ENGINEERING
TOMORROW

Data sheet

Hot gas bypass regulator type CPCE
Liquid gas mixer type LG (accessory)

A CPCE hot gas bypass regulator is used to adapt compressor capacity to actual evaporator load.

It is installed in a bypass line between the high and low pressure sides of the refrigeration system and is designed for hot gas injection into the evaporator just after the expansion valve.

An LG type liquid gas mixer can be used at the point of injection to ensure a proper mixture.

Features

CPCE hot gas bypass regulator
- Superior control accuracy,
- Provides protection against too low an evaporator temperature,
- Direct connection to system suction line.

LG liquid gas mixer
- LG provides a homogeneous mixture of liquid and hot gas refrigerant in the evaporator,
- Can be used for hot gas defrosting or reverse cycle systems,
- Compliant with ATEX hazard zone 2.

Approvals

UL listed, file SA7200

Technical data

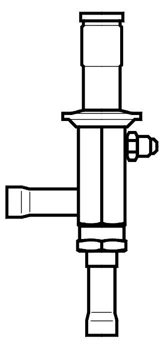
Refrigerants	R22, R1270, R1290, R134a, R404A, R407C, R507A, R600, R600a
Regulating range	p_e = 0 – 87 psig
Factory setting	5.8 psig
Maximum working pressure	MWP = 406 psig
Maximum differential pressure	Δp = 260 psig
Maximum test pressure	Pe = 450 psig
Maximum media temperature	285 °F
Minimum media temperature	-58 °F

Metric conversions
1 psi = 0.07 bar
$^5/_9$ (t_1 °F -32) = t_2 °C

This product is approved for R600, R600a, R1270, and R1290 by ignition source assessment in accordance with standard EN13463-1.

For complete list of approved refrigerants, visit **www.products.danfoss.com** and search for individual code numbers, where refrigerants are listed as part of technical data.

Ordering

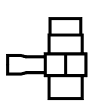


Hot gas bypass regulator

Type	Connection				Rated capacity[1]) [TR]				Code no.
	Flare		Solder - ODF		R22	R134a	R404A/ R507	R407C	
	[in]	[mm]	[in]	[mm]					
CPCE 12	$^1/_2$	12	–	–	6.2	4.3	6.3	6.7	**034N0081**
CPCE 12	–	–	$^1/_2$	12	6.2	4.3	6.3	6.7	**034N0082**
CPCE 15	–	–	$^5/_8$	16	9.2	6.3	9.1	9.9	**034N0083**
CPCE 22	–	–	$^7/_8$	22	12.2	8.4	12.1	13.2	**034N0084**

[1]) Rated capacity is based on:
Minimum suction temperature: t_s= 15 °F
Condensing temperature: t_c= 100 °F
Superheat of expansion valve: Δt_s= 7 °F

Liquid gas mixer



Type	Connection						Code no.
	For expansion valve ODM		For hot gas ODF		For liquid distributor ODF		
	[in]	[mm]	[in]	[mm]	[in]	[mm]	
LG 12 – 16	$^5/_8$	16	$^1/_2$	12	$^5/_8$	16	**069G4001**
LG 12 – 22	$^7/_8$	22	$^1/_2$	12	$^7/_8$	22	**069G4002**
LG 16 – 28	1 $^1/_8$	28	$^5/_8$	16	1 $^1/_8$	28	**069G4003**
LG 22 – 35	1 $^3/_8$	35	$^7/_8$	22	1 $^3/_8$	35	**069G4004**

Sizing

For optimum performance, it is important to select a CPCE valve according to system conditions and application.

The following data must be used when sizing a CPCE valve:

- Refrigerant: HCFC, HFC and HC
- Minimum suction temperature: t_s in [°F]
- Compressor capacity at minimum suction temperature: Q_1 in [TR]
- Evaporator load at minimum suction temperature: Q_2 in [TR]
- Superheat setting of expansion valve in [°F] Condensing temperature: t_c in [°F]
- Connection type: flare or solder

Selection

Example
When selecting the appropriate valve it may be necessary to convert the actual capacity using a correction factors. This is required when your system conditions are different than the table conditions.

The following examples illustrate how this is done.
- Refrigerant: R404A
- Minimum suction temperature: t_s= -20 °F
- Compressor capacity at minimum suction temperature: Q_1= 22.5 TR
- Evaporator load at minimum suction temperature: Q_2= 17 TR
- Superheat setting of expansion valve: 9 °F
- Condensing temperature: t_c= 90 °F
- Connection type: solder

Step 1

Determine the replacement capacity. This is done by taking the compressor capacity at minimum suction temperature Q_1 minus evaporator load at minimum suction temperature Q_2.
Q_1-Q_2=22.5-17=5.5 TR.

Step 2

Determine the correction factor for the expansion valve superheat setting.

From the correction factors table (see below) a superheat setting of 9 °F, R404A corresponds to a factor of 1.3.

Correction factors

Suction temp. t after reduction [°F]	Refrigerant	Superheat of expansion valve Δt_s [°F]						
		1	3	5	7	9	11	13
50	**R134a**	0.1	0.5	0.9	1.0	1.0	1.0	1.0
	R22, R404A, R507, R407C	0.3	0.9	1.0	1.0	1.0	1.0	1.0
30	**R134a**	0.1	0.3	0.7	1.0	1.0	1.0	1.0
	R22, R404A, R507, R407C	0.2	0.9	1.0	1.0	1.0	1.0	1.0
15	**R134a**	0.1	0.3	0.6	1.0	1.3	1.4	1.4
	R22, R404A, R507, R407C	0.1	0.5	1.0	1.0	1.0	1.0	1.0
-5	**R134a**	0.1	0.3	0.6	1.0	1.5	2.2	2.4
	R22, R404A, R507, R407C	0.1	0.3	0.7	1.0	1.0	1.0	1.0
-20	**R134a**	0.1	0.3	0.6	1.0	1.5	2.2	2.9
	R22, R404A, R507, R407C	0.1	0.3	0.6	1.0	1.3	1.4	1.4
-40	**R22, R404A, R507, R407C**	0.1	0.3	0.6	1.0	1.5	2.0	2.2

Metric conversions
1 psi = 0.07 bar
$^5/_9$ (t_1 °F -32) = t_2 °C
1 TR = 3.5 kW

Step 3

Corrected replacement capacity is
Q=1.3 × 5.5=7.2 TR

Step 4

Now select the appropriate capacity table and choose the column for minimum suction temperature ts and the column for condensing temperature t_c.

Using the corrected replacement capacity, select a valve that provides an equivalent or greater capacity.
A CPCE 22 delivers a replacement capacity of 8.0 ton at a minimum suction temperature of -20 °F and a condensing temperature of 90 °F.

Step 5

CPCE 22, $^7/_8$ in solder connection,
code no. 034N0084.

Capacity

Type	Minumum suction temperature t_s after pressure/ temperature reduction [°F]	Regulator capacity Q tons at condensing temperature t_c [°F]				
		70	90	100	120	140
R22						
CPCE 12	50	2.2	4.6	6.1	7.6	9.5
	30	3.7	4.9	6.2	7.7	9.5
	15	3.9	4.9	6.2	7.8	9.5
	-5	3.9	5.0	6.3	7.9	9.5
	-20	2.3	3.1	4.2	5.3	9.5
	-40	1.2	1.6	2.2	–	9.5
CPCE 15	50	3.3	6.8	9.0	11.2	13.9
	30	5.3	7.2	9.1	11.3	13.9
	15	5.7	7.3	9.2	11.4	13.9
	-5	5.7	7.3	9.3	11.6	13.9
	-20	3.3	4.5	6.0	7.7	13.9
	-40	1.7	2.2	3.0	–	13.9
CPCE 22	50	4.3	9.0	11.9	14.9	18.4
	30	7.1	9.5	12.0	15.0	18.4
	15	7.5	9.7	12.2	15.2	18.4
	-5	7.6	9.7	12.2	15.3	18.4
	-20	4.4	6.0	8.0	10.2	18.4
	-40	2.3	3.0	4.1	–	18.4
R134a						
CPCE 12	50	0.9	4.2	5.8	7.2	9.1
	30	3.1	4.5	5.8	7.3	9.1
	15	2.3	3.2	4.3	5.8	7.3
	-5	1.4	1.8	2.5	3.3	4.2
	-20	0.9	1.1	1.5	2.0	2.5
CPCE 15	50	0.9	6.1	8.5	10.7	13.4
	30	4.6	6.7	8.5	10.7	13.4
	15	3.3	4.7	6.3	8.5	10.7
	-5	1.9	2.7	3.5	4.8	6.1
	-20	1.1	1.4	2.0	2.6	3.2
CPCE 22	50	1.3	8.2	11.2	14.1	17.7
	30	6.1	8.9	11.3	14.1	17.7
	15	4.4	6.1	8.4	11.2	14.1
	-5	2.6	3.5	4.7	6.3	8.2
	-20	1.5	2.0	2.8	3.6	4.5

Metric conversions
1 psi = 0.07 bar
$^5/_9$ (t_1 °F -32) = t_2 °C
1 TR = 3.5 kW

The capacities are based on: Liquid temperature ahead of expansion valve t_l= 100 °F

Capacity
(continued)

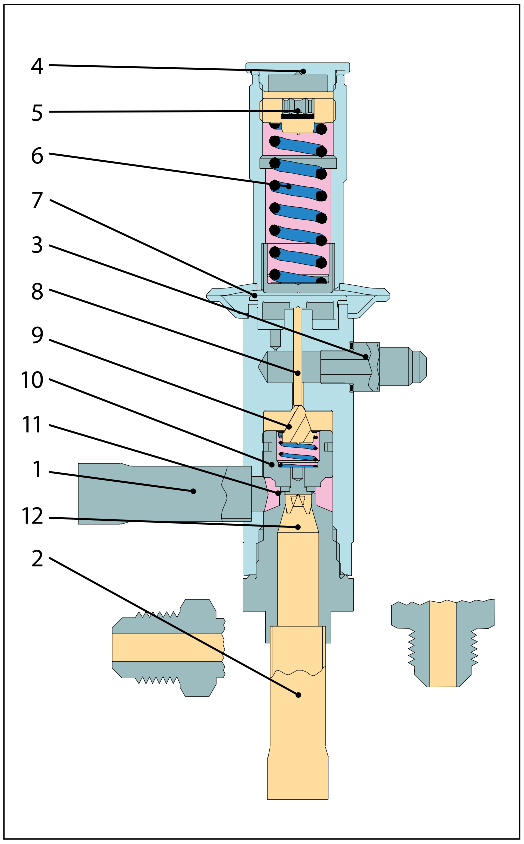
Type	Minumum suction temperature t_s after pressure/ temperature reduction [°F]	Regulator capacity Q tons at condensing temperature t_c [°F]				
		70	90	100	120	140
R404A/R507						
CPCE 12	50	2.2	4.6	6.2	7.7	9.6
	30	3.6	5.0	6.2	7.7	9.6
	15	3.9	5.0	6.3	7.7	9.6
	-5	4.0	5.0	6.3	–	9.6
	-20	3.1	4.2	5.4	–	9.6
	-40	1.7	2.2	2.9	–	9.6
CPCE 15	50	3.3	6.8	9.1	11.3	14.1
	30	5.4	7.3	9.1	11.3	14.1
	15	5.7	7.3	9.1	11.3	14.1
	-5	5.7	7.3	9.1	–	14.1
	-20	4.5	6.1	7.9	–	14.1
	-40	2.4	3.2	4.1	–	14.1
CPCE 22	50	4.4	9.0	12.1	15.0	18.7
	30	7.2	9.6	12.1	15.0	18.7
	15	7.6	9.6	12.1	15.1	18.7
	-5	7.6	9.8	12.1	–	18.7
	-20	5.9	8.0	10.5	–	18.7
	-40	3.2	4.3	5.4	–	18.7
R407C						
CPCE 12	50	2.4	5.0	6.6	8.2	10.3
	30	4.0	5.3	6.7	8.3	10.3
	15	4.2	5.3	6.7	8.4	10.3
	-5	4.2	5.4	6.8	8.5	10.3
	-20	2.5	3.3	4.5	5.7	10.3
	-40	1.3	1.7	2.4	–	10.3
CPCE 15	50	3.6	7.3	9.7	12.1	15.0
	30	5.7	7.8	9.8	12.2	15.0
	15	6.2	7.9	9.9	12.3	15.0
	-5	6.2	7.9	10.0	12.5	15.0
	-20	3.6	4.9	6.5	8.3	15.0
	-40	1.8	2.4	3.2	–	15.0
CPCE 22	50	4.6	9.7	12.9	16.1	19.9
	30	7.7	10.3	13.0	16.2	19.9
	15	8.1	10.5	13.2	16.4	19.9
	-5	8.2	10.5	13.2	16.5	19.9
	-20	4.8	6.5	8.6	11.0	19.9
	-40	2.5	3.2	4.4	–	19.9

Metric conversions
1 psi = 0.07 bar
$^5/_9$ (t_1 °F -32) = t_2 °C
1 TR = 3.5 kW

The capacities are based on: Liquid temperature ahead of expansion valve t_l= 100 °F

Design / Function

CPCE



1. Inlet
2. Outlet
3. Pilot pressure connection
4. Protective cap
5. Setting screw
6. Main spring
7. Diaphragm
8. Pressure pin
9. Pilot orifice
10. Servo piston
11. Pressure equalizing hole
12. Main orifice

Hot gas bypass regulator type CPCE is a servo-operated valve.

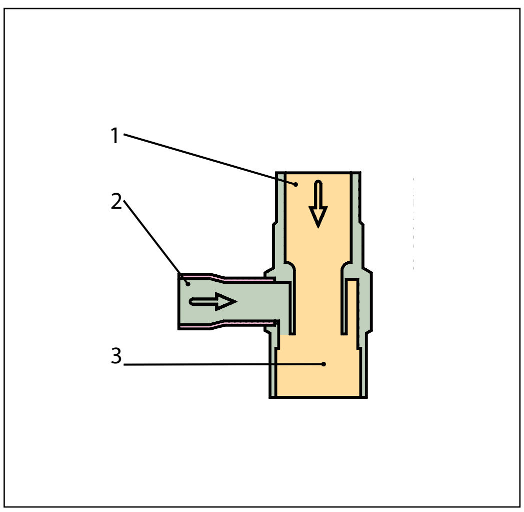
The diaphragm (7) is acted on by two forces: the spring force (6) and the force created from the pilot pressure (3) (suction pressure).

When the pilot pressure falls below the valve's setting, the throttling ball is forced away from the pilot orifice (9) by the spring pressure transfered through the pressure pin (8).

The pressure over the servo piston (10) is then relieved through the pilot connection allowing the differential pressure across the inlet and outlet to open the valve, in turn allowing the flow of hot gas into the evaporator.

When the pilot pressure (suction pressure) rises above the valve's setting, the throttling ball seals off the piston chamber where high pressure begins to build through the equalization hole (11), causing the valve to close.

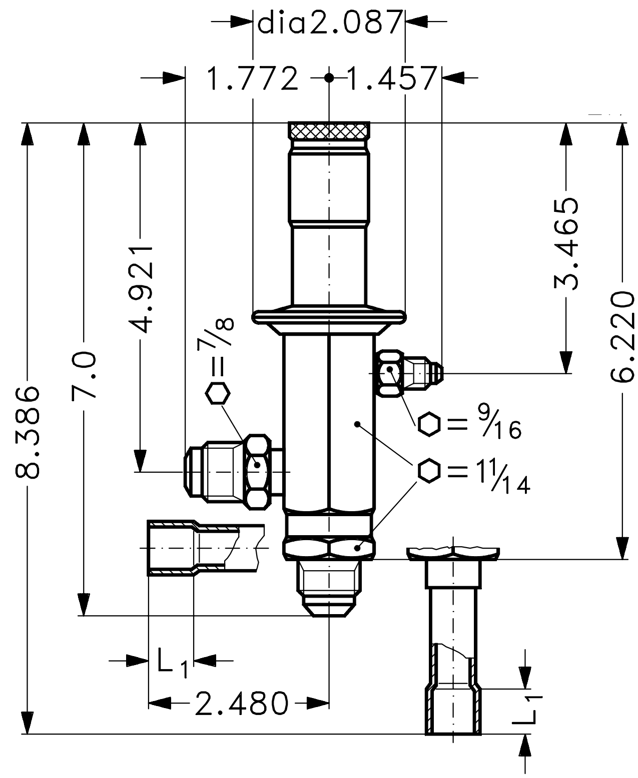
LG



1. Liquid inlet
2. Hot gas inlet
3. Outlet

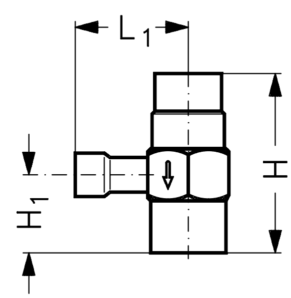
Dimensions [in] and weights [lb]

CPCE



Type	L_1	Net weight
CPCE 12	0.375	2
CPCE 15	0.5	2
CPCE 22	0.669	2

LG



Type	H	H_1	L_1	NV	Net weight
LG 12 – 16	2.125	0.875	1.563	0.938	0.2
LG 12 – 22	2.438	1.031	1.688	1.125	0.4
LG 16 – 28	3.125	1.375	1.875	1.438	0.7
LG 22 – 35	3.500	1.563	2.625	1.625	0.9

Metric conversions
1 in = 25.4 mm
1 lb = 0.454 kg