Vickers® by Danfoss
Proportional Valves

Proportional Pressure Relief Valves

KCG-6/8, 1* Series

Basic Characteristics

Max. pressure ..... 350 bar (5000 psi)
Max. flow rate . 400 L/min (106 USgpm)
Mounting face to ISO 6264:
For KCG-6 ..... AR-06-2-A
For KCG-8 ..... AS-08-2-A

General Description

These two-stage pressure relief valves (based on Vickers by Danfoss type CG2V valves featured in catalog 2323) offer extensive application possibilities through their ability to control the pressure setting in proportion to an applied electrical input (up to a pressure limit which is manually adjustable and lockable).

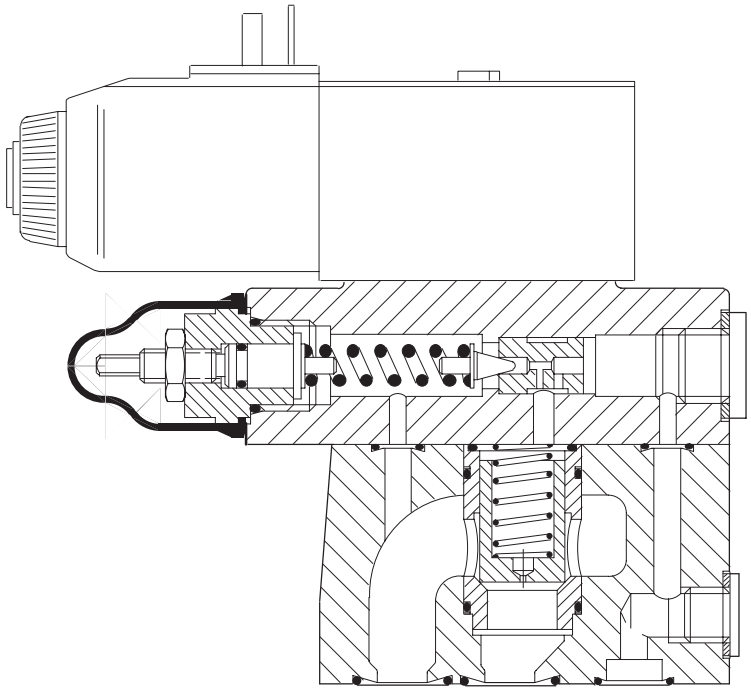
KCG-6/8
The valve responds to variations of current input to its solenoid, for which separate Vickers by Danfoss drive amplifiers, with PWM output stage and output current control, are available.

The proportional pilot control stage is a Vickers by Danfoss type KCG-3 valve, described in catalog 2162.

Features and Benefits

- With or without integrated electronics.
- Remote electrical proportional control of pressure from a choice of five pressure ranges per valve size.
- Excellent repeatability and stable performance results from cartridge design of mainstage elements.
- Low installed cost and space requirement from high power/size ratios (more than double that of many conventional designs).

KCG-6 Valve with Type "U" Coil Connection

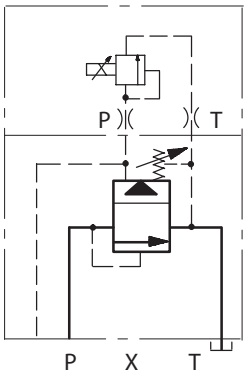


VICKERS by Danfoss

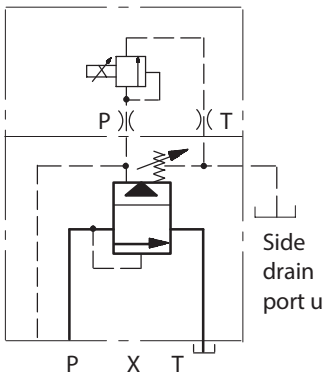
BC457577804425en-000201
GB-2324D

Functional Symbols

KCG-6/8 with manual and electrical pilots internally drained to port T:
Model code [7] = Blank

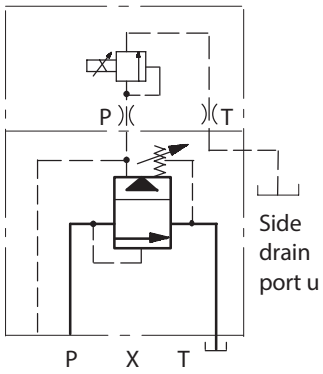


KCG-6/8 with manual and electrical pilots drained to side drain port ◆:
Model code [7] = 1



◆ Tapped port on side of pilot head.

KCG-6/8 with manual pilot internally drained to port T; electrical pilot drained to side drain port ◆:
Model code [7] = 3



◆ Tapped port on side of pilot head.

Model Code

Features in brackets () may be omitted. All other features must be specified.

Models requiring separate amplifiers

(F3-)KCG-* - * *** -* -Z-M-*** - *** -1*

[1] [2] [3] [4] [5] [6] [7] [8] [9] [11] [12]

[1] Fluid compatibility

Blank = Antiwear hydraulic oil (class L-HM)
F3 = As above or phosphate ester (class L-HFD)

[2] Valve type

KC = Proportional pressure relief

[3] Mounting type

G = Subplate mounted

[4] Mounting surface, ISO 6264

6 = AR-06-2-A
8 = AS-08-2-A

[5] Type of manual adjustment

K = Micrometer with keylock
M = Micrometer without keylock
W = Screw/locknut

[6] Pressure adjustment control range

40 = 6 - 40 bar (87 - 580 psi)
100 = 7,75 - 100 bar (112 - 1450 psi)
160 = 8,5 - 160 bar (125 - 2300 psi)
250 = 8,5 - 250 bar (125 - 3600 psi)
350 = 9,0 - 350 bar (130 - 5000 psi)

[7] Pilot drain options

See also "Functional Symbols "

Code	Drain routing: Manual pilot stage	Electrical pilot stage
Blank	Port T	Port T
1	Side port	Side port
3	Port T	Side port

[8] Override

Z-M = No manual override

[9] Coil connection type (KCG only)

U = ISO 4400 (DIN43650) interface ▼

U1 = Fitted with ISO4400 DIN plug

▼ Female connector to be supplied by user.

[10] Coil rating

Code = amps x ohms ◆
G1 = 3,5 x 1,65
GP1 = 3,0 x 2,0
H1 = 1,6 x 7,3
HA1 = 0,94 x 22
HL1 = 0,80 x 29
◆ Resistance at 20 °C (68 °F).

[11] Tank pressure rating

1 = 10 bar (145 psi)

[12] Design number, 1* series

Subject to change. Installation dimensions unaltered for design numbers 10 to 19 inclusive.

Operating Data

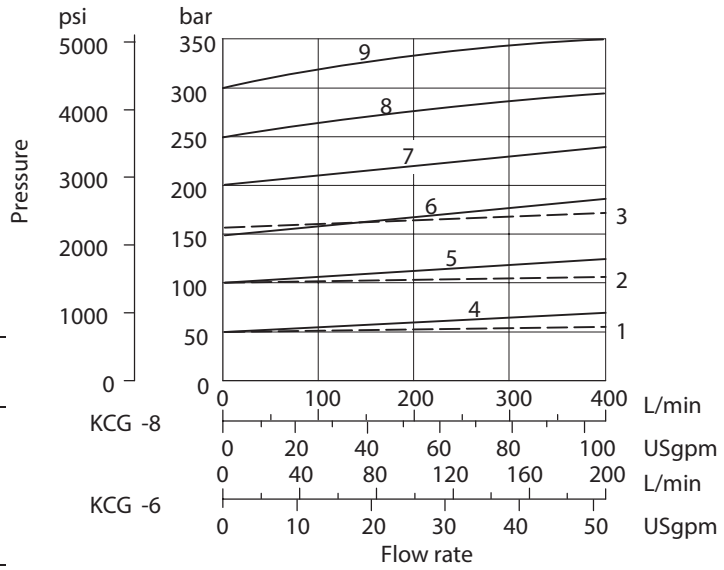
Standard test conditions are with antiwear hydraulic oil at 36 cSt (168 SUS) and 50° C (122° F)

Maximum pressures: Ports P and X ▲ Port T ▲ in KCG-*-****-Z- valves Port T ▲ in KCG-*-****-1/3-Z- valves Side drain port ▲ s Back pressure at these ports additive to the pressure setting of the valve.	 350 bar (5000 psi) 2 bar (30 psi) 350 bar (5000 psi) 2 bar (30 psi)
Rated flow at Δp = 6 bar (87 psi): KCG-6 KCG-8	 200 L/min (52.8 USgpm) 400 L/min (105.7 USgpm)
Vent ◆ flow with valve at rated flow ◆ See "Venting", page 6.	1 L/min (0.26 USgpm)
Pilot control drain flow, when valve is limiting system pressure, i.e. flow P to T occurring: KCG-6 KCG-8	 1,3 L/min (0.34 USgpm) 2,0 L/min (0.53 USgpm)
Coil or amplifier rating: KCG models	 See 10 in "Model Code " 24V x 40W max. (22 to 36V including 10% pk. to pk. max. ripple)
Pressure override when relieving and when off-load	See graphs
Hysteresis KCG models	 <5% (with 100 mA pk.-to-pk. dither) <6% (with factory-set dither)
Linearity, between 10% and 100% of rated pressure: KCG-6 models at 100 L/min (26 USgpm) KCG-8 models at 200 L/min (52 USgpm)	 <6% <6%
Repeatability	<1,3% of rated pressure
Mass (weight) KCG-6 KCG-8	 4,9 kg (10.8 lb) 5,8 kg (12.8 lb)
Supporting products: Amplifiers for KCG valves with "H" type coils only: EHH-AMP-7*2 series (power plug) EEA-PAM-513-A-14 (1 adjustable ramp) ISO 4400 (DIN 43650) electrical connector: Black, marked "B" Gray, marked "A" Subplates, size 03 Mounting bolts■ ■ Note: If not using Vickers by Danfoss recommended bolt kits, bolts must be to ISO 898 grade 12.9 or stronger.	 See catalogs 2114, 2115 and AN456962265001en-000101 See catalog BC444273273086en-000101 Part number 710775 Part number 710776 See catalog 2425 See catalog 2314A
Installation and start-up (commissioning): Installation and start-up (commissioning) guide Mounting attitude	 Installation guidelines can be found in PowerSource. No restriction, provided that the valve is kept full of fluid through port T.
Ordering procedure	Valves, subplates, bolt kits and Vickers by Danfoss amplifiers should be ordered by full model code designation. Order ISO (DIN) electrical connectors by part number.

Performance Data

Typical with oil at 36 cSt (168 SUS) and at 50 °C (122 °F)

Pressure Override when Relieving



Model	Curve number 1 2 3 4 5 6 7 8 9
KCG-**-40	●
KCG-**-100	● ●
KCG-**-160	● ● ●
KCG-**-250	● ● ● ● ● ●
KCG-**-350	● ● ● ● ● ●

Pressure Override Off-Load

Graphs show the minimum pressures obtainable:

a) With 0 mA current to the solenoid coil
b) When the valve is vented (see following explanation).

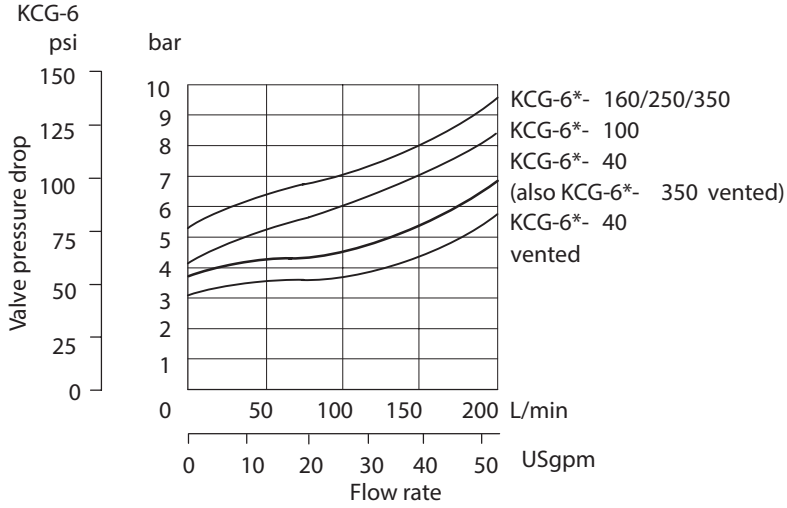
Venting

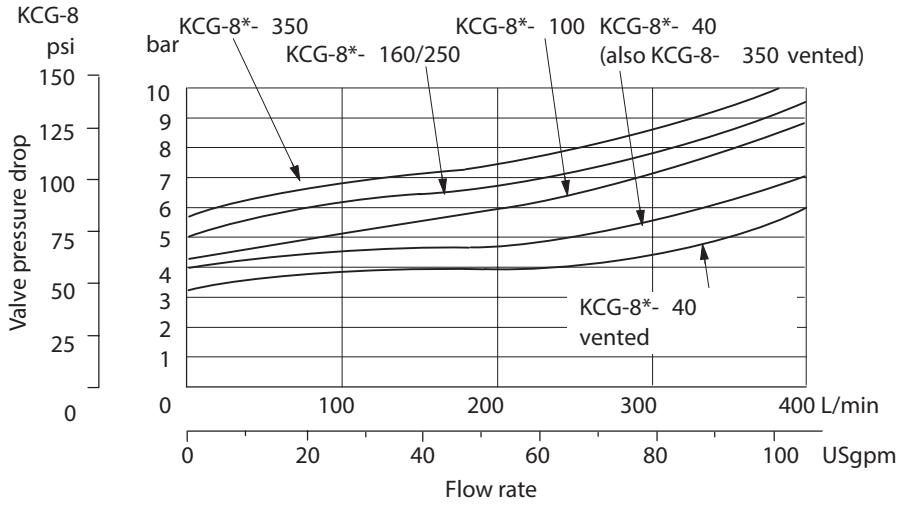
When the vent port X (or alternative vent port in the valve body) is connected to the reservoir via a suitable 2-way pilot valve, the mainstage of the relief valve opens to allow full flow from P to T at low pressure drop. The minimum pressure drop is obtained when the pilot valve is also de-energized. The total pressure drop through the venting 2-way valve and pipework is additive to the pressure at P.

While the valve is vented the system pressure cannot be controlled via the proportional solenoid.

This control feature is frequently used during off-load periods in machine cycle times. If lower off-load system pressures are required then additional full flow unloading valves are recommended, e.g. Vickers by Danfoss CV series cartridge valves.

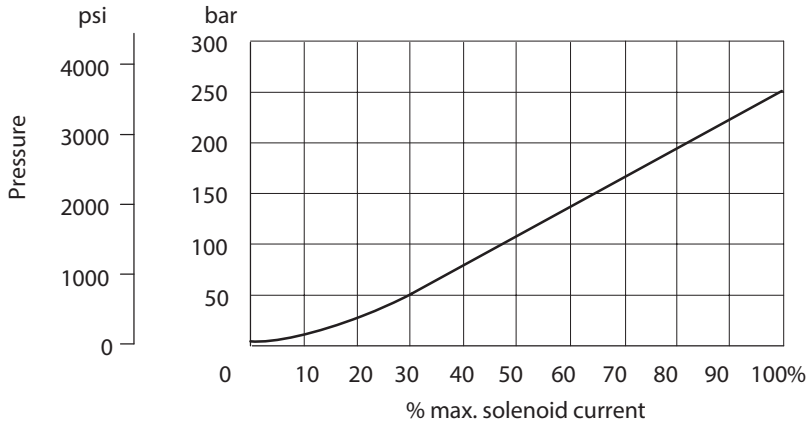
Note: All valves are with pilot valve de-energized.





Valid for models driven from Vickers by Danfoss amplifier with appropriate settings of gain and offset

Pressure Gain



Step Response
KCG models driven from Vickers by Danfoss amplifier with appropriate settings of gain and offset.

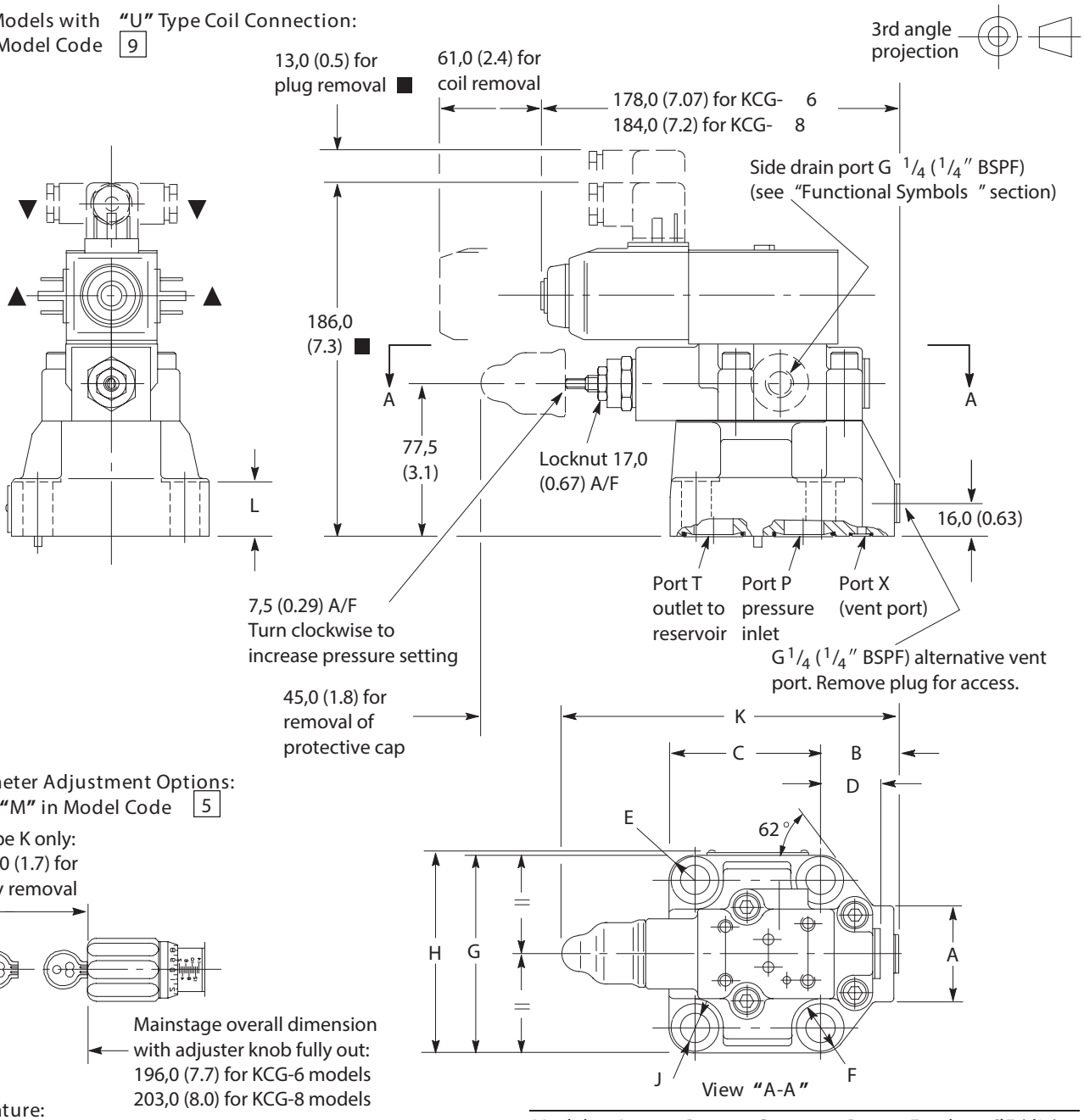
Test method

1. Trapped volume between pump and test valve, as in table.
2. Flow rate set at pump, as in table.
3. Response = time from step input signal until pressure reaches 90% of step change, as measured by transducer.

Valve size	Test conditions: Trapped volume	Flow rate	Step size: Pressure demand	Response time (ms)
6	2,0 liters (0.53 USg)	100 L/min (26 USgpm)	0 to 100% 100% to 0 25 to 100% 100 to 25%	100 70 40 50
8	4,0 liters (1.06 USg)	200 L/min (52 USgpm)	0 to 100% 100% to 0 25 to 100% 100 to 25%	110 70 50 65

Installation Dimensions in mm (inches)

KCG-* Models with "U" Type Coil Connection:
"U" at Model Code 9



Micrometer Adjustment Options:
"K" or "M" in Model Code 5

"K" Feature:
To adjust pressure setting, insert key and turn clockwise. Turn micrometer knob clockwise to increase pressure setting; counter-clockwise to decrease setting. When the key is removed the knob can spin freely without affecting the pressure setting.

▲ Alternative plug positions by loosening knurled nut counter-clockwise, turning coil and re-tightening nut.
■ Dimensions may vary according to source of plug.
▼ The cable entry on this plug can be repositioned at 90° intervals by reassembly of the contact holder relative to the plug housing. The cable entry is Pg 11 for cables Ø6-10 mm (0.24-0.4 dia).

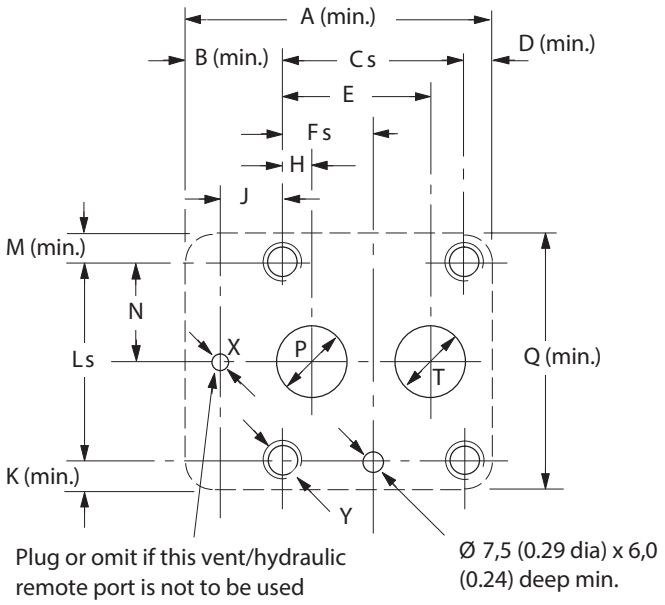
Model	A	B	C	D	E rad	ØF (dia)
KCG-6	58,0 (2.3)	35,0 (1.4)	68,0 (2.7)	35,0 (1.4)	12,0 (0.5)	20,0 (0.78)
KCG-8	42,0 (1.7)	39,0 (1.54)	83,0 (3.3)	30,0 (1.2)	16,0 (0.63)	26,0 (1.02)

Model	G	H	ØJ (dia)	K	L
KCG-6	79,0 (3.1)	82,0 (3.23)	13,5 (0.53)	176,0 (7.0)	20,0 (0.78)
KCG-8	103,0 (4.1)	106,0 (4.2)	17,0 (0.7)	183,0 (7.2)	25,0 (1.0)

Mounting Surfaces, ISO 6264
AR-06-2-A
AS-08-2-A

When a subplate is not used, a raised pad must be provided for mounting. The pad must be flat within 0,001 mm/ 100 mm (0.0001″/10″) and smooth within 0,8 µm (32 µin). Dimensional tolerances are ± 0,2 mm (± 0.008 ″) except where indicated.

Port functions:
P = Pressure inlet
T = Outlet to reservoir
X = Vent, or remote control port

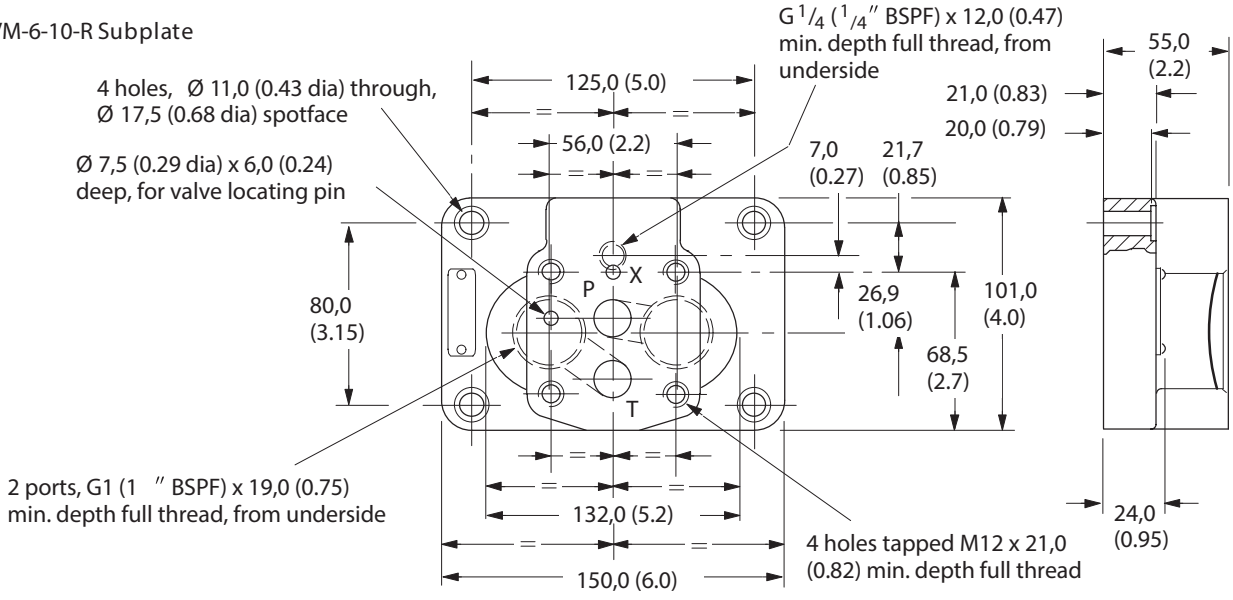


Size	A	B	C	D	E	F	H	J	K	L
AR-06	80 (3.2)	13,1 (0.5)	53,8 (2.12)	13,1 (0.5)	47,5 ◆ (1.87)	22,1 (0.87)	22,1 ◆ (0.87)	0	13,1 (0.5)	53,8 (2.12)
AS-08	118 (4.7)	35,0 (1.4)	66,7 (2.63)	16,3 (0.7)	55,6 (2.19)	33,4 (1.35)	11,1 (0.44)	23,8 (0.94)	16,0 (0.63)	70,0 (2.76)

Size	M	N	ØP (dia)	Q	ØT (dia)	ØX (dia)	Y thread x min. full thread depth
AR-06	13,1 (0.5)	26,9 (1.06)	14,7 (0.58)	80 (3.2)	14,7 (0.58)	4,8 (0.19)	M12 x 21 ($^{7}/_{16}$″ UNF x 0.83) ▼
AS-08	16,0 (0.63)	35,0 (1.38)	23,4 (0.92)	102 (4.0)	23,4 (0.92)	6,3 (0.25)	M16 x 30 ($^{5}/_{8}$″ UNF x 1.2) ▼

▲ Tolerance on bolt and pin locations ± 0,1 mm (± 0.004 ″).
◆ These ISO standard dimensions can be used, but improved flow paths to and from valve are obtained by using 48,0 (1.89) instead of 47,5 (1.87), and 22,6 (0.89) instead of 22,1 (0.87).
▼ ISO standard does not give UNC bolt sizes. These are recommended equivalents to metric sizes specified in the standard.

CGVM-6-10-R Subplate



Further Information

Hydraulic Fluids

Materials and seals used in these valves are compatible with:
Anti-wear petroleum oils ..... L-HM
For use with non-alkyl based phosphate esters, L-HFD, use F3 version in model code.
The extreme operating range is 500 to 13 cSt (270 to 70 SUS) but the recommended running range is 54 to 13 cSt (245 to 70 SUS). For further technical information about fluids see 694

Contamination Control Requirements

Recommendations on contamination control methods and the selection of products to control fluid condition are included in Vickers publication 9132 or 561, "Vickers Guide to Systemic Contamination Control ". The book also includes information on the Vickers concept of "ProActive Maintenance ". The following recommendations are based on ISO cleanliness levels at 2 μm, 5 μm and 15 μm.

For products in this catalog the recommended levels are:
Up to 210 bar (3000 psi) 18/16/13
Above 210 bar (3000 psi) ....17 /15/12

Installation and Start-up Guidelines

The proportional valves in this catalog can be mounted in any attitude but it may be necessary, in certain demanding applications, to ensure that the solenoids are kept full of hydraulic fluid.

If this proves to be the case any accumulated air can be bled from the solenoid bleed screw. This task is easier if the valve has been mounted base downwards. Good installation practice dictates that the tank port, and any drain port, are piped so as to keep the valve full of fluid once the system start-up has been completed.

Temperatures

For petroleum oil:
Min. ..... –20°C (–4°F)
Max.* ..... +70°C (158 °F)

* To obtain optimum service life from both fluid and hydraulic system, 65 °C (150°F) normally is the maximum temperature.

For other fluids where limits are outside those of petroleum oil, consult fluid manufacturer or Danfoss representative. Whatever the actual temperature range, ensure that viscosities stay within those specified under "Hydraulic Fluids ".

Ambient for:
Valves at full performance specification: –20 to +60 °C (–4 to +140 °F).
Valves, as above, will operate at temperatures of 0 to –20 °C (32 to –4 °F) but with a reduced dynamic response.

Storage:
–25 to +85 °C (–13 to +185 °F)

Eurocard electronics:
0 to 50 °C (32 to 122 °F)

Seal Kits

Pilot valves:
KCG-3 (DIN) 02-138201
Mainstage valves:

KCG-6	614824
KCG-8	614931

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