42	121.07	009L7028	009L7058
GBC 54s	2 1/8	54	224.96	009L7029	009L7059
GBC 67s RP	2 5/8	67	310	009L7036	009L7066

# BML, Shut-off diaphragm valves

BML are manual shut-off diaphragm valves designed for installation in the liquid, suction and hot gas lines of refrigeration plants. BML valves can be delivered with flare, ODF solder or ODF solder with extended ends.

In the same product category, BMT 6 is a three-way manual shut-off valve with similar characteristics. BML valve can be used for HCFC, HFC and HC refrigerants.



## Facts

### Applications:

- Traditional refrigeration

### Temperature range:

- -55 – 100 °C / -67 – 212 °F

### Maximum working pressure:

- 28 bar / 406 psig

### Working range:

- -1 – 21 bar / -14 – 304 psig

### Refrigerants:

- R134a
- R22
- R407C
- R404A
- R507
- R290
- R600
- R600a
- R1270
- R513A
- R450A
- R1234ze
- R1234yf

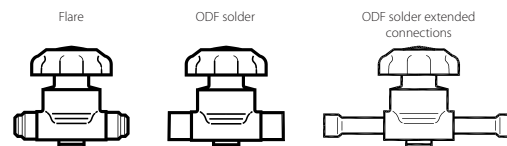
### Benefits:

- Fitted with three stainless steel diaphragms which ensure long operating life
- Valve plate of polyamide nylon to give complete shut-off with minimum torque
- Valve cover with counter-seat to prevent the ingress of moisture in fully open position

# Technical data and ordering

## BML

Shut-off diaphragm valves, with hand wheel



Type	Connection (in.)	kv-value (m <sup>3</sup> /h)	Code no.		
			Flare	ODF solder	ODF extended ends
BML 6	1/4	0.3	009G0101	009G0102	009G0202
BML 10	3/8	0.84	009G0127	009G0122	009G0222
BML 12	1/2	1.5	009G0141	009G0142	009G0242
BML 15	5/8	2.2	009G0168	-	-
BML 22	7/8	2.9	-	009G0191	009G0291

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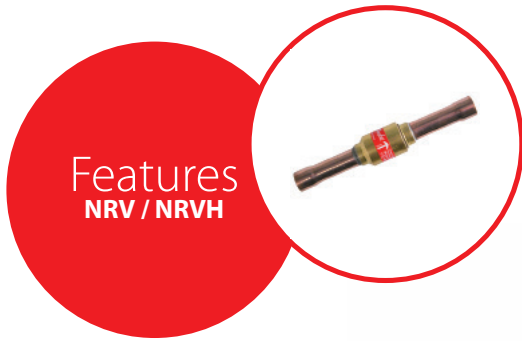
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# NRV / NRVH, Check valves

NRV and NRVH check valves can be used in liquid, suction and hot gas lines in refrigeration and air conditioning plants with HCFC, HFC and HC flammable refrigerants. Special versions, with a max. working pressure of 90 bar / 1305 psig are available for CO2 applications.

The valves ensure the correct flow direction and prevent back-condensation from a warm part of the system to the cold evaporator. A built-in damping piston makes the valves suitable for installation in lines where pulsation can occur, e. g. in the discharge line from the compressor.



Min. pressure drop  
 NRV 0.04 – 0.07 bar / 0.58 – 1.01 psig  
 NRVH 0.3 bar / 4.35 psig

Max. working pressure  
 PS / MWP 46 bar / 667 psig

Flare and solder version  
 NRV 6 – 19  
 NRV 6s – 35s  
 NRVH 6s – 35s



## Facts

### Applications:

- Traditional refrigeration
- Heat pump systems
- Air conditioning units
- Liquid coolers
- Transport refrigeration

### Refrigerants:

- R134a
- R22
- R407C
- R404A
- R507
- R407A
- R407F
- R410A
- R32
- R290
- R600,
- R600a
- R1270
- R448A
- R449A
- R450A
- R452A
- R452B
- R454B
- R513A
- R1234ze
- R1234yf

### Benefits:

- Hermetic tight design for solder versions
- Built-in damping piston that makes the valves suitable for installation in lines where pulsation can occur, e.g. in the discharge line from the compressor
- Available in both straightway and angleway versions
- Solder versions are compliant with ATEX hazard zone 2
- NRVH type check valve is with stronger spring and it's recommended to use for compressors in parallel (i.e. power packs) where higher level of pulsation and vibration are expected

# Technical data and ordering

## NRV / NR VH

### Check valves

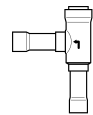
Straight-way  
Flare



Straight-way  
Solder ODF



Angle-way  
Solder ODF



Type	Version		Pressure drop across valve $\Delta p$ bar <sup>1)</sup>	kv-value <sup>2)</sup> m <sup>3</sup> /h	Connection	
					Size	
					in.	Code no.
NRV6	Straight - way	Flare	0.07	0.56	1/4	020-1040
NRV 10	Straight - way	Flare	0.07	1.43	3/8	020-1041
NRV 12	Straight - way	Flare	0.05	2.05	1/2	020-1042
NRV 16	Straight - way	Flare	0.05	3.6	5/8	020-1043
NRV 6s	Straight - way	Solder ODF	0.07	0.56	1/4	020-1010
NRVH 6s <sup>3)</sup>	Straight - way	Solder ODF	0.3	0.56	3/8	020-1069
NRV 10s	Straight - way	Solder ODF	0.07	1.43	3/8	020-1011
NRV 10sH	Straight - way	Solder ODF	1	0.9	3/8	020-4000
NRV 12s	Straight - way	Solder ODF	0.05	2.05	1/2	020-1012
NRV 16s	Straight - way	Solder ODF	0.05	3.6	5/8	020-1018
NRVH 16s	Straight - way	Solder ODF	0.3	3.6	5/8	020-1038
NRV 19s	Straight - way	Solder ODF	0.05	5.5	3/4	020-1019
NRVH 19s	Straight - way	Solder ODF	0.3	5.5	3/4	020-1023
NRV 19s <sup>3)</sup>	Straight - way	Solder ODF	0.05	5.5	7/8	020-1054
NRVH 19s	Straight - way	Solder ODF	0.3	5.5	7/8	020-1066
NRV 22s	Angle - way	Solder ODF	0.04	8.5	7/8	020-1020
NRVH 22s	Angle - way	Solder ODF	0.3	8.5	7/8	020-1032
NRV 22s <sup>3)</sup>	Angle - way	Solder ODF	0.04	8.5	1 1/8	020-1060
NRVH 22s <sup>3)</sup>	Angle - way	Solder ODF	0.3	8.5	1 1/8	020-1072
NRV 28s	Angle - way	Solder ODF	0.04	19	1 1/8	020-1021
NRV 28s <sup>3)</sup>	Angle - way	Solder ODF	0.04	19	1 3/8	020-1056
NRV 35s	Angle - way	Solder ODF	0.04	29	1 3/8	020-1026
NRVH 35s	Angle - way	Solder ODF	0.3	29	1 3/8	020-1034
NRV 35s <sup>3)</sup>	Angle - way	Solder ODF	0.04	29	1 5/8	020-1061

1)  $\Delta p$  = the minimum pressure at which the valve is completely open.

The NR VH with a stronger spring is used in the discharge line from compressors connected in parallel.

2) The Kv value is the flow of water in m<sup>3</sup>/h at a pressure drop across valve of 1 bar,  $\rho = 1000 \text{ kg/m}^3$ .

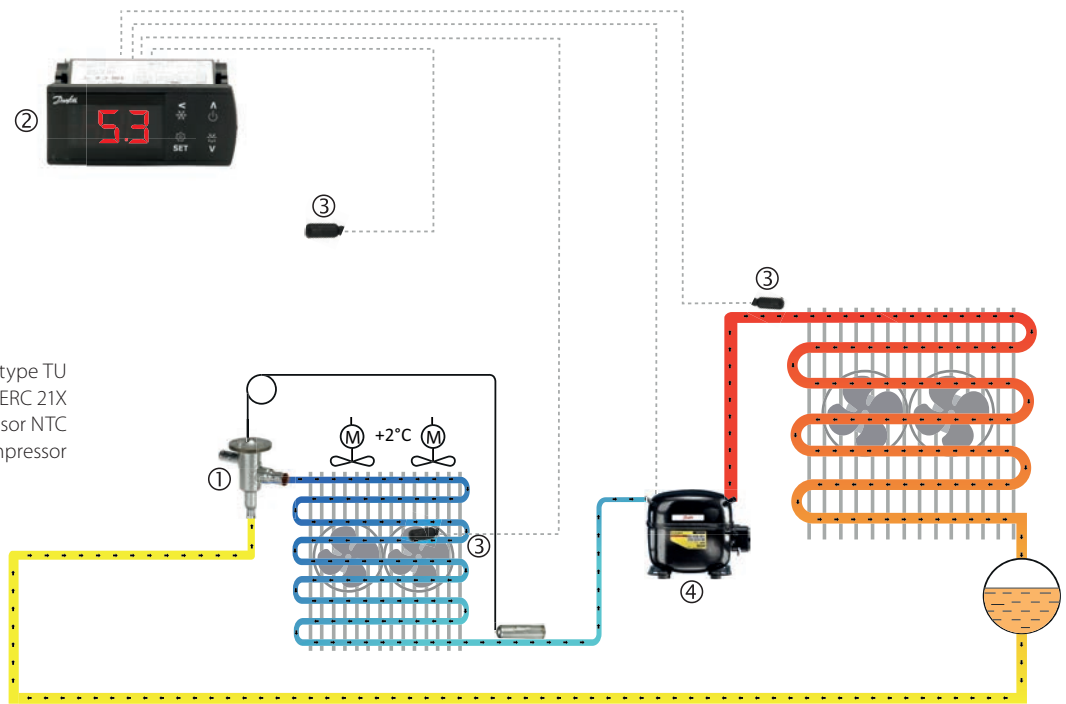
3) Oversize connections.

Max operating pressure is 90 bar.

# ERC 211 / ERC 213 / ERC 214, Refrigeration controllers

ERC 21X is a smart multipurpose refrigeration controller with temperature and defrost management.

The controller has been designed to fulfill today's requirements of advanced commercial Refrigeration applications.



- 1. Thermostatic expansion valve type TU
- 2. Temperature controller ERC 21X
- 3. Temperature sensor NTC
- 4. Compressor

## Facts

### Thermostat:

- ON / OFF thermostat
- Day / Night, continuous cycle, emergency mode
- Pre-installed applications
- Compatible with wide range of sensors (NTC 5 K and 10 K, Pt1000, PTC)

### Defrost:

- Natural, electrical and hot gas defrost
- Defrost on demand
- Start via push button, DI input or time interval
- Stop on time, temperature or push button

### Compressor:

- Voltage protection
- Anti-cycle timers for optimum compressor protection
- High-effect 16 A relays for connection of compressors

### Evaporator Fan:

- Fan delay function
- Smart evaporator fan management for energy saving
- Fan stop at high evaporator temperature

### Alarms:

- High and low temperature alarm
- Sensor failure alarm
- High and low voltage alarm
- Condenser cleaning alarm
- Door open alarm
- External alarm input

### Multi-purpose DI input:

- Two multipurpose DI input for defrost start, Day / night control, main switch, reference displacement and continuous cycle control

### Display & programming:

- Bigger and High efficient LED Display
- Display temperatures in °C / °F
- Parameter settings/readouts and alarm conditions can be read on the display

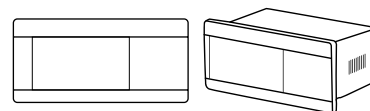
### Other functions:

- Zero cross switching in all relays
- Three levels password protection
- Door function with alarm monitoring
- Delay of outputs at power up
- Keypad lock and unlock feature
- Galvanic Isolation

# Technical data and ordering

## ERC 211 / ERC 213 / ERC 214

### Refrigeration controllers



Type	Description	Code no.
ERC211	KIT - ERC 211,RED LED,230V. Supplied with 1 NTC10K Temp. Probe 1.5m	080G3263
ERC213	KIT - ERC 211,RED LED,230V. Supplied with 2 NTC10K Temp. Probe 1.5m	080G3263
ERC214	ERC 214,Controller, RED LED, 230V. Temp Probe ordered separately	080G3295

Accessories such as temperature probes and covers available. Three phase Optyma Controller available in four sizes

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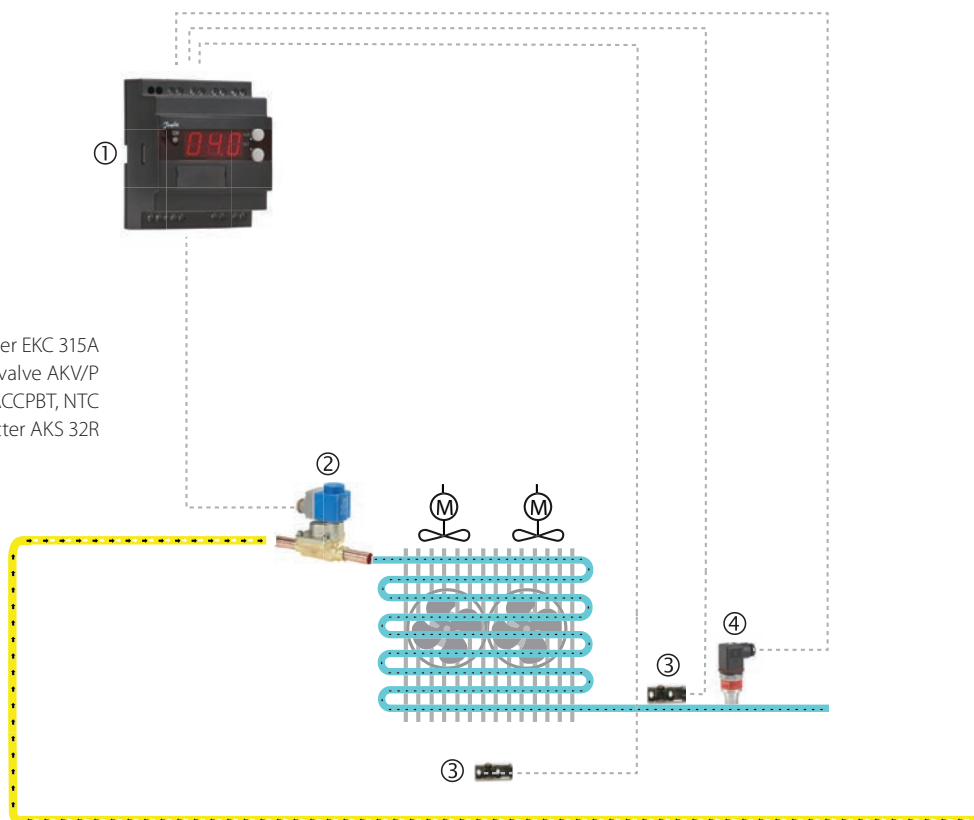
# EKC 315A, Refrigeration control

The controller and valve can be used where there are requirements to accurate control of superheat and temperature in connection with refrigeration:

- Cold store (air coolers)
- Processing plant (water chillers)
- A/C plant

## Features EKC 315A

1. Superheat controller EKC 315A
2. Electric expansion valve AKV/P
3. Temperature sensor ACCPBT, NTC
4. Pressure transmitter AKS 32R



## Facts

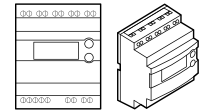
### Benefits:

- The evaporator is charged optimally - even when there are great variations of load and suction pressure
- Energy savings - the adaptive regulation of the refrigerant injection ensures optimum utilisation of the evaporator and hence a high suction pressure
- Exact temperature control - the combination of adaptive evaporator and temperature control ensures great temperature accuracy for the media
- The superheating is regulated to the lowest possible value at the same time as the media temperature is controlled by the thermostat function

# Technical data and ordering

## EKC 315A

### Refrigeration control



Features	Description
Supply voltage	24 V AC ± 15%, 50 / 60 Hz, 80 V A (the supply voltage is galvanically separated from the input and output signals)
Power consumption	Controller: 5 V A AKV coil: 55 V A
Input signal	Current signal: 4 – 20 mA or 0 – 20 mA Pressure transmitter: 4-20 mA from AKS 33 Digital input from external contact function
Sensor input	2 pcs. Pt 1000 ohm
Output signal	Current signal: 4 – 20 mA or 0 – 20 mA Load: Max. 200 ohm
Relay output	1 pcs. SPST: AC-1: 4 A (ohmic)
Alarm relay	1 pcs. SPST: AC-15: 3 A (inductive)
ICAD	ICAD mounted on ICM Current signal: 4 – 20 mA or 0 – 20 mA
Data communication	Possible to connect a data communication module
Environments	-10 – 55 °C, during operations
	-40 – 70 °C, during transport
	20 – 80% Rh, not condensed
	No shock influence / vibrations
Enclosure	IP20
Weight	300 g
Mounting	DIN rail
Display	LED, 3 digits
Terminals	max. 2.5 mm <sup>2</sup> multicore
Approvals	EU Low Voltage Directive and EMC demands re CE-marking complied with LVD-tested acc. to EN 60730-1 and EN 60730-2-9 EMC-tested acc. to EN50081-1 and EN 50082-2

The installation of data communications must comply with the requirements described in literature sheet no. RC8AC

## Ordering

Description	Code no.	PSC
Superheat controller, EKC 315A	084B7086	1
Pressure transmitter, AKS 33 (1/4" flare -1 to 12 bar)	060G2049	1
Temperature sensor, AKS 11 (3.5 m cable, -50 to 100°C)	084N0003	2
Electric Expansion Valve, AKV	Refer Data Sheet for AKV Selection	1

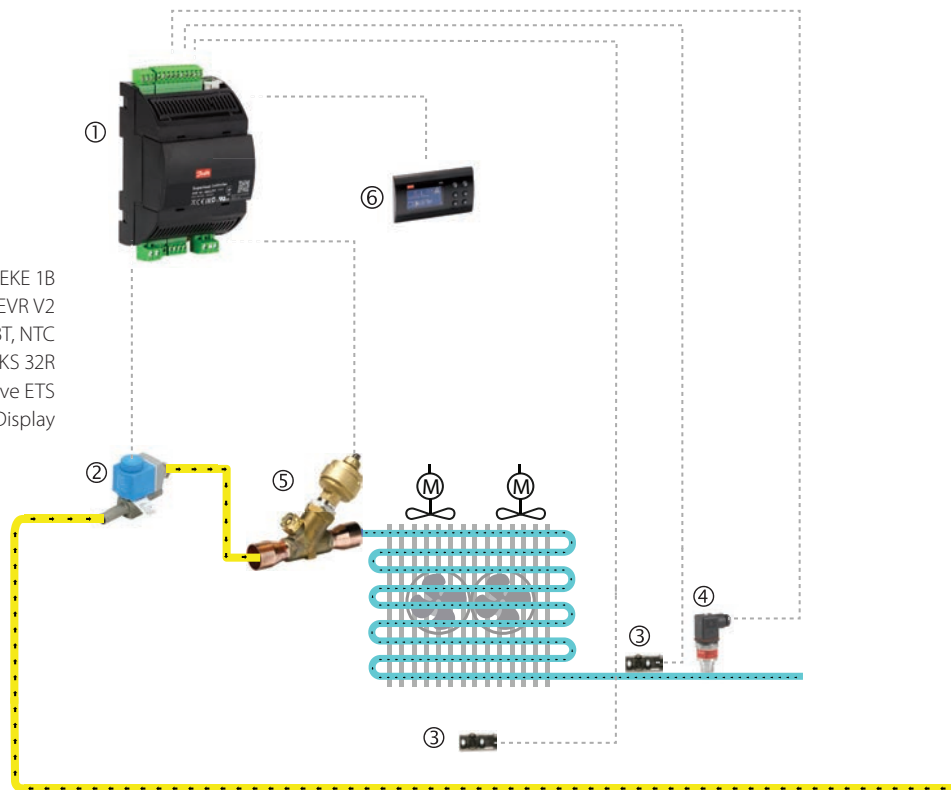
# LP-ETS kit and ETS, Superheat controller

Superheat control in Cold stores, processing plants or A/C plants with Stepper Valve



Features  
LP-ETS kit & ETS

1. Superheat controller EKE 1B
2. Solenoid valve EVR V2
3. Temperature sensor ACCPBT, NTC
4. Pressure transmitter AKS 32R
5. Stepper valve ETS
6. MMIGRS2 Display



## Facts

### Benefits:

- The evaporator is charged optimally even when there are great variations of load and suction pressure
- Energy savings
- The superheating is regulated to the lowest possible value at the same time as the media temperature is controlled by the thermostat function

### Functions:

- Regulation of superheat
- Temperature control
- MOP function
- ON/OFF input for start/stop of regulation
- Input signal that can displace the superheat reference or the temperature reference
- Alarm if the set alarm limits are exceeded
- Relay output for solenoid valve
- PID regulation

### Energy Saving:

- The adaptive regulation of the refrigerant injection ensures optimum utilization of the evaporator and hence a high suction pressure

# Technical data and ordering

## Ordering Code: LP-ETS-KIT

Kit Includes the following codes

Description	Code no.	PSC
Superheat Controller, EKE 1B	080G5350	1
Pressure transmitter, AKS 32R (1/4" flare 1- 34 bar)	060G0090	1
ACCPBT, NTC Temperature probe, IP68 6X20, 3m Cable	080G0202	2
Din Plug	060G0008	1
120 Ohm Resistors	LP-RR0550	2
Solenoid Valve, EVR V2	Refer to Data Sheet for selection of EVR. Not Included in the kit Refer to Data	1
Stepper Valve, ETS	Refer to Data Sheet of ETS. Not Included in the kit	1
Control Panel (MMGIRS2)	080G0294	1
ACCCBI Cable, Telephone U.I. 1.5m	080G0075	1

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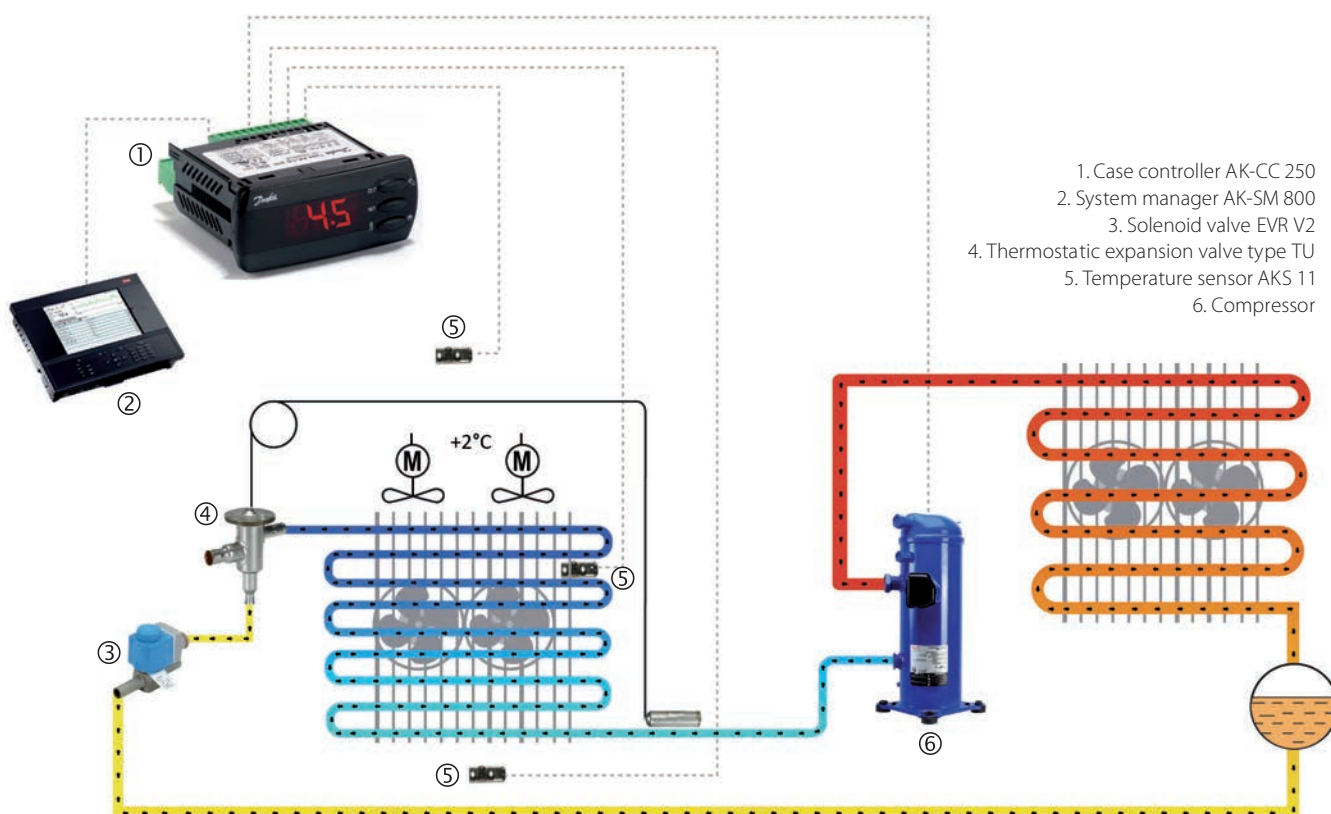
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# AK-CC 250A, Universal refrigeration controller

The controller is used for evaporator control refrigeration appliances in supermarkets. With many predefined applications one unit will

offer you many options. Flexibility has been planned both for new installations and for service in the refrigeration trade.

## Features AK-CC 250A



1. Case controller AK-CC 250
2. System manager AK-SM 800
3. Solenoid valve EVR V2
4. Thermostatic expansion valve type TU
5. Temperature sensor AKS 11
6. Compressor

## Facts

### Benefits:

- Many applications in the same unit
- The controller has integrated refrigeration-technical functions, so that it can replace a whole collection of thermostats and timers

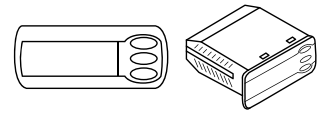
- Buttons and seal imbedded in the front
- Can control two compressors
- Fixed MODBUS data communication
- Easy to remount data communication
- Quick setup
- Two temperature references


- HACCP (Hazard Analysis and Critical Control Points):
  - temperature monitoring and registration of period with too high temperature
  - factory calibration that will guarantee a better measuring accuracy than stated in the standard EN 441-13 without subsequent calibration (Pt 1000 ohm sensor)
- Digital inputs for various functions
- Clock function with backup

# Technical data and ordering

## AK-CC 250A

### Universal refrigeration controller



Features	Description		
Supply voltage	230 V AC 10 – 15%. 2.5 V A		
Sensors for AK-CC 250A, 3 pcs off either	Pt 1000 ohm (0 °C) PTC (1000 ohm / 25 °C) NTC-M2020 (5000 ohm / 25 °C) Measuring range: -60 – 99 °C		
Accuracy	Controller: ± 1 K below -35 °C, ± 0.5 K between -35 – 25 °C, ± 1 K above +25 °C Pt 1000 sensor: ± 0.3 K at 0 °C, ± 0.005 K per grad		
External display	EKA 163 A (only in stand alone)		
Digital inputs	Signal from contact functions Requirements to contacts: Gold plating Cable length must be max. 15 m Use auxiliary relays when the cable is longer		
Electrical connection cable	Max. 1.5 mm <sup>2</sup> multi-core cable		
Relays *)	CE (250 V AC)		UL *** (240 V AC)
	DO1. Refrigeration	8 (6) A	10 A Resistive 5 FLA, 30 LRA
	DO2. Defrost	8 (6) A	10 A Resistive 5 FLA, 30 LRA
	DO3. Fan	6 (3) A	6 A Resistive 3 FLA, 18 LRA - 131 VA Pilot duty
Environments	DO4. Alarm		
	4 (1) A Min. 100 mA **)		
	4 A Resistive 131 VA Pilot duty		
Enclosure	0 – 55 °C, During operations		
	-40 – 70 °C, During transport		
	20 – 80% Rh, not condensed		
Escapement reserve for the clock	No shock influence / vibrations		
Approvals	IP65 from front Buttons and packing are embedded in the front		
	EU Low Voltage Directive and EMC demands re CE-marking complied with LVD tested acc. EN 60730-1 og EN 60730-2-9, A1, A2 EMC tested acc. EN50082-1 og EN 60730-2-9, A2		

\*) DO1 and DO2 are 16 A relays. DO3 and DO4 are 8 A relays. Max. load must be kept  
 \*\*) Gold plating ensures make function with small contact loads  
 \*\*\*) UL-approval based on 30000 couplings

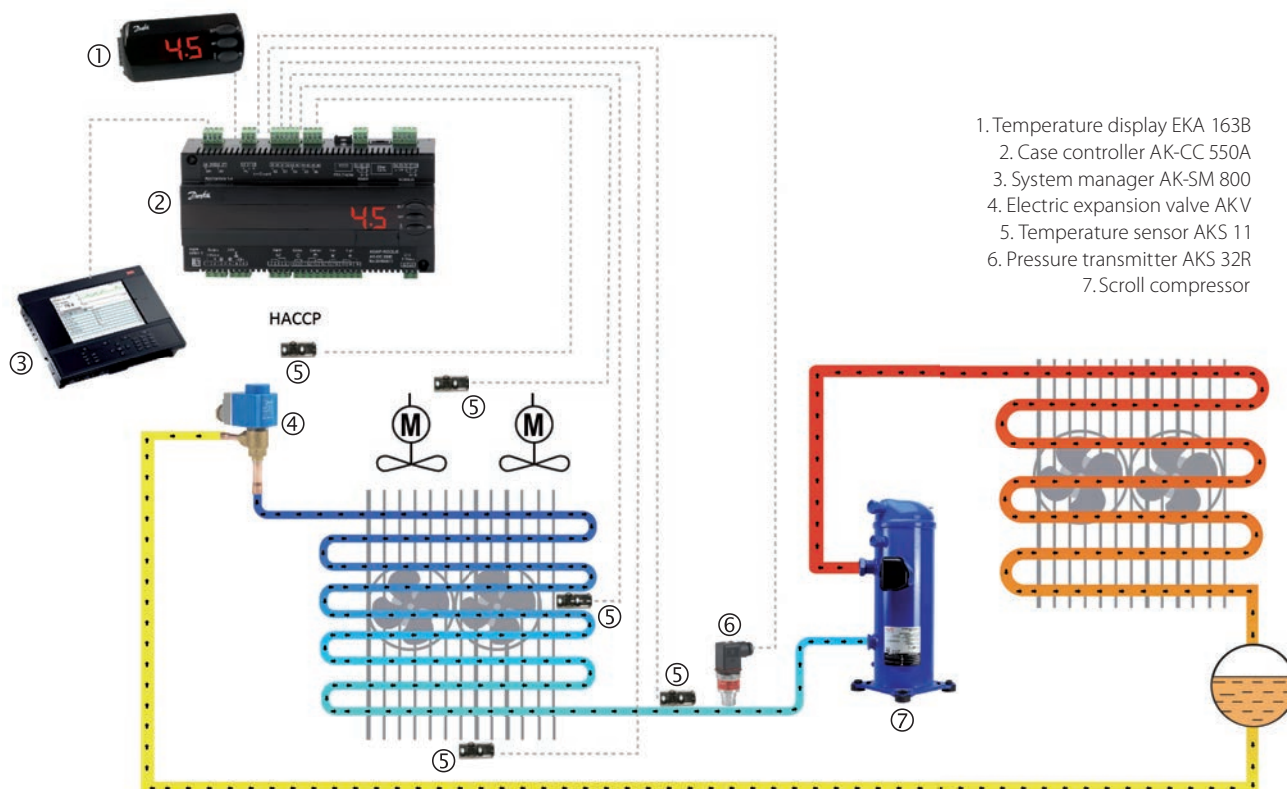
## Ordering

Description	Code no.	PSC
Case Controller, AK-CC 250	084B8528	1
Sensor AKS 12 1.5m PT1000	084N0036	2
Thermostatic Expansion Valve, TU	Refer to data sheet for selection	1
Solenoid Valve, EVR	Refer to data sheet for selection	1
Scroll Compressor	Refer to data sheet for selection	

# AK-CC 550A, Controller for appliance control

AK-CC 550A is a complete refrigeration appliance control with great flexibility to adapt to all types of refrigeration appliances and cold storage rooms.

## Features AK-CC 550A



## Facts

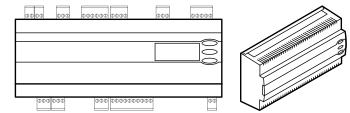
### Benefits:

- Energy optimisation of the whole refrigeration appliance
- One controller for several different refrigeration appliances
- Integrated display at the front of the controller
- Quick set-up with predefined settings
- Built-in data communication
- Built-in clock function with power reserve
- Can be used on CO<sub>2</sub> systems

# Technical data and ordering

## AK-CC 550A

Controller for appliance control



Features	Description
Supply voltage	230 V AC 10 – 15%, 5 V A, 50 / 60 Hz
Sensor S2	Pt 1000
Sensor S3, S4, S5, S6	Pt 1000 PTC 1000 ohm / 25 °C (All 4 must be of the same type)
Accuracy	Measuring range: -60 – 120 °C Controller: $\pm 1$ K below -35 °C, $\pm 0.5$ K between -35 – 25 °C, $\pm 1$ K above 25 °C Pt 1000 sensor: $\pm 0.3$ K at 0 °C, $\pm 0.005$ K per grad
Measuring of Pe	Pressure transmitter: AKS 32R
Display	LED, 3-digits
External display	EKA 163B or 164B. (any EKA 163A or 164A)
Digital inputs DI1, D2	Signal from contact functions Requirements to contacts: Gold plating Cable length must be max. 15 m Use auxiliary relays when the cable is longer
Digital input DI3	230 V AC
Electrical connection cable	Max.1.5 mm <sup>2</sup> multi-core cable
Solid state output	DO1 (for AKV coil) Max. 240 V AC, Min. 28 V AC Max. 0.5 A Leak < 1 mA Max. 1 pcs. AKV
Relays *)	DO3, DO4 DO2, DO5, DO6 CE (250 V AC) 4 (3) A 4 (3) A
Environments	0 – 55 °C, During operations -40 – 70 °C, During transport 20 – 80% Rh, not condensed No shock influence / vibrations
Enclosure	IP20
Mounting	DIN-rail or wall
Weight	0.4 Kg
Data communication	Fixed: MODBUS Extension options: LON RS485 / DANBUSS / TCP / IP(OEM) / MODBUS The controller cannot be hooked up with a monitoring unit type m2
Power reserve for the clock	4 hours
Approvals	EU Low Voltage Directive and EMC demands re CE-marking complied with LVD tested acc. EN 60730-1 and EN 60730-2-9, A1, A2 - EMC tested acc. EN50082-1 and EN 60730-2-9, A2

\*) DO3 and DO4 are 16 A relays. DO2, DO5 and DO6 are 8 A relays. Max. load must be observed

## Ordering

Description	Code no.	PSC
Case controller with MODBUS Data Communication, AK-CC 550A, CO2 version	084B8030	1
Case-Controller, Std.ver.230V	084B8020	1
Temperature sensor, AKS 11 (3.5 m cable, -50 to 100°C)	084N0003	5
Pressure transmitter, AKS 32R (1/4" flare -1 to 12 bar)	060G1036	1
Electric Expansion Valve, AKV/AKVP	Refer Data Sheet for Selection	1

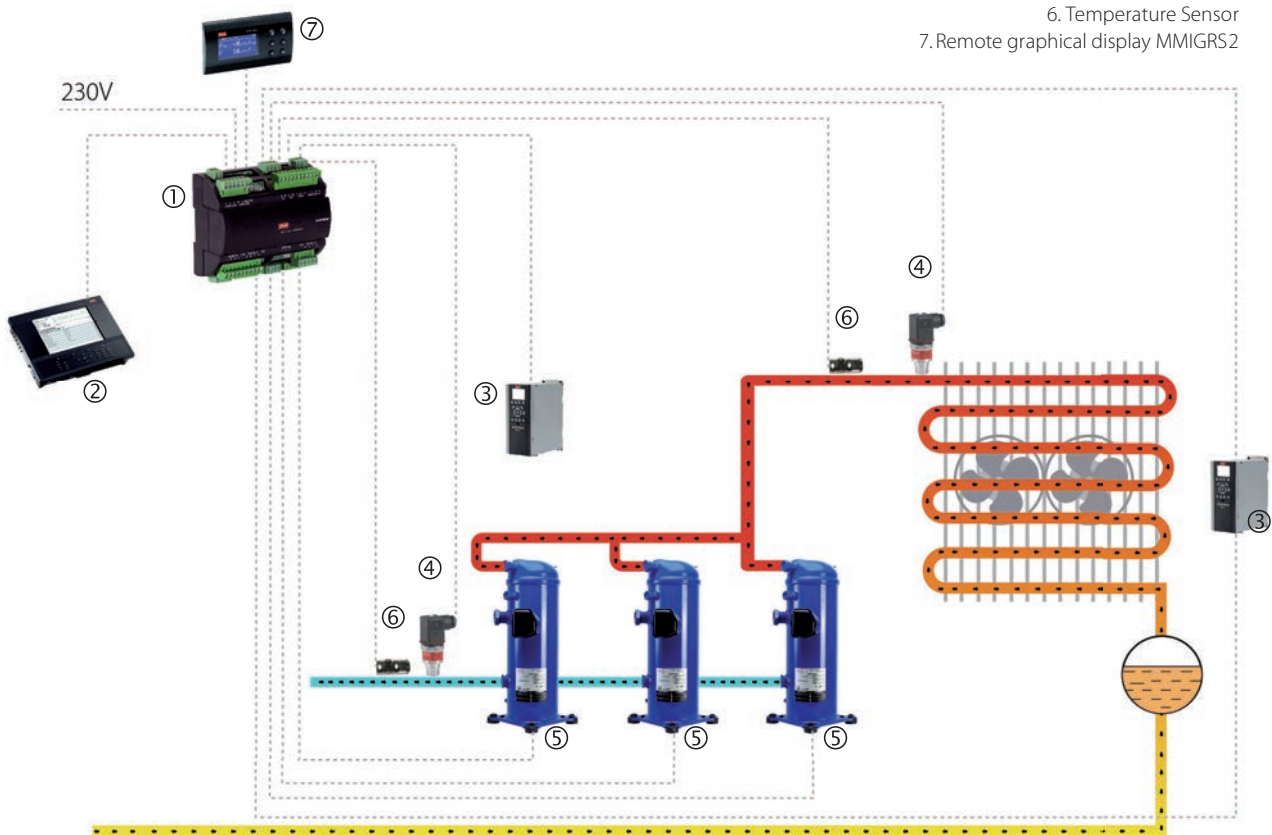
# AK-PC 351, Capacity controller

AK-PC 351 is used for capacity regulation of compressors and condensers in small refrigeration applications.  
A maximum of 4 compressors and one condenser can be regulated:

- One suction group + one condenser group, max. 6 steps
- One compressor group, max. 4 steps
- One condenser group, max. 4 steps

## Features AK-PC 351

1. AK-PC 351 Pack controller
2. System manager AK-SM 800
3. VLT® Frequency converter FC 103
4. Pressure transmitter AKS 32R
5. Scroll compressor
6. Temperature Sensor
7. Remote graphical display MMIGRS2



## Facts

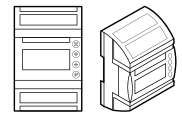
### Benefits:

- Energy savings via:
  - optimisation of suction pressure
  - night time increase
  - floating condensing pressure

# Technical data and ordering

## AK-PC 351

### Capacity controller



Features	Description
Supply voltage	24 V AC $\pm$ 15%, 50 / 60 Hz, 17 V A 24 V DC (20 – 60 V), 17 V A
4 analog Input	Pressure measuring: Ratiometric pressure transmitter type AKS 32R 1 – 5 volt pressure transmitter type AKS 32 0 – 20 (4 – 20) mA pressure transmitter type AKS 33 Temperature measurement Pt 1000 ohm / 0 °C NTC - 86 K from digital scroll / stream
8 digital input	From contact function E.g. to: Start / stop of regulation Monitoring of safety circuits General alarm function
Relay output to capacity control	5 pcs. SPST (5 A): AC-1: 5 A (ohmic)
	5 pcs. SPST (5 A): AC-15: 2 (inductive)
	1 pc. Solid State PWM for scroll -unload I <sub>max.</sub> = 0.5 A I <sub>min.</sub> = 50 mA Leak < 1.5 mA
2 Voltage output	0-10 V DC Ri = 1 kohm
Display output	For type MMIGRS2
Data communication	Modbus for AK-SM 850
Environments	-20 – 60 °C, During operations
	-40 – 70 °C, During transport
	20 – 80% Rh, not condensed
	No shock influence / vibrations
Enclosure	IP40
Weight	0.2 kg
Mounting	DIN-rail
Connection terminals	max. 2.5 mm <sup>2</sup> multi core
Approvals	EU Low Voltage Directive and EMC demands re CE-marking complied with LVD tested acc. EN 60730-1 and EN 60730-2-9 EMC-tested acc. EN61000-6-2 and 3

## Ordering

Description	Code no.	PSC
Pack Controller AK-PC 351 (24 V)	080G0289	1
Pressure transmitter AKS 32R for suction (1/4" flare -1 to 12 bar)	060G1036	1
Pressure transmitter AKS 32R for discharge (1/4" flare -1 to 34 bar)	060G0090	1
Plug with 5 m cable	060G1034	2
Temperature sensor AKS 11 for suction (3.5 m cable, -50 to 100°C)	084N0003	1
Temperature sensor AKS 21A for discharge (5 m cable, -70 to 180°C)	084N0008	1
Speed drive FC-103 for lead compressor and condenser	consult FC-103 configuration tool(drives.danfoss.com)	
Scroll Compressors, third party compressors		

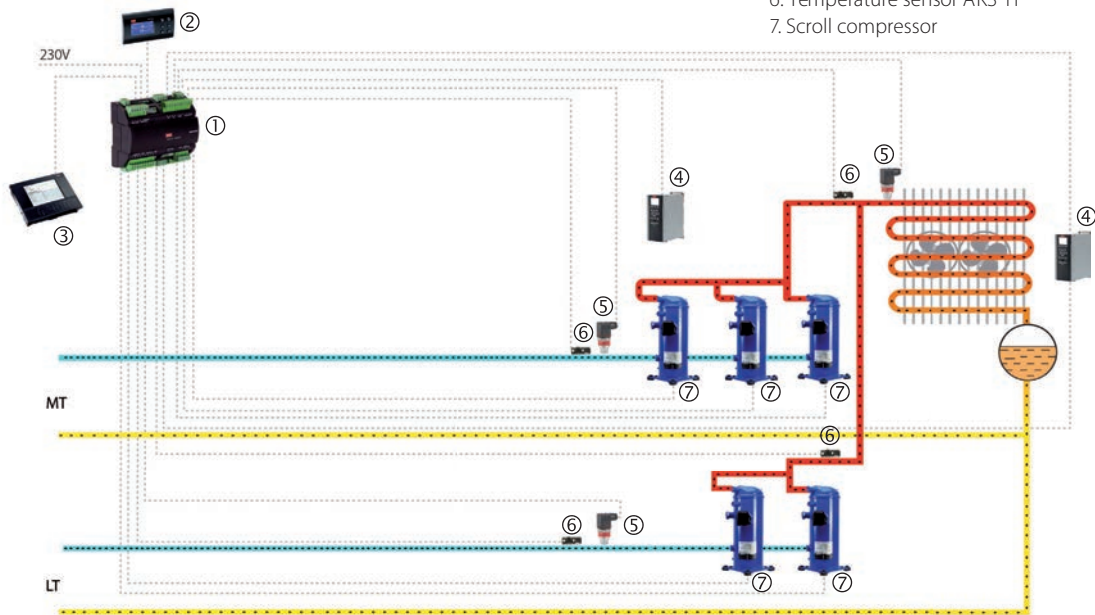
# AK-PC 551, Capacity controller

AK-PC 551 is used for capacity regulation of compressors and condensers in small refrigeration applications. A maximum of 8 compressors and one condenser can be regulated:

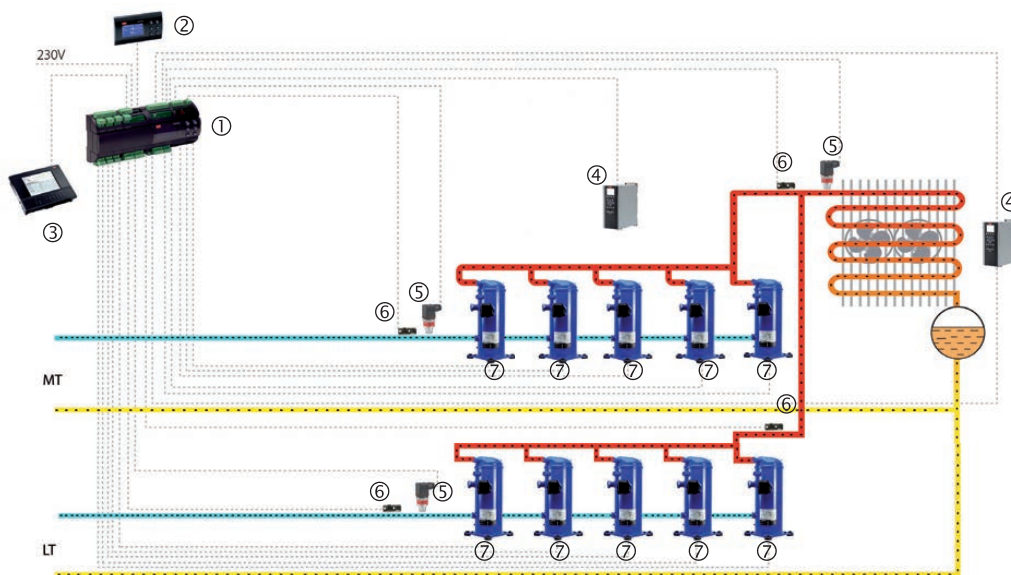
- One suction group + one condenser group
- Two suction groups + one shared condenser, max. 4 + 4 steps
- One compressor group, max. 8 steps
- One condenser group, max. 8 steps

## Features AK-PC 551

1. Pack controller AK-PC 551
2. Remote graphical display MMIGRS2
3. System Manager AK-SM 800
4. VLT® Frequency converter FC 103
5. Pressure transmitter AKS 32R
6. Temperature sensor AKS 11
7. Scroll compressor



One Suction



Two Suction

## Facts

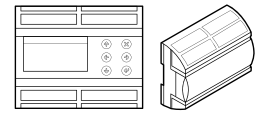
### Benefits:

- Energy savings via:
  - optimisation of suction pressure
  - night time increase
  - floating condensing pressure
  - load limitation

# Technical data and ordering

## AK-PC 551

### Capacity controller



Features	Description
Supply voltage	24 V AC $\pm$ 15%, 50 / 60 Hz, 17 V A
	24 V DC (20 – 60 V), 17 V A
	230 V AC (85 – 265 V) 50 / 60 Hz, 20 V A
8 analog Input	Pressure measuring: Ratiometric pressure transmitter type AKS 32R 1 – 5 volt pressure transmitter type AKS 32 0 – 20 (4 – 20) mA pressure transmitter type AKS 33
	Temperature measurement Pt 1000 ohm / 0 °C NTC - 86 K from digital scroll / stream
8 digital input	From contact function E.g. to: Start / stop of regulation Monitoring of safety circuits General alarm function
Relay output to capacity control	4 pcs. SPDT (8 A): AC-1: 6 A (ohmic)
	4 pcs. SPDT (8 A): AC-15: 4 A (inductive)
	2 pcs. SPST (16 A): AC-1: 10 A (ohmic)
	2 pcs. SPST (16 A): AC-15: 3.5 A (inductive)
	2 pcs. Solid State. PWM for scroll -unload
2 Voltage output	0-10 V DC Ri = 1kohm, Separate 24 V supply required
Display output	For type MMIGRS2
Data communication	Modbus for AK-SM 850
Environments	-20 – 60 °C, During operations
	-40 – 70 °C, During transport
	20 – 80% Rh, not condensed
Enclosure	No shock influence / vibrations
Weight	IP20
Mounting	0.4 kg
Connection terminals	DIN-rail
Approvals	max. 2.5 mm <sup>2</sup> multi core EU Low Voltage Directive and EMC demands re CE-marking complied with LVD tested acc. EN 60730-1 and EN 60730-2-9 EMC-tested acc. EN61000-6-2 and 3

## Ordering

Description	Code no.	PSC
Pack Controller AK-PC 551 with built-in display	080G0281 (230 V) or 080G0283 (24 V)	1
Remote Display MMIGRS2	080G0294	1
Wire for Display	080G0076 (3 m)	1
Pressure transmitter AKS 32R for suction (1/4" flare -1 to 12 bar)	060G1036	1
Pressure transmitter AKS 32R for discharge (1/4" flare -1 to 34 bar)	060G0090	1
Plug with 5 m cable	060G1034	2
Temperature sensor AKS 11 for suction (3.5 m cable, -50 to 100°C)	084N0003	1
Temperature sensor AKS 21A for discharge (5 m cable, -70 to 180°C)	084N0008	1
Variable Speed drive FC-103 for lead compressor and condenser	Consult FC-103 configuration tool (drives.danfoss.com)	
Scroll Compressor		

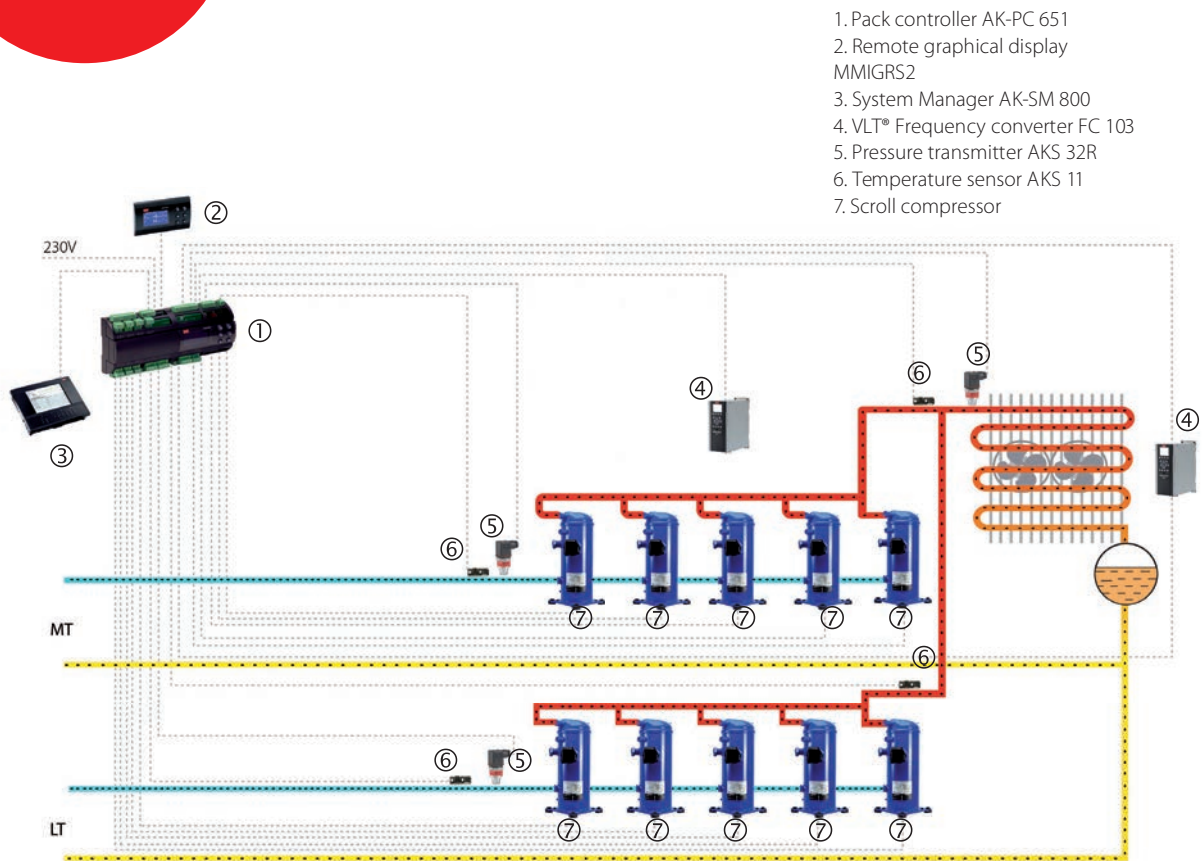
# AK-PC 651, Capacity controller

AK-PC 651 is used for capacity regulation of compressors and condensers in small refrigeration applications.

A maximum of 10 compressors and one condenser can be regulated:

- One suction group + one condenser group
- One compressor group, max. 10 steps
- One condenser group, max. 8 steps

## Features AK-PC 651



## Facts

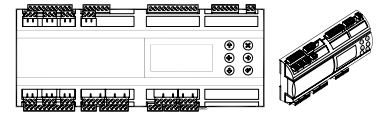
### Benefits:

- Energy savings via:
  - optimisation of suction pressure
  - night time increase
  - floating condensing pressure
  - load limitation

# Technical data and ordering

## AK-PC 651

### Capacity controller



Features	Description
Supply voltage	230 V AC (85 – 265 V) 50 / 60 Hz, 26 V A
10 analog Input	Pressure measuring: Ratiometric pressure transmitter type AKS 32R 1 – 5 volt pressure transmitter type AKS 32 0 – 20 (4 – 20) mA pressure transmitter type AKS 33 Temperature measurement Pt 1000 ohm / 0 °C NTC - 86 K from digital scroll / stream
18 digital input (14 for low voltage + 4 for high voltage or low voltage)	From contact function E.g. to: Start / stop of regulation Monitoring of safety circuits General alarm function
Relay output to capacity control	7 pcs. SPST (8 A): AC-1: 6 A (ohmic), AC-15: 4 A (inductive)
	4 pcs. SPDT (8 A): AC-1: 6 A (ohmic), AC-15: 4 A (inductive)
	2 pcs. SPDT (16 A): AC-1: 7 A (ohmic), AC-15: 3.5 A (inductive)
	2 pcs. Solid State. PWM for scroll -unload
4 Voltage output	0-10 V DC Ri = 1 kohm, Separate 24 V supply required
Display output	For type MMIGRS2
Data communication	Modbus for AK-SM 850
Environments	-20 – 60 °C, During operations
	-40 – 70 °C, During transport
	20 – 80% Rh, not condensed
Enclosure	No shock influence/vibrations
Weight	IP20
Mounting	0.8 kg
Connection terminals	DIN-rail
Approvals	max. 2.5 mm <sup>2</sup> multi core EU Low Voltage Directive and EMC demands re CE-marking complied with LVD tested acc. EN 60730-1 and EN 60730-2-9 EMC-tested acc. EN61000-6-2 and 3

## Ordering

Description	Code no.	PSC
Pack Controller AK-PC 651 with built-in display	080G0312	1
Remote Display MMIGRS2	080G0294	1
Wire for Display	080G0076 (3 m)	1
Pressure transmitter AKS 32R for suction (1/4" flare -1 to 12 bar)	060G1036	2
Pressure transmitter AKS 32R for discharge (1/4" flare -1 to 34 bar)	060G0090	1
Plug with 5 m cable	060G1034	3
Temperature sensor AKS 11 for suction (3.5 m cable, -50 to 100°C)	084N0003	1
Temperature sensor AKS 21A for discharge (5 m cable, -70 to 180°C)	084N0008	1
Variable Speed drive FC-103 for lead compressor and condenser	Consult FC-103 configuration tool (drives.danfoss.com)	
Scroll Compressor		

# AK-SM 800 series, System manager

The System Manager controller from Danfoss is the global control and supervisory solution for the food retail industry. The System Manager uses the latest technology to provide the maximum benefit to the end user, both in terms of energy saving optimization, control options and full web user access.

Designed specifically for the food retail and food processing / handling market, the System Manager provides comprehensive functionality and support tools to cover small to large stores.



## Facts

### Benefits:

- Direct support to EM-800 (AKM not supported / needed)
- Supports centralized and decentralized control strategy; compatible with Danfoss case and pack controllers and Danfoss I/O
- Open XML data transfer allowing remote access to key system parameters

### Design features:

- Active TFT SVGA color screen 800x600
- Front alarm status LED
- Removable keyboard panel (revealing connections)
- Easy access to USB flash drive
- Wall and panel mounting options
- Built in alarm relay output

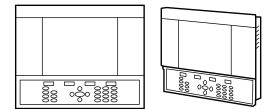
### Hardware capability features:

- Built in web server
- No back up battery required
- RS485 LonWorks®
- Ethernet
- EKC Modbus
- USB

# Technical data and ordering

## AK-SM 800 series

### System manager



SM800 version comparison	AK-SM 810, SM820 - C-Store Version	SM850 - Refrig version	SM880 - Full version
<b>Refrigeration Control</b>			
All SM800 variants come with Centralized I/O and Pack / Case control options. EKC AK2 SLV FC102	Max 32 generic device support	Max 120 generic support	Max 120 generic support
<b>Lighting Control</b>			
All SM800 variants come with built in lighting control via I/O modules. The number of zones differ	10	30	30
<b>HVAC</b>			
Only the SM820 and SM880 support built in HVAC control via I/O	10	n/a	45
<b>Alarms</b>			
Capacity	250	250	250
<b>Miscellaneous points (via IO modules)</b>			
Relay (R), Sensor (S), ON / OFF (O / F), Variable (V)	R=20, S=20, O / F=20, V=20	R=70, S=80, O / F=70, V=70	R=70, S=80, O / F=70, V=70
<b>Master control</b>			
Po Optimization, Master Schedules, AKC ON <i>Note: Adaptive Defrost not currently supported</i>	X	X	X
<b>Misc Calculations</b>			
Boolean Logic statements	96	96	96
<b>History</b>			
The SM800 has the ability to record datapoints for history and view	600 points	600 points	600 points
<b>Leak Detectors</b>			
Refrigerant gas detectors (connected via AK I/O)	10	50	50
<b>Energy Meters</b>			
Pulse Input (via I/O module), Carlo Garvazi, Wattnode, Wattnode Plus Modbus, Veris Modbus	32	80	80
<b>Service Tool Support</b>			
Tunneling via front end (IP connection only)	X	X	X

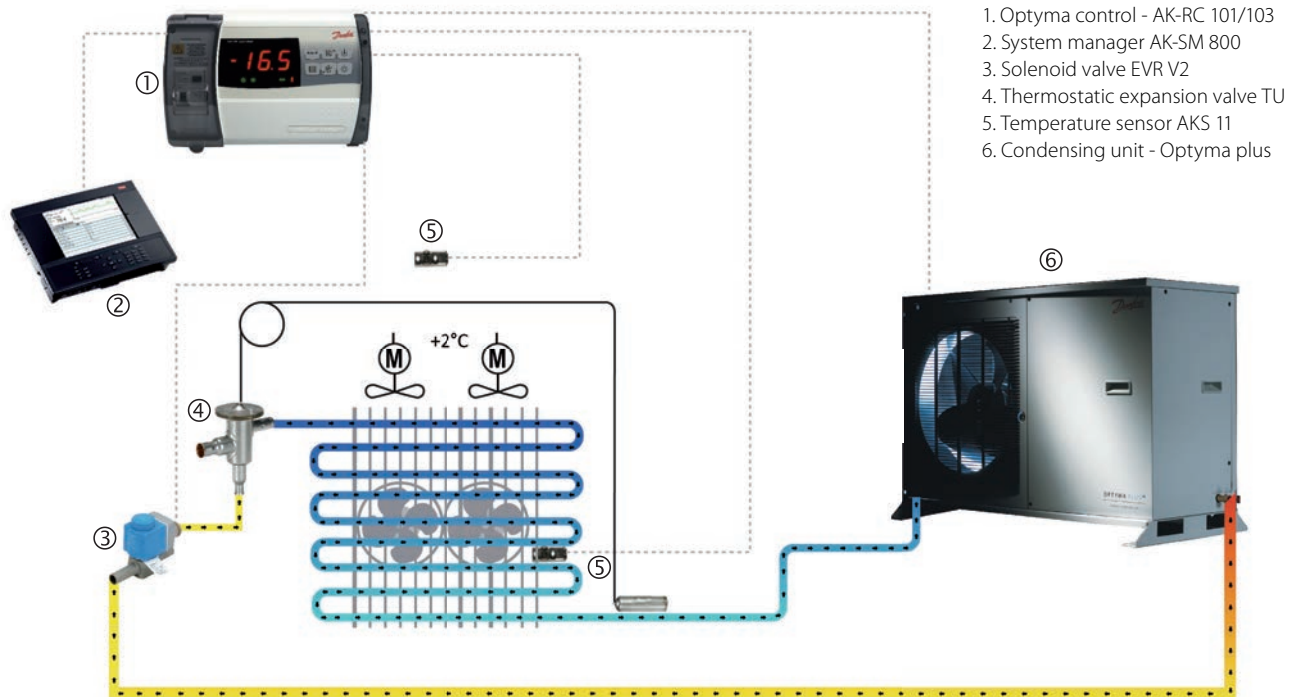
## Ordering

Type	Description	Options	Code no.
AK-SM 810	C-Store Refrigeration/HVAC/Lighting.No display, No buttons	Convenience Store with 32 device capacity	080Z4006
AK-SM 820	C-Store (Refrigeration / HVAC / Lighting)	Convenience Store version with 32 device capacity	080Z4004
AK-SM 850	Refrigeration (including lighting)	Refrigeration version with 120 device capacity	080Z4001
AK-SM 880	Full (Refrigeration / HVAC / Lighting)	Full store version with 120 device capacity	080Z4008
AK-SM 800AL	Alarm logger	AK-SM 8xx accessory	080Z4014

# Optyma™ Control, Single / Three-phase

The Optyma™ Control is particularly suitable for the Optyma™ and Optyma™ Plus condensing units from Danfoss but is also compatible with other condensing units on the market. The control features an attractive new design and simple flexible programming.

It offers both control and protection in a single unit, thanks to the unique built-in differential magnetothermic circuit breaker, which guarantees safety by cutting the general power supply.



## Facts

### Benefits:

- Direct control of defrosting elements, evaporator fans, room light with outputs directly connectable to the various units
- Standard and ADAP-KOOL® compatible Modbus data communication

### Display & programming:

- LED indicators and large display show system status
- User-friendly keypad
- Display resolution to 0.1 °C

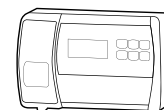
### Protection:

- Automatic fuse protect the refrigeration unit
- Stylish ABS housing with transparent cover for access to the automatic fuse, all with an IP65 protection rating so that panel can be used outside the room

# Technical data and ordering

## Optyma™ Control, Single phase

### Electronic controller

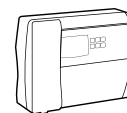


Features	Description	
Power supply	Voltage	230 V AC ± 10%, 50 / 60 Hz
	Max absorbed power (electronic control)	~ 7 V A
Ambient conditions	Operating temperature	-5 – 50 °C
	Storage temperature	-30 – 70 °C
	Relative humidity	< 90% RH
General characteristics	Connectable sensor types	NTC 10 K 1%
	Resolution	0.1 °K
	Probe read precision	± 0.5 °K
	Read range	-45 – 45 °C
Output characteristics max. applicable load (230 V AC)	Compressor	1500 W (AC3)
	Defrost	3000 W (AC1)
	Fans	500 W (AC 3)
	Room light	800 W (AC1)
	Configurable alarm contact / aux (voltage-free contact)	100 W
General electric protection	Bipolar differential magnetothermic circuit breaker	16 A Id = 300 mA switching power 4.5 kA, Id = 30 mA (on request)
Insulation and mechanical characteristics	Cover protection	Rating IP65
	Cover material	Self-extinguishing ABS
	Type of insulation	Class II
	Box dimensions	262 x 168 x 97

# Technical data and ordering

## Optyma™ Control, three phase

### Electronic controller



Features	Optyma™ Control AK-RC 103, three-phase (3 kW)	Optyma™ Control AK-RC 103, three-phase (5 kW)
Case dimensions	400 × 300 × 135 mm	400 × 300 × 135 mm
Protection rating	IP65	IP65
Power supply (3F + N + T)	400 V AC ± 10% 50 / 60 Hz	400 V AC ± 10% 50 / 60 Hz
Load type	three-phase	three-phase
Operating temperature	-5 – 40 °C	-5 – 40 °C
Storage temperature	-25 – 55 °C	-25 – 55 °C
Relative ambient humidity	< 90% RH	< 90% RH
Main switch / general	4 poles magnetothermic 16 A	4 poles magnetothermic 25 A
Compressor protection	motor circuit breaker	motor circuit breaker
Defrosting	electrical	electrical
Status indicators	LED + display	LED + display
Alarm signals	LED + buzzer	LED + buzzer
Ambient probe	NTC 10 K 1%	NTC 10 K 1%
Evaporator probe	NTC 10 K 1%	NTC 10 K 1%
Door switch	present	present
High/low pressure switch	present	present
Kriwan® connection	present	present
Compressor functioning mode	pump-down / thermostat	pump-down / thermostat
Compressor	370 W – 3000 W	3000 W – 5500 W
Condenser fans output 1	800 W (1 ph)	800 W (1 ph)
Condenser fans output 2		total (1 ph)
Evaporator fans	500 W (1 ph)	2000 W (1 ph/3 ph)
Defrosting heaters	6000 W	9000 W
Room light	800 W (AC1) resistive load	800 W (AC1) resistive load
Solenoid valve	present	present
Compressor oil heater	present	present
Alarm relay	100 W	100 W

## Ordering

Type	Description	Psc	Code no.
AK-RC 101	Optyma™ Control, single-phase	1	080Z3200
AK-RC 103	Optyma™ Control, three-phase (3 kW) 4.5-6.3 A	1	080Z3201
AK-RC 103	Optyma™ Control, three-phase (3 kW) 7-10 A	1	080Z3202
AK-RC 103	Optyma™ Control, three-phase (5 kW) 11-16 A	1	080Z3206
AK-RC 103	Optyma™ Control, three-phase (5 kW) 14-20 A	1	080Z3207



# MBS 3000, Compact pressure transmitter

The compact pressure transmitter MBS 3000 is designed for use in almost all industrial applications, and offers a reliable pressure measurement, even under harsh environmental conditions. The flexible pressure transmitter programme covers a 4 – 20 mA output signal, absolute and gauge (relative) versions, measuring

ranges from 0 – 1 to 0 – 600 bar and a wide range of pressure and electrical connections. Excellent vibration stability, robust construction, and a high degree of EMC/EMI protection equip the pressure transmitter to meet the most stringent industrial requirements.

## Features MBS 3000



## Facts

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### Benefits:

- 4 – 20 mA output signal
- Operating temperature: -40 – 85 °C
- Measuring range: 0 – 600 bar
- Standard pressure connection G ¼ A
- For use in severe industrial environments such as pumps, compressors, pneumatics and water treatment
- Wetted parts: stainless steel (AISI 316)

# Technical data and ordering

## MBS 3000

### Compact pressure transmitter

Measuring range $P_e$ (bar) <sup>1)</sup>	Pressure connection		Output signal		Code no.
	G 1/4 EN 837	M20 x 1.5	4 – 20mA	0 – 10V	
0 – 1	•		•		060G1113
0 – 2.5	•		•		060G1122
0 – 4	•		•		060G1123
0 – 6	•		•		060G1124
0 – 10	•		•		060G1125
0 – 10	•			•	060G1650
0 – 16	•		•		060G1133
0 – 25	•		•		060G1430
0 – 40	•		•		060G1105
0 – 100	•		•		060G1107
0 – 160	•		•		060G1112
0 – 250	•		•		060G1111
0 – 400	•		•		060G1109

1) Gauge/relative

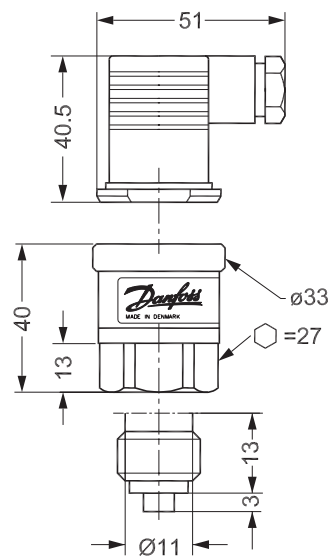
## MBS 3000

### Spare parts & accessories



Type	Description	Code no.
Plug	EN 175301-803-A, Pg 9 plug	060G0008
	EN 175301-803-A, plug with 5 m cable	060G1034

### Dimensions & weight



Weight: 0.17 kg

All dimensions in millimetres

# MBS 3100, Compact pressure transmitter

The compact ship approved pressure transmitter MBS 3100 is designed for use in almost all marine applications, and offers a reliable pressure measurement, even under harsh environmental conditions.

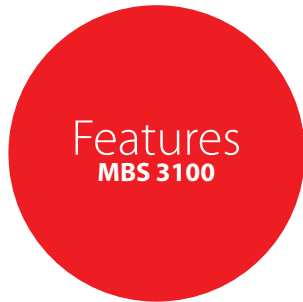
The flexible pressure transmitter programme covers a 4 – 20 mA output signal, absolute and gauge (relative) versions, measuring ranges from 0 – 1 to 0 – 600 bar, plug and cable connections and a wide range of pressure connections.

Excellent vibration stability, robust construction, and a high degree of EMC/EMI protection equip the pressure transmitter to meet the most stringent marine requirements. The compact ship approved pressure

transmitter MBS 3100 is designed for use in almost all marine applications, and offers a reliable pressure measurement, even under harsh environmental conditions.

The flexible pressure transmitter programme covers a 4 – 20 mA output signal, absolute and gauge (relative) versions, measuring ranges from 0 – 1 to 0 – 600 bar, plug and cable connections and a wide range of pressure connections.

Excellent vibration stability, robust construction, and a high degree of EMC/EMI protection equip the pressure transmitter to meet the most stringent marine requirements.



## Facts

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### Benefits:

- 4 – 20 mA output signal
- Operating temperature: -40 – 85 °C
- Measuring range: 0 – 600 bar
- Standard pressure connection G ¼ A EN 837, G ¼ A, O-ring DIN 3852 G ½ A EN 837
- Available with all relevant marine approvals
- Suited for marine applications
- Wetted parts: stainless steel (AISI 316)

# Technical data and ordering

## MBS 3100

### Compact pressure transmitter

Measuring range $P_e$ (bar) <sup>1)</sup>	Pressure connection			Code no.
	G ¼ EN 837	G ¼ A, O-ring DIN 3852	G ½ A EN 837	
0 - 4	•			060G1367
0 - 6	•			060G1368
0 - 10	•			060G1369
0 - 40	•			060G1372
0 - 4		•		060G1463
0 - 6		•		060G1464
0 - 10		•		060G1465
0 - 40		•		060G1468
0 - 10			•	060G1471
0 - 16			•	060G1472

1) Gauge / relative  
2) Sealed gauge

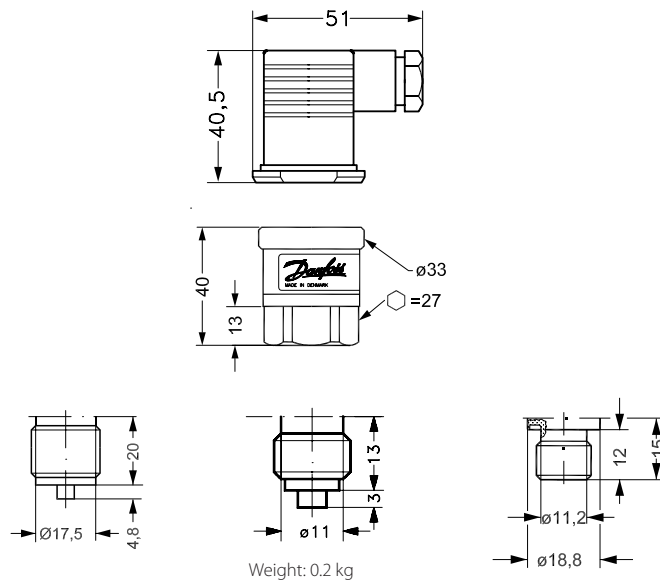
## MBS 3100

### Spare parts & accessories



Type	Description	Code no.
Plug	EN 175301-803-A, Pg 9 plug	060G0008
	EN 175301-803-A, plug with 5 m cable	060G1034
Adapters	G ½ female - ¼ flare male	060G1024

### Dimensions & weight



All dimensions in millimetres

# MBS 5100, Pressure transmitter

The ship approved high accuracy pressure transmitter MBS 5100 is designed for use in almost all marine applications, and offers a reliable pressure measurement, even under harsh environmental conditions.

The pressure transmitter programme in block design covers a 4 – 20 mA output signal, absolute and gauge (relative) versions,

measuring ranges from 0 – 1 to 0 – 600 bar, zero point and span adjustment, plug connection and female/flange pressure connections.

Excellent vibration stability, robust construction, and a high degree of EMC/EMI protection equip the pressure transmitter to meet the most stringent industrial requirements.

## Features MBS 5100



## Facts

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### Benefits:

- 4 – 20 mA output signal
- Operating temperature: -40 – 85 °C
- Measuring range: 0 – 600 bar
- Pressure connection G ¼ female
- Available with all relevant marine approvals
- Designed to meet the strict demands in marine equipment
- Wetted parts: stainless steel (AISI 316)



# AKS, Pressure transmitters

AKS pressure transmitters are used for commercial air-conditioning and for commercial and industrial refrigeration applications. They are made in stainless steel to be compatible with fluorinated and natural refrigerants and laser welding with no soft seals ensure hermetic tightness for decades.

AKS pressure transmitters utilize temperature calibrations methods and sensing technologies optimized for the refrigeration and air-conditioning segments.

## Features AKS

Dedicated temperature calibration to increase accuracy when used for suction or discharge pressure regulation

Compact AKS 32R; AKS 3000 with solder or female flare pressure ports



Parts in touch with refrigerants are all laserwelded, free of soft gaskets

## Facts

### Benefits:

- Designed for precise and energy optimized control
- Robust design optimized for
  - air-conditioning
  - refrigeration plant
  - supermarket installation
  - natural refrigerants like CO<sub>2</sub> and R717
- Pressure ranges up to 159 bar
- High test pressure,  $\geq 33$  bar
- Available with 4 – 20 mA, 1 – 5 V DC or 10 – 90% Vs ratiometric signals
- Available with a variety of pressure connection, incl.  $\frac{1}{4}$  inch female flare with valve depressor and  $\frac{3}{8}$  inch solder connection, ensuring a 100% hermetic installation

# Technical data and ordering

## AKS 32R and AKS 2050 - With 10 – 90% ratiometric output signal

### Pressure transmitters

Type	Pressure range (bar)	Max. overload pressure (bar)	Electrical connection	Pressure connection	Code no.
AKS 32R	-1 – 12	33	EN 175301-803-A without plug	$\frac{7}{16}$ – 20 UNF flare $\frac{1}{4}$ in	060G1036
	-1 – 34	55	EN 175301-803-A without plug	$\frac{7}{16}$ – 20 UNF flare $\frac{1}{4}$ in	060G0090
AKS 2050	-1 – 59	100	EN 175301-803-A without plug	Thread ISO 228/1 – G $\frac{3}{8}$ A (BSP)	060G5750 <sup>1)</sup>
	-1 – 99	150	EN 175301-803-A without plug	Thread ISO 228/1 – G $\frac{3}{8}$ A (BSP)	060G5751 <sup>1)</sup>
	-1 – 159	250	EN 175301-803-A without plug	Thread ISO 228/1 – G $\frac{3}{8}$ A (BSP)	060G5752 <sup>1)</sup>
	-1 – 59	100	EN 175301-803-A without plug	$\frac{1}{4}$ – 18 NPT	060G6342
	-1 – 159	250	EN 175301-803-A without plug	$\frac{1}{4}$ – 18 NPT	060G6344

1) With pulse-snobber

## AKS 32 and AKS 2050

### Accessory

Type	Electrical connection	Comments	Code no.
Cable with plug	Plug 3 + E (female)	5 m cable	060G1034
Plug	EN 175301-803-A	Pg 9	060G0008

## AKS 32 with 1 – 5 V output signal

### Pressure transmitters

9 – 30 V DC supply voltage, accuracy 0.3% FS (typical), pressure reference gauge (relative)

Type	Pressure range (bar)	Max. overload pressure (bar)	Electrical connection	Pressure connection	Code no.
AKS 32	-1 – 12	33	EN175301-803-A Pg9 plug	$\frac{7}{16}$ – 20 UNF flare $\frac{1}{4}$ in	060G2069
	-1 – 34	40	EN175301-803-A Pg9 plug	$\frac{7}{16}$ – 20 UNF flare $\frac{1}{4}$ in	060G2071

## AKS 33 with 4 – 20 mA output signal

### Pressure transmitters

10 – 30 V DC supply voltage, accuracy 0.3% FS (typical), pressure reference gauge (relative)

Type	Pressure range (bar)	Max. overload pressure (bar)	Electrical connection	Pressure connection	Code no.
AKS 33	-1 – 12	33	EN175301-803-A Pg9 plug	$\frac{7}{16}$ – 20 UNF flare $\frac{1}{4}$ in	060G2049
	-1 – 12	33	EN175301-803-A Pg 9 plug	G $\frac{3}{8}$ EN 837	060G2105
	-1 – 12	33	EN175301-803-A Pg9 plug	$\frac{1}{4}$ – 18 NPT	060G2101
	-1 – 20	40	EN175301-803-A Pg9 plug	$\frac{1}{4}$ – 18 NPT	060G2102
	0 – 25	40	EN175301-803-A Pg9 plug	$\frac{1}{4}$ – 18 NPT	060G2115

## AKS 33 with 4 – 20 mA output signal

### Pressure transmitters

10 – 30 V DC supply voltage, accuracy 1% FS (typical), pressure reference gauge (relative)

Type	Pressure range (bar)	Max. overload pressure (bar)	Electrical connection	Pressure connection	Code no.
AKS 3000	-1 – 12	33	EN175301-803-A Pg9 plug	$\frac{7}{16}$ – 20 UNF flare $\frac{1}{4}$ in	060G1323
	0 – 30	55	EN175301-803-A Pg9 plug	$\frac{7}{16}$ – 20 UNF flare $\frac{1}{4}$ in	060G1327
	0 – 40	100	EN175301-803-A Pg9 plug	$\frac{7}{16}$ – 20 UNF flare $\frac{1}{4}$ in	060G1328
	0 – 60	200	EN175301-803-A Pg9 plug	$\frac{1}{4}$ – 20 NPT flare $\frac{1}{4}$ in	060G1083

# EKS / AKS, Temperature sensors

AKS temperature sensors are used for exacting applications within air-conditioning as well as commercial and industrial refrigeration applications.

The Pt 1000 sensor element meets the DIN/EN 60751 class B requirements and ensures an accurate and reliable temperature signal applicable for regulation, safety and data logging.

EKS temperature sensors are a family of cost efficient temperature sensors based on thermistors with NTC or PTC characteristics which are used with Danfoss EKC controllers.



EN441 certified  
AK-HS 1000  
HACCP sensors

AKS 11 temperature sensor for reliable super heat control to optimize accuracy and process efficiency

AKS21 sensor system for controlling extreme high and low temperatures

## Facts

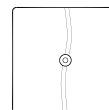
### Benefits:

- AKS 11 is designed for easy installation and optimized for demanding control functions like liquid injection control in evaporators where a reliable sensor is a must
- AKS 12 is the all-round cable temperature sensor to be used for plain temperature monitoring and control purposes
- AKS 21 is the ultimate sensor for -70 – 180 °C anywhere in the refrigeration plant and is available in various designs (cable and B-head) and with various accessories like sensor pockets
- AK-HS 1000 is the first choice for a temperature sensor for monitoring and HACCP data logging. The sensor design makes it simulate a refrigerated product what enable a realistic temperature signal is transmitted to a HACCP data logger
- EKS comes with PTC 1000 Ω (EKS 111), NTC 5000 Ω (EKS 211), or NTC 1000 Ω (EKS 221) with various cable lengths

# Technical data and ordering

## AK-HS - For monitoring and data logging in HACCP systems

Temperature sensors



Type	Signal	Temperature range (°C)	Measuring accuracy	Enclosure	Cable length (m)	Code no.
AK-HS 1000	Pt 1000	-30 – 50	EN 60751 Class B	IP 54	5.5	084N1007

## EKS - For measuring air temperatures

Temperature sensors

PTC characteristics matches controllers types EKC 101, EKC 201, EKC 301, CC and AK.

NTC characteristics matches controllers, types EKC and CC.



Type	Signal	Temperature range (°C)	Sensor tube	Electrical connection	Cable length (m)	Code no.
EKS 111	PTC 1000	-55 – 100	Round	Cable with pins	1.5	084N1178
	PTC 1000	-55 – 100	Round	Cable with pins	3.5	084N1179
	PTC 1000	-55 – 150	Round	Cable with pins	8.5	084N1168
EKS 211	NTC 5000	-40 – 80	Round	Cable	3.5	084N1221

## EKS - For measuring temperatures

Temperature sensors

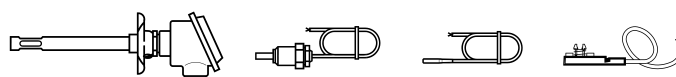
The sensor characteristics matches to OPTYMA room controllers and MCX unit controllers.

Type	Signal	Temperature range (°C)	Sensor tube	Electrical connection	Cable length (m)	Code no.
EKS 221	NTC 10000	-50 – 120	Round	Cable	3.5	084N3210

## AKS - For measuring temperature

Temperature sensors

Recommended for accurate temperature measurement in superheating, food safety logs and other important applications



Type	Signal	Measure range [°C]	Sensor tube	Electrical connection	Cable length [m]	Code no.
AKS 12	Pt 1000	-40 – 80	Round	AMP plug	3.5	084N0039
AKS 11	Pt 1000	-50 – 100	Concave	Cable	1.5	084N0036
	Pt 1000	-50 – 100	Concave	Cable	8.5	084N0008
AKS 21A	Pt 1000	-70 – 180	Round	Cable	3.5	084N2007
AKS 21W	Pt 1000	-70 – 180	Sensor pipe	Cable	2.5	084N2017

# DGS, Gas sensor

DGS helps to comply to environmental F-Gas Regulations and / or Health and Safety requirements, on new or existing systems in:

- Supermarkets
- Process refrigeration plants
- Refrigerated storage and warehousing
- Special applications areas / zones



**Utilizing**  
either Semi Conductor (SC) or Infrared (IR) technologies

**Can be used**  
in stand-alone or integrated systems, where continuous real-time, automatic monitoring with Danfoss ADAP-KOOL® Refrigeration Control and Monitoring System and / or Building Management Systems is applied

**RS485 Modbus**  
for data communication and integration into a complete ADAP-KOOL® system

**Gives**  
quick and immediate response in detecting a wide range of different gases typically applied in Refrigeration and Air Conditioning systems

## Facts

### Typical Refrigerant gas applications include:


- Halocarbons: HFC's, HCFC's, CFCs.
- Carbon Dioxide (CO<sub>2</sub>/R744)
- Hydrocarbons (e.g. R290)
- Other special application gases to customer request

- Sensing technology varies to make the best detection for a given gas, in terms of performance and cost. DGS IR is based on Infra-Red sensor technology, DGS SC is based on Semi-Conductor and DGS-PE is based on Pellistor

# Technical data and ordering

## DGS

### Gas sensors

Features	Description		
Supply voltage	24 V DC $\pm$ 20 % ; reverse polarity protected 24 V AC - 10 % / + 15 %		
Power Consumption (24V DC)	Max. 250 mA (5 VA)		
Digital input - Alarm acknowledge and test alarm - Alarm relay /fault relay	Potential-free contact 40 V AC/DC, 0.5 A, change-over contact (SPDT) Critical relay: Normally Closed (SIL II compliant), Warning relay: Normally Open		
Analoge output signal	Proportional, overload and short-circuit proof, load $\leq$ 500 Ohm Measuring range: 0-10 V / 2-10V /0-20mA / 4-20mA		
Modbus Physical	5 V DC, 250 mA max. overload, short-circuit and reverse-polarity protected		
Enclosure rate	IP 65		
Humidity range	15 - 90 % RH not-condensing		
Burning behaviour	UL 94 V2		
Housing colour	Black		
Dimensions (W x H x D in mm)	94 x 130 x 57		
Installation	Wall mounting		
Cable entry	2 x M12 / 3 x M20		
Wire connection: Power supply, Modbus Analog output, Digital input Sensor head	Screw-type terminals 0.25 to 2.5 mm <sup>2</sup> Screw-type terminals 0.25 to 1.3 mm <sup>2</sup> 3-pin plug connector		
Sensor information	<b>DGS-IR (CO<sub>2</sub>)</b>	<b>DGS-SC (HFC)</b>	<b>DGS-PE (Propane)</b>
Temperature range	-35 to +40°C	-30 to +50°C	-30 to +50°C
Response time T90	<120s	<40s	<10s
Recovery time, T0	90s	180s	120s
Maximum calibration interval	60 months	12 months	6 months
Measuring range	0 – 20,000ppm	20 – 2,000ppm	0 – 5,000ppm
Default alarm threshold	5,000ppm	500ppm	800ppm
Compliance	 IEC61010-1 ANSI/UL CAN/CSA-C22.2 No61010-1 RoHS		
Light (LED)	20 – 80% Rh, not condensed		
Buzzer	>85 dB (A) (0.1 distance ) 2300 Hz		

## Ordering

Type	Description	Code no.
DGS Sensors	DGS-SC HFC gr.1* + B&L	080Z2809
	DGS-SC HFC gr.2* + B&L	080Z2810
	DGS-SC HFC gr.3* + B&L	080Z2811
	DGS-PE Propane + B&L	080Z2812
	DGS-IR CO <sub>2</sub> + B&L	080Z2807
	DGS-IR-CO <sub>2</sub> 5 m + B&L	080Z2808

\*HFC gr.1: R1234ze, R454c, **R1234yf**, R454a, R452A, R454b, R513a

HFC gr.2: R407F, R416a, R417a, R407A, R422a, R427a, R449A, R437a, **R134A**, R438a, R422D

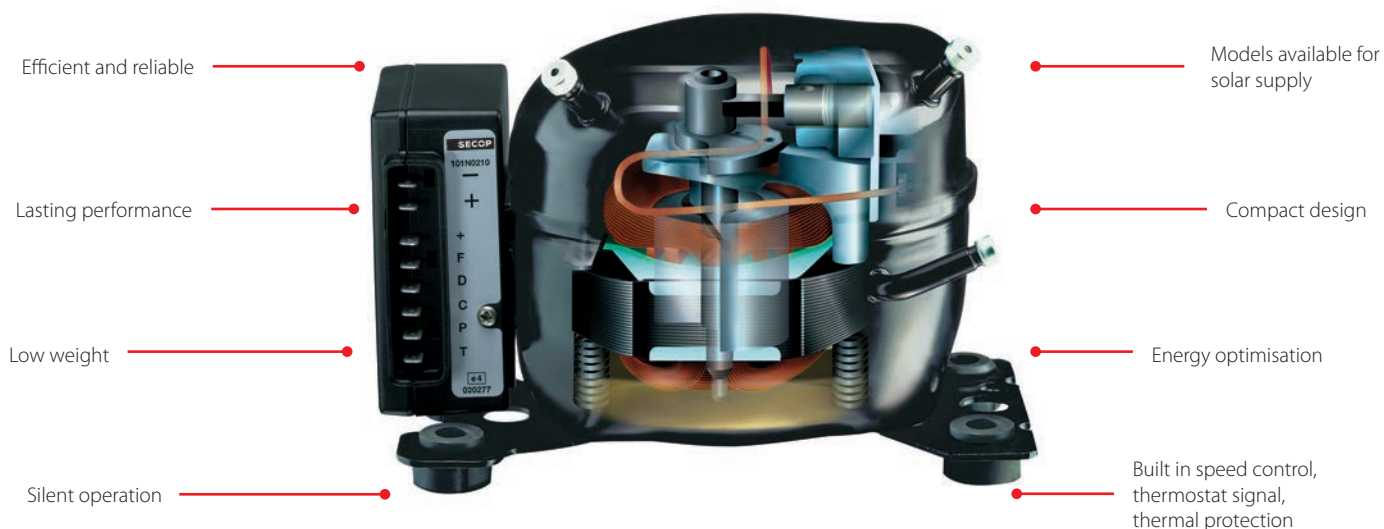
HFC gr.3: R448A, R125, R404A, R32, R507A, R434a, R410A, R452b, **R407C**, R143b

**Bold = calibration gas**

# Secop reciprocating compressors produced for Danfoss - Direct current

BD range is the leading and widest AC / DC compressor range tailored for cooling on the move.

The excellent performance of the BD series safeguards food, medical and telecommunication.



Efficient and reliable

Lasting performance

Low weight

Silent operation

Models available for solar supply

Compact design

Energy optimisation

Built in speed control, thermostat signal, thermal protection

## Facts

### Applications:

- 12 / 24 V DC mobile refrigerators and freezers
- 12 V DC LBP / MBP van cooling boxes
- 12 / 24 V DC HBP telecommunication systems

### Refrigerants:

- R134a

### Capacity range:

- 32 - 274 W

### Segment usage:

- Refrigeration MT

### Benefit:

- Operation under extreme conditions
- Minimal energy consumption
- Portable beyond traditional limits
- Application possible at extreme voltage rate

# Technical data and ordering

## R134a

Application	Compressors model	Kit ordering code		Cooling capacity (W) <sup>1)</sup>	Electrical equipment	
		with DC electronic module	with AC / DC electronic module		DC Electronic module (spare - EMI)	AC / DC electronic module (spare)
LBP / MBP	BD35F	195B0722	195B0744	35.9	101N0212	101N0510
	BD50F	195B0723	-	52.5	101N0212	101N0510
	BD80F	195B0742	-	78	101N0390	-
	BD250GH	195B0748	-	78	101N0390	-

AC plug for BD compressor - 105N9531

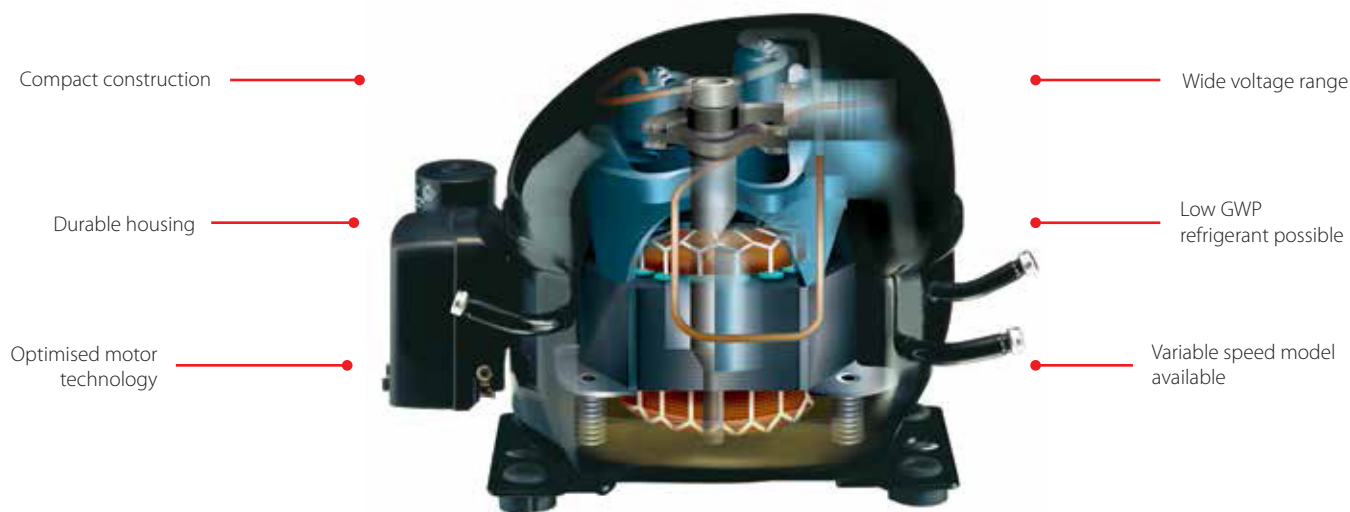
BD Remote kit with 75cm. Cable - 105N9100

1) Condensing temperature : 55, Evaporating temp: -25, Suction gas temp: 32, Liquid temperature: 55

# Secop reciprocating compressors produced for Danfoss- Light commercial

Specially optimised for use in household and light commercial applications, hermetic reciprocating compressors from Secop for Danfoss provide high cooling capacity in an energy saving design.

Compressor models are available for R134a, R290, R404A / R507A and R600a, for cooling needs from 20W to 6kW.



Compact construction

Wide voltage range

Durable housing

Low GWP refrigerant possible

Optimised motor technology

Variable speed model available

## Facts

### Applications:

- Laboratory and medical equipment
- Compressed air dryers
- Glass door merchandisers
- Display cabinets
- Fridges and freezers
- Ice cream cabinet
- Vending machines
- Drink dispensers
- Ice making machines
- Bottle coolers
- Heat pumps
- Milk cooling tanks

### Refrigerants:

- R134a
- R290
- R404A
- R507A
- R600a

### Capacity range:

- 20-6k W

### Segment usage:

- Household and light commercial application

### Benefit:

- Easy installation
- Low noise and high energy efficiency
- Robust in tough operating conditions
- Immune to unstable power supply
- Environmentally friendly solutions Portable beyond traditional limits
- Application possible at extreme voltage rate

# Technical data and ordering

## R134a

Application	Compressors model	Ordering Compressor single pack with HST equipment	Capacity (W) condition a listed	Displacement (cm <sup>3</sup> )	Electrical equipments					
					LST(RSIR)	HST (CSIR)		HST (CSR)	LST / HST	
					PTC Starting device	Starting relay	Starting capacitor	Starting unit	Cord relief	Cover
					spades	spades		spades		
6.3 mm	6.3 mm	6.3 mm	6.3 mm							
HBP / MBP / LBP <sup>1)</sup>	PL35G	195B0245	28	2.00	103N0011	117U6021	117U5014	-	103N1010	-
	TL3G	195B0006	41	3.13	103N0011	117U6009	117U5014	-	103N1010	103N2010
	TL4G	195B0008	58	3.86	103N0011	117U6004	117U5014	-	103N1010	103N2010
	TL5G	195B0011	79	5.08	103N0011	117U6000	117U5014	-	103N1010	103N2010
	FR6G	195B0023	83	6.23	103N0011	117U6000	117U5015	-	103N1010	103N2010
	FR7.5G	195B0024	99	6.93	103N0011	117U6001	117U5015	-	103N1010	103N2010
	FR8.5G	195B0026	123	7.95	103N0011	117U6015	117U5015	-	103N1010	103N2010
	FR10G	195B0027	136	9.05	103N0011	117U6010	117U5015	-	103N1010	103N2010
	FR11G	195B0028	170	11.15	103N0011	117U6010	117U5015	-	103N1010	103N2010
	SC10G	195B0043	113	10.29	-	117U6002	117U5017	-	-	-
	SC12G	195B0050	175	12.87	-	117U6003	117U5017	-	-	-
	SC15G	195B0053	164	15.28	-	117U6005	117U5017	-	-	-
	SC18G	195B0059	283	17.69	-	117U6019	117U5017	-	-	-
	SC21G	195B0636	333	20.95	-	-	-	117-7029	-	-
SC12/12G	195B0051	350	2 × 12.87	-	117U6003	117U5017	-	-	-	
LBP <sup>2)</sup>	PL50F	195B0001	40	2.50	-	117U6021	117U5014	-	103N1010	-
	TL3FX	195B0005	54	3.13	103N0011	117U6007	117U5014	-	103N1010	103N2010
	TL5FX	195B0009	82	5.08	103N0011	117U6004	117U5014	-	103N1010	103N2010
	TL55FX	195B0010	98	5.08	103N0011	117U6004	117U5014	-	103N1010	103N2010
	TL56F	195B0012	104	5.70	103N0011	117U6004	117U5014	-	103N1010	103N2010
	TL57FX	195B0224	120	6.49	103N0011	117U6000	117U5014	-	103N1010	103N2010
	NL6FX	195B0165	110	6.13	103N0011	117U6004	117U5015	-	103N1010	103N2010
	NL7FX	195B0176	136	7.27	103N0011	117U6000	117U5015	-	103N1010	103N2010
	NL7FK	195B0091	136	7.27	103N0011	117U6000	117U5015	-	103N1010	103N2010
	NL9FK	195B0092	155	8.35	103N0011	117U6001	117U5015	-	103N1010	103N2010
	NL11FX	195B0093	200	11.15	103N0011	117U6002	117U5015	-	103N1010	103N2010
	SC15FX	195B0052	230	15.28	-	117U6003	117U5017	-	-	-
	SC18FX	195B0057	280	17.69	-	117U6005	117U5017	-	-	-
SC21FX	195B0047	335	20.95	-	117U6019	117U5017	-	-	-	
MBP <sup>3)</sup>	NL7.3MF	195B0370	304	7.27	103N0011	117U6016	117U5015	-	103N1010	-
	NL10MF	195B0275	441	10.10	103N0011	117U6022	117U5018	-	103N1010	-
	GS26MFX	195B0433	1266	26.30	-	-	-	117-7055	-	-
	GS34MFX	195B0435	1648	33.80	-	-	-	117-7056	-	-
HBP <sup>4)</sup>	FR7GH	195B0167	525	6.93	-	117U6016	117U5015	-	103N1010	-
	SC10GH	195B0142	762	10.29	-	117U6005	-	-	-	-
	SC15GH	195B0144	1139	15.28	-	117U6011	-	-	-	-

Note: LST- Low starting torque= PTC relay only

HST- high starting torque= starting relay + capacitor.

1)- Condensing temperature : 55, Evaporating temp: -25, Suction gas temp: 32, Liquid temperature: 55

2)- Condensing temperature : 55, Evaporating temp: -25, Suction gas temp: 32, Liquid temperature: 55

3)- Condensing temperature : 55, Evaporating temp: -10, Suction gas temp: 32, Liquid temperature: 55

4)- Condensing temperature : 55, Evaporating temp: 5, Suction gas temp: 32, Liquid temperature: 55

# Technical data and ordering

## R404A & R507

Application	Compressors model	Ordering code	Cooling capacity (W)	Displacement	Electrical Equipment				
					Compressor Single package with HST equipment	HST (CSIR)		HST (CSR)	LST / HST
		Starting relay				Starting capacitor	Starting device	Cord relief	Cover
		spades		spades					
cm <sup>3</sup>	6.3 mm	6.3 mm	6.3 mm						
LBP <sup>1)</sup>	TL4CL	195B0021	142	3.86	117U6000	117U5014	-	103N1010	103N2010
	FR6CL	195B0031	243	6.23	117U6015	117U5015	-	103N1010	103N2010
	FR7.5CL	195B0398	262	6.93	117U6016	117U5015	-	103N1010	103N2010
	FR8.5CL	195B0038	290	7.95	117U6010	117U5015	-	103N1010	103N2010
	NL7CLX	195B0350	340	7.27	117U6002	117U5015	-	103N1010	103N2010
	SC10CLX	195B0074	360	10.29	117U6005	117U5017	-	103N1004	103N2008
	SC12CL	195B0076	637	12.87	117U6005	117U5017	-	103N1004	103N2009
	SC15CL	195B0088	780	12.87	-	117U5017	-	103N1004	103N2008
	SC18CL	195B0066	995	17.68	117U6013	117U5012	-	103N1004	103N2009
	SC21CLX	195B0640	813	20.95	-	-	117-7027	103N1004	103N2009
	GS26CLX	195B0427	1240	26.3	-	-	117-7056	-	-
	GS34CLX	195B0439	1715	33.8	-	-	117-7074	-	-
	SC15/15CL	195B0109	1230	2X15.28	117U6019	117U5017	-	103N1004	103N2009
	SC21/21CL	195B0644	1636	2X20.95	-	-	117-7027	103N1004	103N2009
MBP <sup>2)</sup>	NF7MLX	195B0443	635	7.27	117U4139	117U5018	-	2x117U0349	117U1021
	SC10MLX	195B0345	855	10.29	117U6011	117U5017	-	103N1004	103N2008
	SC12MLX	195B0323	1038	12.87	117U6011	117U5017	-	103N1004	103N2008
	SC15MLX	195B0391	1285	15.28	117U6013	117U5012	-	103N1004	103N2009
	SC18MLX	195B0652	1497	17.68	-	-	117-7027	103N1004	103N2009
	SC18MLX.3	195B0653	1557	17.68	-	-	117-7027	103N1004	103N2009
	GS21MLX	195B0436	1748	21.2	-	-	117-7070	-	-
	GS26MLX	195B0437	2254	26.3	-	-	117-7072	-	-
	GS34MLX	195B0438	2953	33.8	-	-	117-7056	-	-
HBP <sup>3)</sup>	TL4DL	195B0166	527	3.86	117U6001	117U5014	-	103N1010	103N2010
	FR6DL	195B0032	840	6.23	117U6010	117U5015	-	103N1010	103N2010
	SC10DL	195B0075	1450	10.29	117U6005	117U5017	-	103N1004	103N2009
	SC12DL	195B0077	1890	12.87	117U6019	117U5017	-	103N1004	103N2009
	SC15DLX	195B0641	2210	15.28	117U6019	117U5017	-	103N1004	103N2009
	SC10/10DL	195B0111	2900	2X10.29	117U6005	117U5017	-	103N1004	103N2009
	SC12/12DL	195B0112	3780	2X12.87	117U6019	117U5017	-	103N1004	103N2009

1)- Condensing temperature : 45, Evaporating temp: -25, Suction gas temp: 32, Liquid temperature: 45

2)- Condensing temperature : 45, Evaporating temp: -10, Suction gas temp: 32, Liquid temperature: 45

3)- Condensing temperature : 45, Evaporating temp: 5, Suction gas temp: 32, Liquid temperature: 45

# Technical data and ordering

## R600a

Application	Compressors model	Compressor single pack with HST equipment	Capacity (W) <sup>1)</sup>	Displacement (cm <sup>3</sup> )	Electrical Equipment				
					LST (RSIR) & (RSCR)		Run capacitor	LST / HST	
					PTC Starting device	PTC device with run capacitor connector	Optional or compulsory (refer data sheet)	Cord relief	Cover
					spades				
					6.3 mm	4.8 mm	6.3 mm		
LBP / MBP	TLES9KK.2	195B0228	110	8.83	103N0011	103N0021	117-7117	103N1010	103N2010
LBP	NLX13KK.2	195B0456	167	13.25	-	103N0021	-	103N1010	103N2010
	NLX15KK.2	195B0506	192	14.65	-	103N0021	-	103N1010	103N2010
	NLE15KK.4	195B0374	190	14.65	103N0011	103N0021	117-7117	103N1010	103N2010

1)- Condensing temperature: 45, Evaporating temp: -25, Suction gas temp: 32, Liquid temperature: 55

## R290

Application	Compressors model	Compressor single pack with HST equipment	Capacity (W) <sup>1)</sup>	Displacement (cm <sup>3</sup> )	Electrical Equipment							
					LST (RSIR)	LST(RSCR)	Run capacitor	HST (CSIR)		LST / HST		
					PTC Starting device w/o run capacitor connector	PTC device with run capacitor connector	1 optional 2 compulsory	Starting relay	Starting capacitor	Cord relief	Cover	
					cm <sup>3</sup>							
					6.3 mm	4.8 mm	6.3 mm	6.3 mm	6.3 mm			
LBP / MBP	DLE7.5CN	195B0728	290	0.27	103N0011	103N0021	117-7117	117U7002	117U5015	103N1010	103N2010	
LBP	SC12CNX.2	195B0458	45	2.87	-	-	-	-	117U5017	-	-	
	SC18CNX.2	195B0489	689	7.69	-	-	-	-	117U5017	-	-	

1)- Condensing temperature: 45, Evaporating temp: -25, Suction gas temp: 32, Liquid temperature: 45

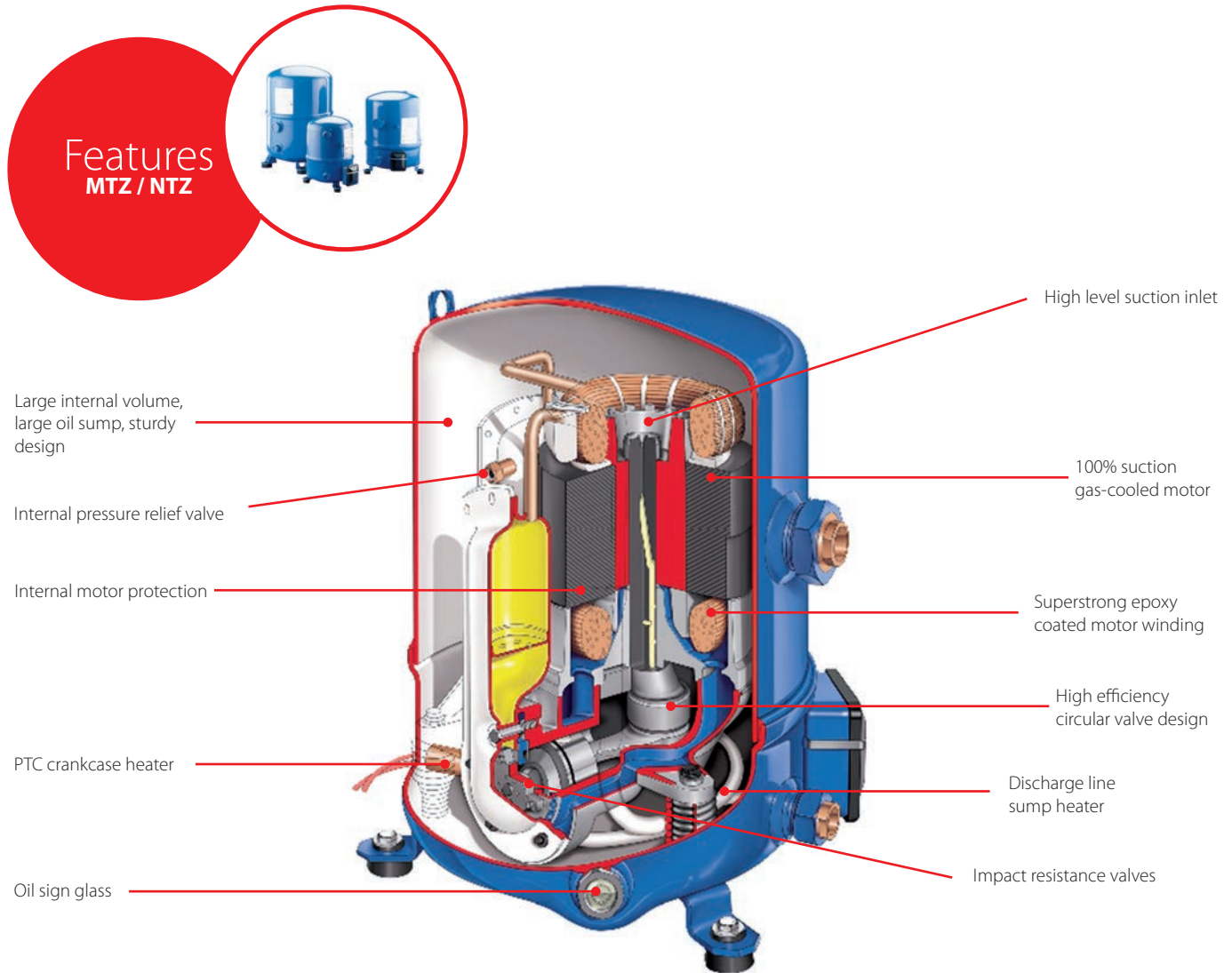
## Accessories

Description	Code
Bolt joint (M6 metric)	118-1917
Snap on (Ø 7.3 mm)	118-1919
Clip	118-3585
Steel Pin	118-3586
Washer Ø 21 x Ø 8.1 mm x 0.9 mm	118-3588
Rubber grommet 16 mm	118-3661
Rubber grommet 19 mm	118-3666

# MTZ / NTZ, Reciprocating compressors

Maneurop® MTZ series compressors are of the hermetic reciprocating type and are designed for medium and high evaporating temperature applications. NTZ are designed for low evaporating temperature applications.

Available in a large variety of single and tandem models for refrigerants R404A, R134a, R407A/F, R407C, R448A, R449A, R452A and R513A, the compressors fit in lots of different applications.



## Facts

### Applications:

- Walk-in freezers and cold rooms
- Frozen food processing and storage
- Ice cream machines
- Display cabinets
- Water chillers
- Large packaged air conditioners
- Process chillers
- Industrial air-con

### Segment usage:

- Airconditioning
- Refrigeration MT (NTZ)

### Refrigerants:

- R134a
- R407F
- R407A
- R404A (NTZ)
- R452A (NTZ)
- R507A
- R407C
- R448A
- R449A
- R513A

### Capacity range:

- 0.25 – 45 kW
- 1.4 – 9.150kW (NTZ)

### Benefit:

- Operation under extreme conditions
- Versatile
- No need for air circulation around the compressor
- Long lifetime expectancy and reliability

# Technical data and ordering

## MTZ

### Reciprocating compressors

Compressor model	Cooling capacity (W)										No of cylinders	Oil Charge (dm <sup>3</sup> )	Displacement (m <sup>3</sup> /h) @2900	Code no.	
	Refrigeration <sup>1)</sup>					High temp <sup>2)</sup>								400 / 3 / 50 Volts / Phase / Hz	230 / 1 / 50 Volts / Phase / Hz
	R404A/R507	R407A	R134a	R407F	R448A/R449A	R452A	R513A	R513A	R407C	R134a					
MTZ018	1910	1740	1075	1850	1840	2000	1181	2757	3470	2532	1	0.95	5.3	MTZ18-4VI	MTZ18-5VI
MTZ022	2630	2390	1408	2540	2580	2810	1546	3526	4550	3335	1	0.95	6.6	MTZ22-4VI	MTZ22-5VI
MTZ028	3430	3130	1823	3320	3180	3250	1949	4426	5890	4217	1	0.95	8.4	MTZ28-4VI	MTZ28-5VI
MTZ032	3980	3640	2076	3860	3660	3790	2318	5107	6650	4907	1	0.95	9.4	MTZ32-4VI	MTZ32-5VI
MTZ036	4670	4260	2753	4520	4250	4300	2670	6010	7510	6013	1	0.95	10.5	MTZ36-4VI	MTZ36-5VI
MTZ040	5330	4890	2914	5170	4880	5090	3169	6888	8660	6342	1	0.95	11.8	MTZ40-4VI	-
MTZ044	5370	4890	2926	5200	5010	5370	3183	7380	9130	6836	2	1.8	13.3	MTZ44-4VI	-
MTZ050	6260	5700	3364	6060	5700	6110	3621	8085	10420	7956	2	1.8	14.9	MTZ50-4VI	-
MTZ056	6710	6120	3526	6500	6340	6790	3822	8894	11680	8621	2	1.8	16.7	MTZ56-4VI	-
MTZ064	7980	7270	4192	7730	7330	7840	4419	10141	13360	10057	2	1.8	18.7	MTZ64-4VI	-
MTZ072	8920	8130	4873	8640	8440	9020	5037	11436	15320	11543	2	1.8	21	MTZ72-4VI	-
MTZ080	10470	9540	5857	10140	10010	9680	5700	12963	17380	13262	2	1.8	23.6	MTZ80-4VI	-
MTZ100	12280	11200	6617	11900	11310	12310	7150	15950	20480	15452	4	3.9	29.8	MTZ100-4VI	-
MTZ125	15710	14330	8306	15220	15220	16070	9614	21058	26880	18941	4	3.9	37.5	MTZ125-4VI	-
MTZ144	18490	16870	10732	17910	17560	17830	10999	23855	29770	23536	4	3.9	42.1	MTZ144-4VI	-
MTZ160	20310	18520	11900	19670	20140	19880	12490	26641	34090	25779	4	3.9	47.3	MTZ160-4VI	-

1) Refrigeration: 50 Hz, EN12900 ratings To = -10°C, Tc = 45°C, SC = 0K, SH = 10K

2) High temp : 50 Hz, EN12900 ratings To = 5°C, Tc = 50°C, SC = 0K, SH = 10K

## NTZ

### Reciprocating compressors

Compressor model	Cooling capacity (W)		No of cylinders	Oil Charge (dm <sup>3</sup> )	Code no.	
	Refrigeration <sup>1)</sup>				400 / 3 / 50 Volts / Phase / Hz	230 / 1 / 50 Volts / Phase / Hz
	R404A	R452A				
NTZ048	1493	1484	1	0.95	120F0226	120F0228
NTZ068	2446	2442	1	0.95	120F0230	120F0232
NTZ096	2955	3085	2	1.8	120F0234	-
NTZ108	3583	3761	2	1.8	120F0238	-
NTZ136	4565	4747	2	1.8	120F0236	-
NTZ215	7046	6942	4	3.9	120F0240	-
NTZ271	9701	9150	4	3.9	120F0242	-

1) Refrigeration: 50 Hz, EN12900 ratings To = -25°C, Tc = 45°C, SC = 0K, SH = 10K

# MLZ / LLZ, Scroll compressors for refrigeration

MLZ and LLZ scroll compressors are dedicated to commercial and light commercial refrigeration applications with refrigerants R134a, R404A / R507A, R22, R407A. Both brazed and rotolock connections are available for most of the compressors.

MLZ: medium-temperature scroll compressors  
R404 / R507A, R407A / F, R134a, R448A, R449A, R452A, R22  
LLZ: low-temperature scroll available with and without liquid injection and operate with R404A, R507A, R452A.

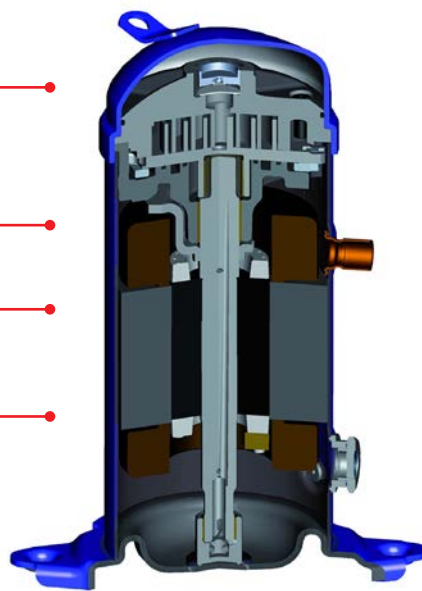


High efficiency motor

Optimised pressure ration for refrigeration applications

Optimized scroll design

HOOP overload protection  
Rotalock or braze connections



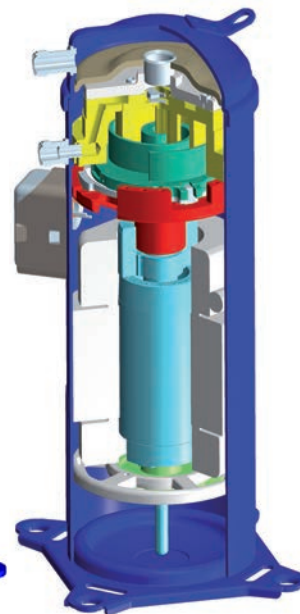
MLZ

Optional sound jacket attenuates sound levels

Multi-refrigerant scrolls save on inventory

Suitable for transport of refrigerated goods

Vapor injection available with optional economizer kit increases LLZ efficiency and cooling capacity



LLZ

## Facts

### Applications:

- Walk-in freezers and cold rooms
- Frozen food processing and storage
- Blast freezers
- Low temperature racks
- Ice cream machines
- Display cabinets
- Water chillers
- Large packaged air conditioners
- Process chillers etc

### Segment usage:

- Refrigeration MT & LT

### Refrigerants:

- R404A
- R507A
- R407A/F
- R448A
- R449A
- R452A
- R134A
- R513A

### Capacity range:

- 0.5 – 12.5 TR / 1.8 – 44 kW

### Benefit:

- Footprint up to 30% smaller than alternative reduces the logistics costs and frees up space in the system
- 30% fewer parts which improves the reliability of the compressor
- Optional vapor injection boosts the cooling capacity and efficiency by more than 20% on LLZ
- Better reliability with improved overload protection and oil injection

# Technical data and ordering

## MLZ

### Scroll compressors

Compressors model	Cooling capacity (W) <sup>1)</sup>				Code no.	
	R404A / R507A	R448A	R407A/F	R134a (2)	400 / 3 / 50 Volts / Phase / Hz	230 / 1 / 50 Volts / Phase / Hz
MLZ015	3300	3200	3100	2000	121L8629	121L8631
MLZ019	4500	4200	4000	2500	121U8004	121U8026
MLZ021	4700	4400	4200	2700	121L8633	121L8635
MLZ026	5800	5500	5300	3300	121L8637	121L8639
MLZ030	7100	6600	6500	4000	121L8641	121L8643
MLZ038	8400	7800	7500	4700	121L8645	-
MLZ045	10200	9700	9100	5900	121L8649	-
MLZ048	11100	10400	10000	6200	121L8651	-
MLZ058	13000	12200	11500	7400	121L8653	-
MLZ066	15100	14200	13400	8600	121L8657	-
MLZ076	17300	15200	14700	9600	121L8655	-

1) at EN12900 conditions:  $T_e = -10\text{ }^\circ\text{C}$ ,  $T_c = 45\text{ }^\circ\text{C}$ ,  $RGT = 20\text{ }^\circ\text{C}$ ,  $SC = 0K$

## LLZ

### Scroll compressors

Compressors model	Cooling capacity (W) <sup>1)</sup>					Code no.
	Without economizer / no injection			Liquid injection <sup>2)</sup>	With economizer / vapour injection	
	R404A	R452A	R448A / R449A	R448A / R449A	R404A	400 / 3 / 50 Volts / Phase / Hz
LLZ013	3536	3295	3053	3053	5662	121L9535
LLZ015	4295	3993	3910	3910	6724	121L9537
LLZ018	5050	4745	4577	4577	8010	121L9539
LLZ024	6451	5876	5549	5549	10060	121L9541
LLZ034	8695	8615	7840	7840	13340	121L9543

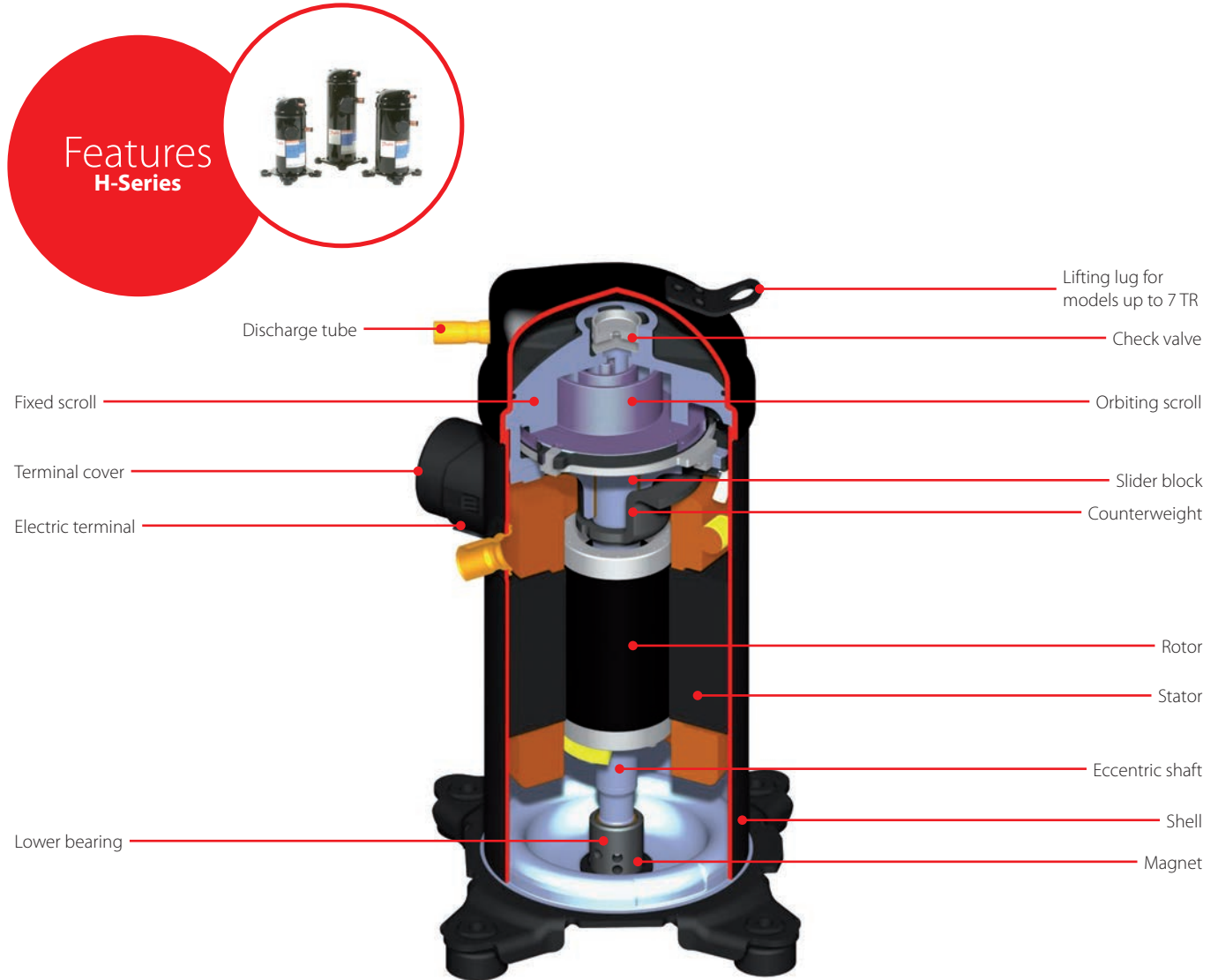
1) At EN12900 conditions:  $T_e = -25\text{ }^\circ\text{C}$ ,  $T_c = 45\text{ }^\circ\text{C}$ ,  $SH = 10K$ ,  $SC = 0K$

2) Liquid injection will have same capacity as no injection but will have extended operating envelope

# H-Series, Scroll compressor

Danfoss scrolls are designed for excellence in performance, silence and endurance. They feature compressors that are among the quietest, most efficient, reliable and available on the market. Ranging from 2.5 – 10 TR, the universal dimension, footprint and connections of the H series make it the natural choice for greater comfort in existing or new residences.

Available in a large variety of single and tandem models for refrigerants R407C, R134a, R410A and R22, the compressors combine high energy efficiency with low sound and minimal vibration.



## Facts

### Applications:

- Small to medium packaged air conditioners for commercial purpose

### Segment usage:

- Airconditioning

### Refrigerants:

- R134a
- R407C
- R410A
- R22

### Capacity range:

- 0.25 – 20 TR / 1.07 – 34 kW

### Benefit:

- Excellent reliability due to Patented internal protection combined with HOOP (Hot Oil Over Protector) thermal valve
- Standard dimensions and tubing: ideal for both new installations and replacement markets
- No startup and shutdown noise

# Technical data and ordering

## H-Series

### Scroll compressors

Compressors model	Cooling capacity (W) <sup>1)</sup>	Oil Charge (dm <sup>3</sup> )	Net weight (kg)	Code no.	
	R407C			400 / 3 / 50 Volts / Phase / Hz	230 / 1 / 50 Volts / Phase / Hz
HRP025	5730	1.06	31	121L3088	-
HRP034	7 940	1.06	31	121L2024	120U2019
HRP038	8 840	1.06	31	120U1006	-
HRP040	9 110	1.06	31	120U1016	120U1929
HRP047	11 130	1.33	31	120U1046	120U0986
HRP058	13 470	1.57	37	-	120U1596
HRP060	13 860	1.57	37	121L1726	120U1606
HLP068	15 700	1.57	37	120U2014	120U1621
HLP072	16600	1.57	37	120U2072	-
HLP075	18000	1.57	37	120U1766	-
HLP081	19500	1.57	37	121L1781	120U1651
HCP094	21600	2.66	44	121L0601	-
HCP109	26000	2.66	45	121L0376	-
HCP120	28100	2.66	45	121L0401	-

1)  $T_e=7.2^{\circ}\text{C}$ ,  $T_c=54.4^{\circ}\text{C}$ ,  $SH=11.1\text{K}$ ,  $SC=8.3\text{K}$

Compressors model	Cooling capacity (W) <sup>1)</sup>	Oil Charge (dm <sup>3</sup> )	Net weight (kg)	Code no.	
	R410A			460 / 3 / 50 Volts / Phase / Hz	230 / 1 / 50 Volts / Phase / Hz
HRH029	7100	1.06	31	120U2287	-
HRH032	7700	1.06	31	120U1196	120U1171
HRH036	8800	1.06	31	120U1201	120U1176
HRH038	9300	1.06	32	-	120U1181
HRH040	10200	1.33	32	-	120U1186
HRH041	10000	1.57	37	120U1356	-
HRH044	10800	1.57	37	120U1361	-
HRH049	12100	1.57	37	121L1366	-
HRH051	12900	1.57	37	121L1371	120U1326
HRH054	13300	1.57	37	-	120U1331
HRH056	13800	1.57	37	120U1381	-
HLH061	14800	1.57	37	121L2052 (2)	120U2047
HLH068	16900	1.57	37	121L1391	120U1341
HLJ072	17800	1.57	37	121L1396	-
HLJ083	20400	1.57	37	121L1401	-
HCJ091	22380	2.66	45	121L3113	-
HCJ105	26000	2.66	45	120U2578	-
HLJ106	26050	2.66	49	121L3115	-
HCJ120	29 610	2.66	49	120U2342	-
HCJ121	29 720	2.46	49	121L3117	-

All compressors have brazed connections, spade terminals

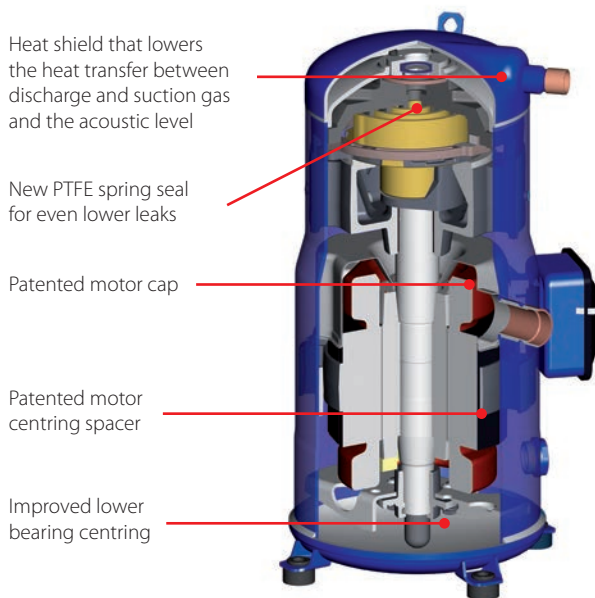
1)  $T_e=7.2^{\circ}\text{C}$ ,  $T_c=54.4^{\circ}\text{C}$ ,  $SH=11.1\text{K}$ ,  $SC=8.3\text{K}$

2) Brazed connections, screw terminals

# SH / SY / SZ, S-Series, Scroll compressors

By combining an in-depth understanding of customer needs with continuous investment in product technology Danfoss is able to offer you the SH / SY / SZ series, which comprise a 7-30TR industry-leading range of scroll compressors optimized for rooftop and chiller applications.

Available in a large variety of single and manifold models for R410A, R407C, R134a and R22. The compressors combine high energy efficiency with low sound and minimal vibration.



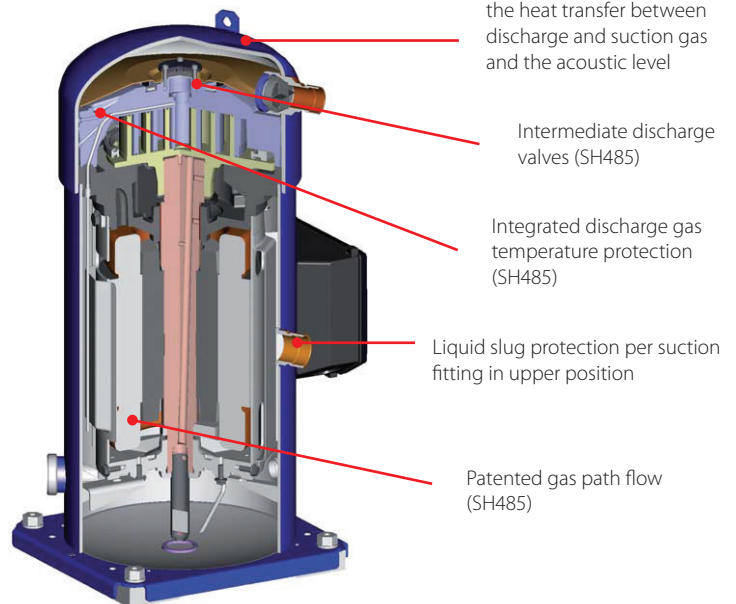
Heat shield that lowers the heat transfer between discharge and suction gas and the acoustic level

New PTFE spring seal for even lower leaks

Patented motor cap

Patented motor centring spacer

Improved lower bearing centring



Heat shield that lowers the heat transfer between discharge and suction gas and the acoustic level

Intermediate discharge valves (SH485)

Integrated discharge gas temperature protection (SH485)

Liquid slug protection per suction fitting in upper position

Patented gas path flow (SH485)

## Facts

### Applications:

- Rooftop
- Process chiller
- Ducted split air-con
- IT cooling
- Chiller application

### Segment usage:

- Airconditioning & High temp.

### Refrigerants:

- R134a
- R410A
- R407C

### Capacity range:

- 7.5 – 40 TR / 26 – 140 kW

### Benefit:

- Greater reliability with the internal non-return valve, which avoids refrigerant migration from the high pressure side
- Highly efficient and reliable protection against overheating, overloading, phase loss and phase order with specific electronic module protection
- Quieter and more efficient operation with "no contact – no wear" scroll design for reduced friction

# Technical data and ordering

## SH

### Scroll compressors

Compressors model	Nominal cooling capacity (W) <sup>1)</sup>		Oil charge (dm <sup>3</sup> )	Net weight (kg)	Displacement m <sup>3</sup> /h @ 2900	Code no.
	R410A					400 / 3 / 50 Volts / Phase / Hz
SH090	22300		3	58	15.404	120H0003
SH105	26800		3.3	64	18.09	120H0211
SH120	30000		3.3	64	20.3	120H0013
SH140	34700		3.3	67	23.1	120H0201
SH161	38800		3.3	69	26.39	120H0023
SH184	44700		3.6	71.5	29.59	120H0361
SH180	44500		6.7	108	29.59	120H0275 <sup>4)</sup>
SH240	59700		6.7	108	39.58	120H0291 <sup>3)</sup>
SH295 <sup>2)</sup>	73200		6.7	111	48.11	120H0827 <sup>4)</sup>
SH380	90500		6.7	159	60	120H0255 <sup>4)</sup>
SH485	116400		6.7	175	77	120H1064 <sup>4)</sup>

1) Te= 7.2°C, Tc= 54.4 °C, SH= 11.1K, SC= 8.3K

2) SH295 replaces SH300. SH300 model remains available for after-market

3) Module 24V AC (Electronic motor protection module located in terminal box)

4) Module 110 - 240V (Electronic motor protection module located in terminal box)

## SY / SZ

### Scroll compressors

Compressors model	Nominal cooling capacity (W) <sup>1)</sup>		Oil charge (dm <sup>3</sup> )	Net weight (kg)	Displacement m <sup>3</sup> /h @ 2900	Code no.
	R407C	R134a				400 / 3 / 50 Volts / Phase / Hz
SZ084	19300	13630	3.25	64	19.9	SZ084-4VI
SZ090	20400	14520	3.25	65	21	SZ090-4VI
SZ100	21600	15500	3.25	65	22.1	SZ100-4VI
SZ110	24600	17550	3.25	73	25.1	SZ110-4VI
SZ120	28600	20260	3.25	73	29	SZ120-4VI
SZ148	35100	24370	3.6	88	34.6	SZ148-4VAI
SZ161	38000	26060	3.6	88	37.7	SZ161-4VAI
SZ185	43100	30440	6.2	100	43.5	SZ185-4CAI
	43100	30440	6.2	100	43.5	SZ185-4RI <sup>3)</sup>
SY240 <sup>2)</sup>	59100	40450	8	150	60.5	SY240A4PBI <sup>3)</sup>
	59100	40450	8	150	60.5	SY240A4CBI
SY300 <sup>2)</sup>	72730	50410	8	157	76.1	SY300A4PBI <sup>3)</sup>
SY380 <sup>2)</sup>	89540	63260	8.4	158	92.4	SY380A4CAI
	89540	63260	8.4	158	92.4	SY380A4CBI

1) Te= 7.2°C, Tc= 54.4 °C, SH= 11.1K, SC= 8.3K

2) SY240-300-380 has replaced SZ240-300-380 compressors

3) Rotolock version

# Overview of lubricant / oil types

Recommended to reduce friction, reduce abrasion of mobile pieces of compressors and protect them against corrosion.

Features  
Lubricant / oil



## Facts

### Type:

- Mineral
- Synthetic
- Semi-synthetic

### Features:

- Obtained per distillation of the petroleum
- Produced from chemical and petrochemical compound
- Blend of different oil bases

# Technical data and ordering

## Lubricant / oil types

Type	Description	Application	Packaging		Code no.
			Type	Quantity	
160P	Mineral oil, 160P, 2 liter can	SM, MT, MLM116	Multipack	8	7754001
160P	Mineral oil, 160P, 2 liter can	SM, MT, MLM116	Multipack	4	7754002
160SZ	POE lubricant, 160SZ, 2.5 liter can	SZ, SH, PSH, WSH, DSH, VZH088-117-170, VSH088-117-170	Multipack	4	120Z0571
320SZ	POE lubricant, 320SZ, 2.5 liter can	SY	Multipack	4	120Z0572
320HV	PVE lubricant, 320HV (FVC68D), 1 liter can	DCJ, HRP, HLP, HCP, HRH, HLH, HLJ, HCJ, HHP, MLZ/LLZ, VZH028-035-044, VZH052-065**, MLZ116	Single pack	1	120Z5034
175PZ	POE lubricant 175PZ, 2.5 liter can	MTZ, NTZ, VTZ	Multipack	4	120Z0639
175PZ	POE lubricant 175PZ, 1 liter can	MTZ, NTZ, VTZ	Multipack	12	120Z0638
215PZ	POE lubricant 215PZ (RL46HB), 1 liter can	MLZ evolution index A LLZ evolution index A VLZ028-035-044	Multipack	12	120Z0648

### Attention:

Always use the original specific oil for each compressor model. The use of a different oil specified can lead to compressor failure. Special attention should be given to the management of the polyolester oil as this is highly hygroscopic and when exposed, quickly absorbs moisture from the air. Do not let the compressor or the oil packaging open to the atmosphere for a long period.

# Spare parts and accessories



## Discharge thermostat kit

Application	Description	Code no.
All models	Discharge thermostat kit	7750009

## Crankcase heater



Application	Description	Code no.
All MTZ/MT/NTZ/VTZ models	PTC heater 27W	120Z0459
All recip 1 cyl	Belt type crankcase heater, 54W, 230V, CE mark, UL	7773106
LLZ all models, VZH028-035-044	Belt type crankcase heater, 55/70W, 400/460V, CE mark, UL	120Z5041
MLZ/MLM 015-019-021-026	Belt type crankcase heater, 70W, 240V, CE mark, UL	120Z5040
HRM025-047, HRP025-047, HRH029-050	Belt type crankcase heater, 40W, 230V, CE mark, UL	120Z0055
VSH088.117 & VZH088.117	Belt type crankcase heater, 65W, 230V, CE mark, UL	120Z0038
SM/SZ175-185 & SH180-240 to 485, VSH170 & VZH170, All recip 4 cyl	Belt type crankcase heater, 75W, 110V, CE mark, UL	7773110
SM/SZ175-185 & SH180-240 to 485, VSH170 & VZH170, All recip 4 cyl	Belt type crankcase heater, 75W, 230V, CE mark, UL	7973005
SM/SZ175-185 & SH180-240 to 485, VSH170 & VZH170, All recip 4 cyl	Belt type crankcase heater, 75W, 230V, CE mark, UL	7773108
SM/SZ175-185 & SH180-240 to 485, VSH170 & VZH170, All recip 4 cyl	Belt type crankcase heater, 75W, 400V, CE mark, UL	7773118
SM/SZ084-161, VSH088.117 & VZH088.117, All recip 2 cyl	Belt type crankcase heater, 65W, 400V, CE mark, UL	7773117
SM/SZ084-161, VSH088.117 & VZH088.117, All recip 2 cyl	Belt type crankcase heater, 65W, 230V, CE mark, UL	7773107
SM/SZ084-161, VSH088.117 & VZH088.117, All recip 2 cyl	Belt type crankcase heater, 65W, 230V, CE mark, UL	7973002
SY/SZ240-380	Belt type crankcase heater, 130W, 400V, CE mark, UL	7773123
SY/SZ240-380	Belt type crankcase heater, 130W, 230V, CE mark, UL	7773122



## Acoustic hood

Application	Description	Code no.
MT(Z)18-40 & NTZ048-068 Single pack 1	Slim acoustic hood for 1 cyl	120Z0575
MT(Z)44-81 & NTZ096-136 Single pack 1	Slim acoustic hood for 2 cyl	120Z0576
MT(Z)100-160 & NTZ215-271 Single pack 1	Slim acoustic hood for 4 cyl	120Z0577
SM/SZ084.090.100 Single pack 1	Acoustic hood for scroll compressor	7755011
SM/SZ110.120	Acoustic hood for scroll compressor	7755010
SM/SZ148*.161*	Acoustic hood for scroll compressor	7755017
SY/SZ240.300	Acoustic hood for scroll compressor	7755016
SM/SZ175.185	Acoustic hood for scroll compressor	7755007

# Spare parts and accessories



## Capacitor & relay

Application	Description	Code no.
HRM032-047, HRP034-047, HRH029-040 all code 5, HHP015.019.021.026	Start capacitor 250V, 145-175 µF	120Z0399
HRM051-054, HRP051-054 all code 5, HHP030	Start capacitor 250V, 161-193 µF	120Z0400
HRM045-047, HRP045-047, HRH038-040 all code 5, HHP019-021	Run capacitor 440V, 60 µF	120Z0050
HRM054-060, HLM068-081, HRP054-060, HLP068-081, HRH051-056, HLH068, HLJ072-083 all code 5, HHP038, MLZ/MLM038.042	Run capacitor 440V, 55 µF	8173234
HHP015	Run capacitor 440V, 40 µF	8173231
HRM032-042, HRP034-042, HRH029-036 all code 5, HHP026	Run capacitor 440V, 70 µF	120Z0051
MLZ/MLM038.042	Start capacitor 330V, 88-108 µF (98 µF)	8173001
MT(Z)18-81, SM/SZ084-110 & SH090 & WSH090 & PSH019	Electronic soft start kit, MCI 15 C	7705006
MT(Z)100-160, SM/SZ115-185 & SH105-184 & WSH105-184 & PSH023.026.030.034.039	Electronic soft start kit, MCI 25 C	7705007
MT(Z)18-5, 22-5, 28-5 & NTZ 048-5, 068-5	Permanent capacitors 440V, 20 µF, 10 µF	7701026
MT(Z)32-5, 36-5	Relay + Capacitors: run (25 + 10 µF), start (140 µF)	7701023



## Terminal box

Application	Description	Code no.
HRM, HLM, HCM, HRP, HLP, HCP, HRH, HLH, HLJ, HHP	Square terminal box (C & Q version)	120Z5018
HRM, HLM, HCM, HRP, HLP, HCP, HRH, HLH, HLJ, HHP	Round terminal box (P & T version)	120Z5015
HRM, HLM, HCM, HRP, HLP, HCP, HRH, HLH, HLJ, HHP, HHP030.038.045	IP54 upgrade kit for square terminal box	118U0057
SH180.240.295.300.380*.485*, SY/SZ240.300.380 - SY/SZ185 with module	Terminal box 210 x 190 incl. cover	120Z0458
SM084.090.100.110.112.120.124.147.148*.161* SZ084.090.100.110.120.148*.161* SH090.105.120.140*.161* WSH090.105.120.140*.161*	Service kit for terminal box 96 x 115 mm, including 1 cover, 1 clamp	8156135
SM/SZ148-3.161-3.175.185	Terminal box 186 x 198 mm, incl cover	8156139
MT/MTZ18-44(1), 18-73(3), 18-81(4), 18-50(5), 18-40(6), 32-56(7), 22-80(9) & NTZ048-136 (except 136-1)	Cover 80 x 96 mm ; clamp	8156134

## Mounting kit



Application	Description	Code no.
MT/MTZ18-81 & NTZ048-136	Mounting kit 1 & 2 cyl; Ebox: 80 x 96 mm; Sleeves 5/8" - 1/2"	8156001
MT/MTZ100-160 & NTZ215-271	Mounting kit for 4 cylinder compressor & MS, including 4 grommets, 4 bolts Ebox: 96 x 115 mm; Sleeves 1" 1/8 - 3/4"	8156007
SH180 - 240 to 485 in parallel installation, PSH051.064.077	Mounting kit for 1 scroll compressor including 4 hexagonal rigid spacers, 4 sleeves, 4 bolts, 4 washers	7777045

# One Supplier Covers your Industrial Refrigeration Needs

Danfoss has made a clear priority to be able to supply all types of components for industrial refrigeration. Having just one place to go for industrial refrigeration is a significant benefit. Danfoss' one-stop-shop concept makes constructing as well as servicing fast and easy and helps keep the part stock at a minimum.

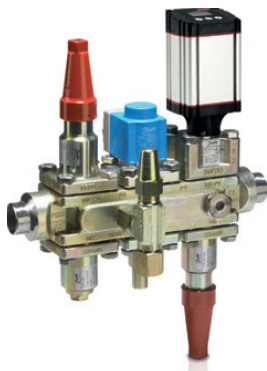
Whether your industrial refrigeration plant is a manual system or a highly-automated system, you will be sure to find a Danfoss solution that exactly matches your project needs in our wide range for industrial refrigeration. With the support of our online tools and our dedicated, local staff, we continuously strive to make your selection of solutions safe and easy.

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## The Flexline™ platform

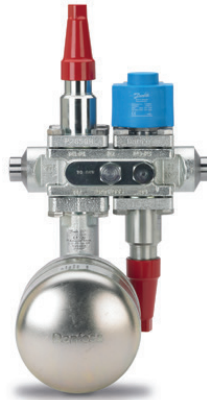
The Flexline™ platform is synonymous with flexibility within industrial refrigeration. Based on a modular design concept, you will

experience that each product features a variety of benefits, including easy selection, installation and maintenance.



### ICF Flexline™ valve station

The Danfoss ICF Flexline™ multi-ported control solution offers you significant savings by substituting a string of valves with just one valve station. Consisting of a valve housing and a maximum of four or six function modules, the valve station is a true plug-and-play solution.



### ICFD Defrost Module

The liquid drain method is widely acknowledged as the most efficient hot gas defrost method within industrial refrigeration. The method ensures that liquid condensate is drained at lowest possible pressure resulting in a reduction of blow-by gas by up to 90%.



### SLV Flexline™ product platform

The SVL Flexline™ product platform is targeted to meet industrial refrigeration requirements worldwide. Using just two basic valve housings – a straightway and an angleway – the platform offers five different functions.

## ICV Flexline™ valves

The ICV product family consists of an ICS pilot operated control, ICM motor operated control and ICLX 2-step solenoid valve. All valve variants are based on one common valve body to offer outstanding flexibility.

The modular concept greatly facilitates the building of a valve that offers energy savings and reduction of down-time. All valves are designed for a maximum working pressure of 52 bar (754 psi) and efficiently handle CO<sub>2</sub> and other future high pressure refrigerants.



**ICLX 2-step solenoid valve**

The ICLX valves are 2-step servo-operated main valves with pilot solenoid valves offering safe, flexible and convenient installation, operation and service.



**ICM motor operated valve**

The ICM motor operated valves are very compact and easy to handle. The ICM motor valve is available as a complete valve and as parts programme.



**ICS pilot operated servo valve**

The ICS pilot operated servo valves are quick and simple to handle, install and service due to their low weight and compact design.



**ICSH, dual position solenoid valve**

The ICSH dual position solenoid valve is designed for gradual and safe opening of the hot gas flow to the evaporator, featuring an extra-safety-configuration to prevent hydraulic shocks in the system.



**New Danfoss Pilot Valve program for ICS control valves**

The new Danfoss Pilot Valve program for ICS control valves consist of just 4 fully backwards-compatible valves, which cover all regulation types and ranges needed in ammonia and CO<sub>2</sub> applications.

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## Danfoss gas detection units for industrial refrigeration systems

The new Danfoss gas detectors are based on an intelligent platform and intuitive user-interface, Danfoss' complete line of fixed gas detectors range from basic to heavy duty models with sensor technology to match the specific refrigerant, application, and safety requirements of your system.

The Danfoss gas detection portfolio enables you to comply with regulations according to EN 378:2016, ISO 5149:2014, IIAR 2-2017, and ASHRAE 15:2016 while providing comprehensive safety and easy-to-use features



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## Evaporator control solution

The evaporator sub-system solution brings together Danfoss' efficient and reliable valves and controls to provide efficient and safe installation, operation & maintenance of the evaporator sub-system.

The evaporator control solution is prepared for smart defrosting which provide an optimized hot gas defrost process to better schedule, control, start and terminate

defrosting delivering improved energy efficiency and reduced defrost cycle duration time. The system features a controller dedicated for industrial refrigeration requirements and applications which manages the steps in the defrost cycle. The solution offers a safe defrost process that meets latest IIAR standards for hot gas defrost.



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## Air purger

The Danfoss Intelligent Purger System is a new, stand-alone air purger solution for multi purging. The automatic purging function, responds immediately to non-condensable gases in the refrigeration

system improving system efficiency and safety. With a compact, plug & play design it provides fast and easy installation, saves space and reduces overall cost.



**Complete industrial refrigeration solutions supplier for sensor, liquid level regulating valves, safety valves, and switches.**



**AKS 4100 Liquid Level Sensor**

Liquid Level Sensor with TDR Guided Radar technology fully adapted to the Industrial Refrigeration segment – reliable and with high accuracy.



**Liquid Level Control (AKS 38, HFI, SV, LLG)**

Liquid level control is an important element in the designing of industrial refrigeration systems. It controls the liquid injection to maintain a constant liquid level. Danfoss offers Mechanical and electro-mechanical solution suited for meet varying plant requirements.



**Safety Relief Valves (SFA, SFV, DSV, BSV, POV)**

Danfoss Safety valves are designed to meet the strict quality demands and safety requirements for refrigeration installations, specified by the international classification societies.



**Switches and thermostats for Industrial Refrigeration**

Pressure controls and thermostats applicable for industrial refrigeration applications including ammonia as a refrigerant.



**Liquid Level Glasses**

LLG are liquid level glasses in ductile steel which meets the strictest requirements on industrial and marine refrigeration installations



Coming Soon

**Semi-welded plate heat exchanger**

Danfoss semi-welded plate heat exchangers are optimized for Ammonia industrial applications systems such as Condensers, flooded and pumped evaporators, Sub-coolers, Desuperheaters, Superheaters, Economizers and Oil coolers.

**IR product information**



**IR products overview**



**IR tools**

If you need any further information, please email to [customer-care.pac@danfoss.com](mailto:customer-care.pac@danfoss.com)

# Danfoss Infogram

Danfoss has created various of information graphics for you to visualise quickly on how to troubleshoot problems, tips and tricks for selecting and installing products, working principal of products etc.



## Cool Room

Overview of cold room types and products



## Compressor Checkup Tips

Overview of compressor basic inspection



## Compressor Replacement

What to remember when selecting a replacement compressor



## Danfoss CoolApps

Overview of Danfoss Cooling mobile app



## Danfoss Learning

Overview of number of cooling courses, registrations, training programs and benefits from Danfoss Learning



## Filter Driers and Sight Glasses

Selection, troubleshooting, symptoms of filter driers and sight glasses



**ICF Valve Station**

What's in it for contractors



**Solenoid Valves Troubleshooting**

Troubleshooting, tips and tricks



**KV Function**

Danfoss KV valves overview and how it works



**Refrigerant Trends and Challenges**

Key drivers of the refrigerant agenda, market observation related to refrigerant prices and regulations



**360° Solenoid Valve**

Selection and installation tips etc

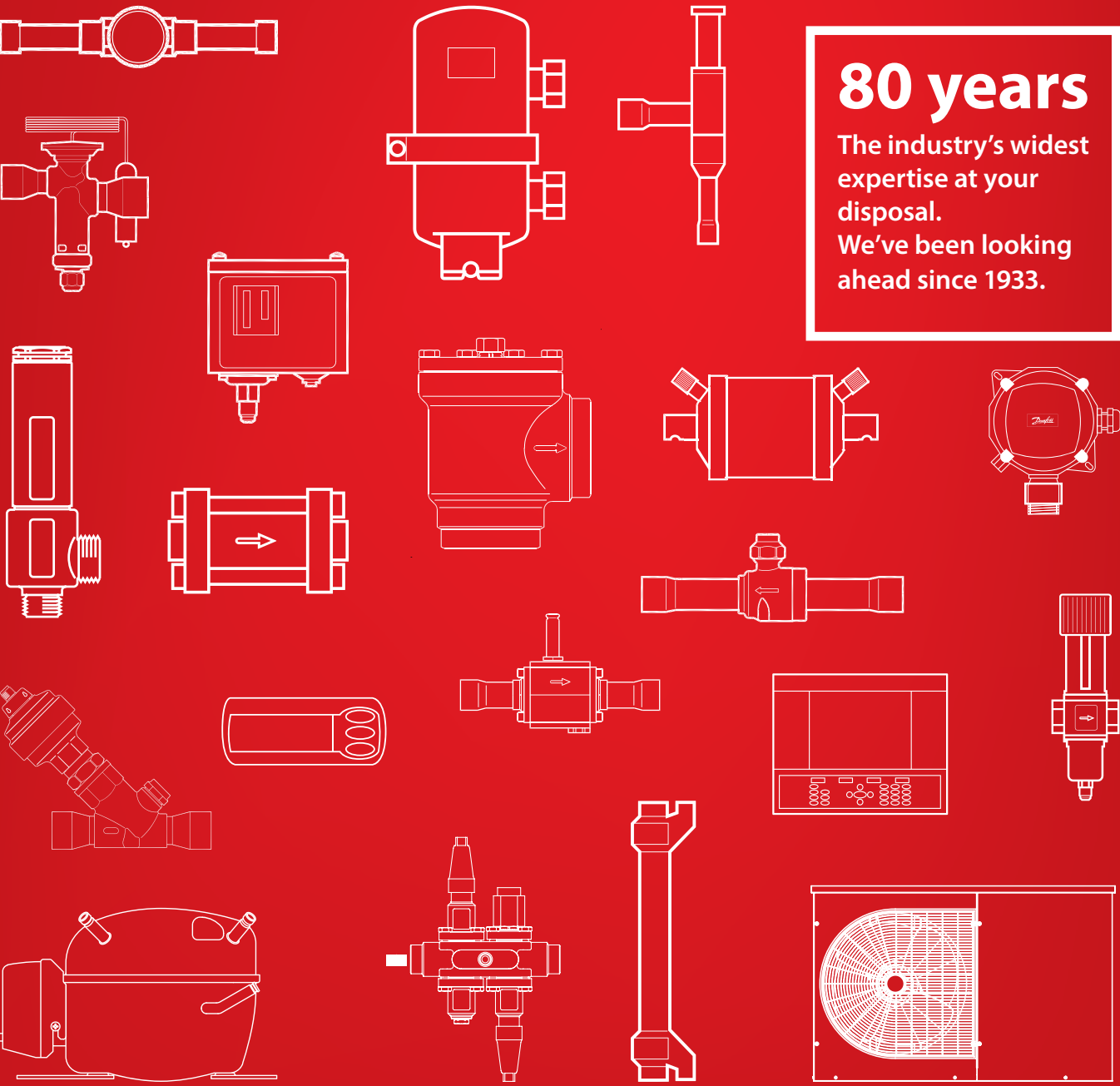


**TXV Troubleshooting**

Expansion troubleshooting, tips and tricks

# REFRIGERATION & AIR CONDITIONING

Automatic Controls | Electronic Controllers | Compressors



**80 years**  
The industry's widest  
expertise at your  
disposal.  
We've been looking  
ahead since 1933.

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