

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.

*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.

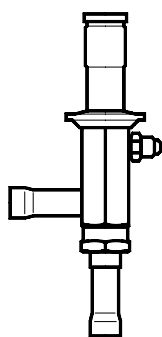
**Approvals**

UL listed, file SA7200

**Technical data**

Refrigerants	HCFC, HFC and HC
Regulating range	$p_e = 0 - 87$ psig
Factory setting	5.8 psig
Maximum working pressure	MWP = 406 psig
Maximum differential pressure	$\Delta p = 260$ psig
Maximum test pressure	$P_e = 450$ psig
Maximum media temperature	285 °F
Minimum media temperature	-58 °F

Metric conversions  
 1 psi = 0.07 bar  
 $\frac{5}{9}(t_1 \text{ °F} - 32) = t_2 \text{ °C}$

**Ordering**
*Hot gas bypass regulator*


Type	Connection				Rated capacity <sup>1)</sup> [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

<sup>1)</sup> Rated capacity is based on:  
 Minimum suction temperature:  $t_s = 15$  °F  
 Condensing temperature:  $t_c = 100$  °F  
 Superheat of expansion valve:  $\Delta t_s = 7$  °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:  $Q_c$  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:  $t_s = -20\text{ }^\circ\text{F}$
- Compressor capacity at minimum suction temperature:  $Q_1 = 22.5\text{ TR}$
- Evaporator load at minimum suction temperature:  $Q_2 = 17\text{ TR}$
- Superheat setting of expansion valve:  $9\text{ }^\circ\text{F}$
- Condensing temperature:  $t_c = 90\text{ }^\circ\text{F}$
- 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  $Q_2$ .  
 $Q_1 - Q_2 = 22.5 - 17 = 5.5\text{ TR}$ .

**Step 2**

Determine the correction factor for the expansion valve superheat setting.

From the correction factors table (see below) a superheat setting of  $9\text{ }^\circ\text{F}$ , R404A corresponds to a factor of 1.3.

*Correction factors*

Suction temp. $t$ after reduction [ $^\circ\text{F}$ ]	Refrigerant	Superheat of expansion valve $\Delta t_s$ [ $^\circ\text{F}$ ]						
		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  
 $\frac{5}{9}(t_1\text{ }^\circ\text{F} - 32) = t_2\text{ }^\circ\text{C}$   
 1 TR = 3.5 kW

**Step 3**

Corrected replacement capacity is  
 $Q = 1.3 \times 5.5 = 7.2\text{ TR}$

**Step 4**

Now select the appropriate capacity table and choose the column for minimum suction temperature  $t_s$  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  $-20\text{ }^\circ\text{F}$  and a condensing temperature of  $90\text{ }^\circ\text{F}$ .

**Step 5**

CPCE 22,  $\frac{7}{8}$  in. solder connection,  
**code no. 034N0084.**

Capacity

Type	Minimum suction temperature $t_s$ after pressure/temperature reduction [°F]	Regulator capacity Q tons at condensing temperature $t_c$ [°F]				
		70	90	100	120	140
<b>R22</b>						
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
<b>R134a</b>						
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  
 $\frac{5}{9}(t_1 \text{ °F} - 32) = t_2 \text{ °C}$   
 1 TR = 3.5 kW

The capacities are based on: Liquid temperature ahead of expansion valve  $t_i = 100 \text{ °F}$

**Capacity**  
(continued)

Type	Minimum suction temperature $t_s$ after pressure/temperature reduction [°F]	Regulator capacity Q tons at condensing temperature $t_c$ [°F]				
		70	90	100	120	140
<b>R404A/R507</b>						
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
<b>R407C</b>						
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

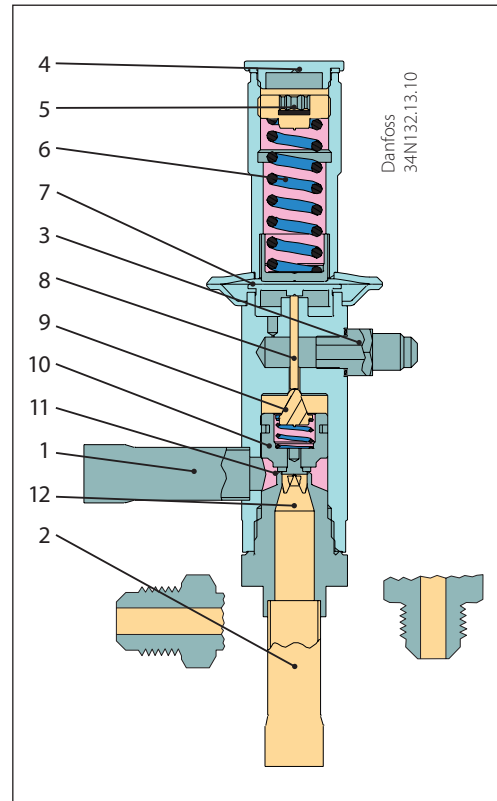
Metric conversions  
 1 psi = 0.07 bar  
 $\frac{5}{9}(t_1 \text{ °F} - 32) = t_2 \text{ °C}$   
 1 TR = 3.5 kW

The capacities are based on: Liquid temperature ahead of expansion valve  $t_1 = 100 \text{ °F}$

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).

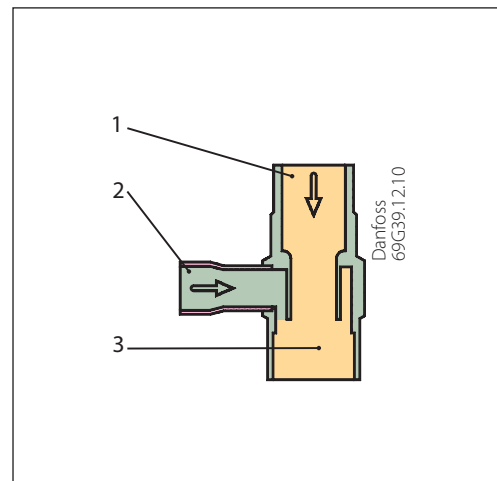
When the pilot pressure falls below the valve's setting, the throttling ball is forced away from the pilot orifice (9) by the spring pressure transferred through the pressure pin (8).

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.

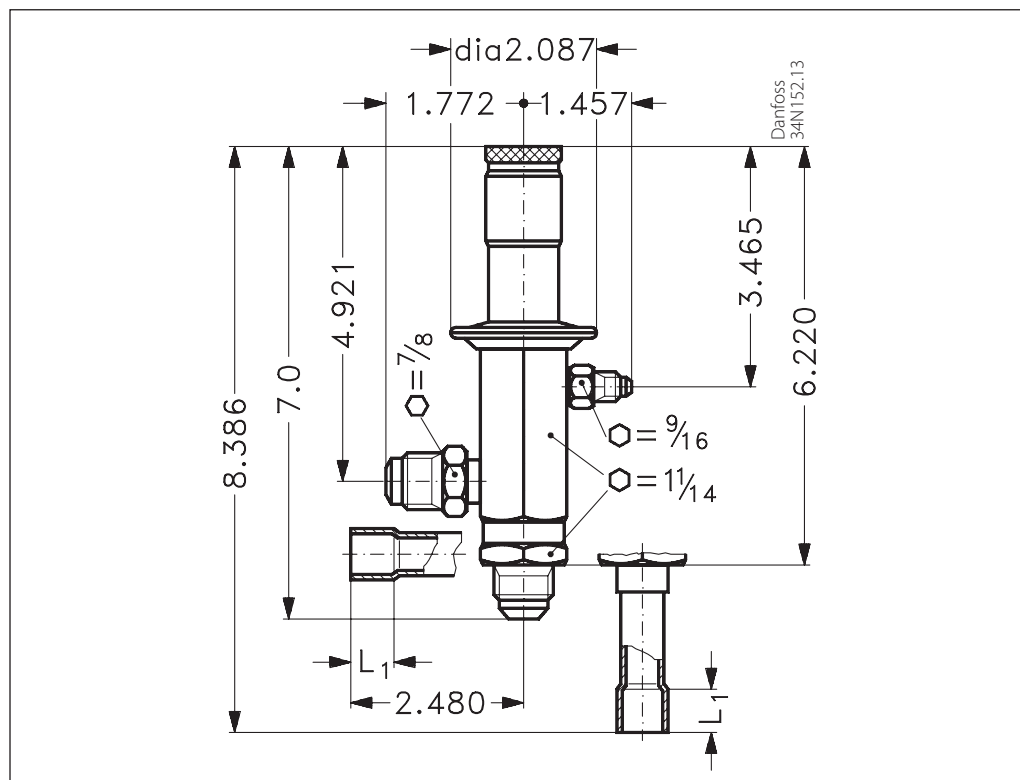
LG

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



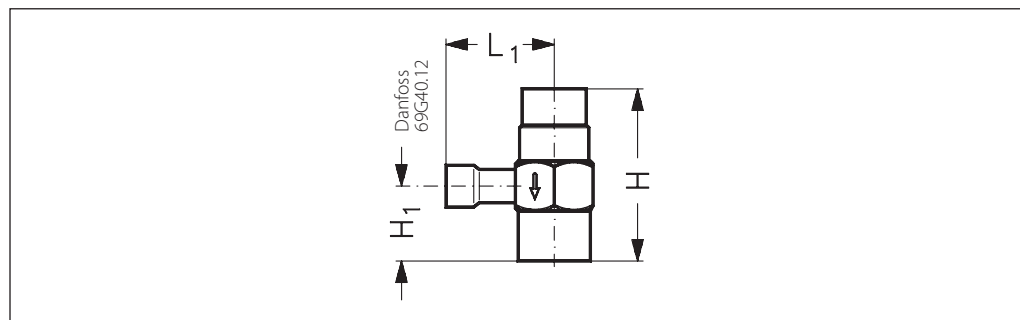
Dimensions [in.]  
and weights [lb]

CPCE



Type	L <sub>1</sub>	Net weight
CPCE 12	0.375	2
CPCE 15	0.5	2
CPCE 22	0.669	2

LG



Type	H	H <sub>1</sub>	L <sub>1</sub>	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

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