	ABBREVIATIONS
AP	HIGH PRESSURE CONNECTION
AS	PHASE LAG (DEGREES)
BP	LOW PRESSURE CONNECTION
C	STROKE (MM)
CH	ACROSS FLATS
Ch	INTERNAL ACROSS FLATS
DA	AMPLITUDE DECAY (DB)
Dp	DIFFERENTIAL PRESSURE (BAR)
F	FORCE (N)
I%	INPUT CURRENT (A)
M	MANOMETER CONNECTION
NG	KNOB TURNS
OR	SEAL RING
P	LOAD PRESSURE (BAR)
PL	PARALLEL CONNECTION
Pr	REDUCED PRESSURE (BAR)
Q	FLOW (L/MIN)
Qp	PUMP FLOW (L/MIN)
SE	ELASTIC PIN
SF	BALL
SR	SERIES CONNECTION
X	PILOTING
Y	DRAINAGE

CARTRIDGE VALVES ISO 7368 (DIN 24342)



CARTRIDGE VALVES	SECT. E 2
KEL 2/2 LOGIC ELEMENTS	SECT. E 3
KEC COVERS	SECT. E 5
COVERS WITH CMP	SECT. E 11
KRA.16/25...	SECT. E 13
PROXIMITY	SECT. E 16

E

CARTRIDGE VALVES
CARTRIDGE SOLENOID VALVES WITH CHECK VALVE
CARTRIDGE SOLENOID VALVES

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2/2 Cartridge valves logic elements according to ISO 7368 (DIN 24342)



Nominal size (max. diameter)	16mm / 25mm
Max. opening pressure	350 bar
Max. nominal flow rate NG16	150 l/min
Max. nominal flow rate NG25	350 l/min
Fluid temperature	-20°C ÷ 75°C
Max. contamination level	class 10 in accordance with NAS 1638 with filter $\beta_{25} \geq 75$

Cartridge valves are basically composed of a cover and an operating unit insert in the ISO 7368 (DIN 24342) mounting frame. Each cartridge valve is characterized by 2 main way for the nominal flow (up to 350 l/min).

By combining the various covers, operating units and connections within the block, many different functions can be obtained like: direct control, non-return, hydraulically piloted non-return, pressure control, flow rate regulation, as well as a combination of these same functions.

Thanks to their design features and operational flexibility, cartridge valves can be used to:
- speed-up machine cycles, and therefore increase productivity and efficiency (better response time compared to traditional valves);
- ensure minimum thermal dissipation (tanks to the passageway dimensions);
- reduce the hydraulic plant weight (tanks to the compact functions block);
- reduce to a minimum any internal leakages;
- provide ease of installation and serving.

The logic units 2/2 (Fig. 1) are formed by a cover (1), a functional unit (2), a spacer (3), a closure spring (4) and a guide bush (5) for each functional unit. Covers can be changed according to the required application and the functional unit can be combined with different springs in order to obtain various opening pressure.

Covers
Covers serve to enclose the functional unit and to house the piloting ports and any incorporated valves or manual adjustment devices. Inside the cover are housed also the seats for the calibrated orifice used to optimize the valve opening/closed response time in according to the type of hydraulic system being implemented.

CETOP 3 interface covers are available, ready to accept solenoid valves or other modular valves for the implementation of particular control functions.

The maximum allowed pressure is a function of the flow rate (max.400 bar).

2/2 Logic elements and covers

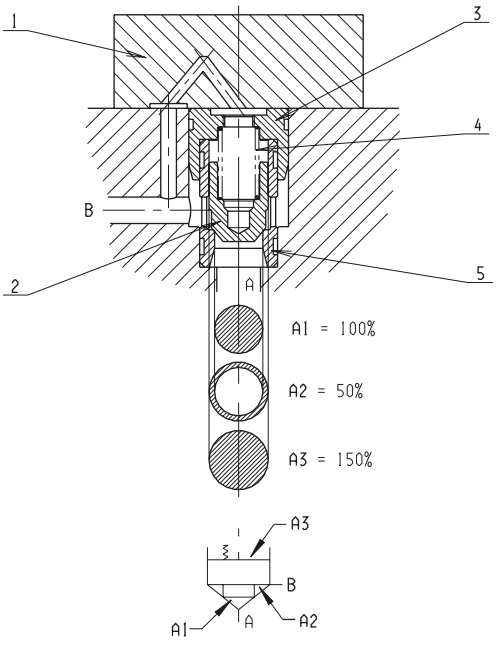
KEL16/25...	Sect. E 3
NG16/NG25 KEL Seats	Sect. E 4
KEC16/25	Sect. E 5
KEC Hydraulic mounting diagr.	Sect. E 6
KEC16/25... with CMP	Sect. E 10
C*P16/25...	Sect. E 10
KRA16/25...	Sect. E 13
KRA16/25... + AD3V...	Sect. E 15
Proximity for KRA	Sect. E 16

Fig. 1 - Area ratio

A	Main flow
B	Main flow
X	External piloting
Z1	External piloting
Z2	External piloting
Y	Drainage
A1	A port effective cross section
A2	B port effective cross section
A3	Spring chamber effective cross section

Orifice functional symbols

	Standard orifice (already inserted) Ø 1mm (diameter)
	A grub screw orifice can be inserted in the threaded seat
	Blind



1 = cover
2 = functional unit
3 = spacer
4 = closure spring
5 = guide bush for functional unit

The logic unit operates as a function of the pressures acting on the relevant areas, and different opening pressures are obtained, depending on the dimensions of these areas.

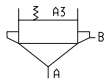
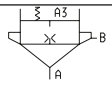
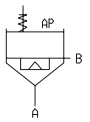
A description of how to interpret the cartridge opening ratios is as follows:
- there are three relevant areas A1, A2, A3;
- area A1 is taken to represent 100%, i.e. it is the reference area;
- area A2, when a 2:1 ratio is shown, is equal to 50% of area A1 and all the other ratios shown in the Table 2 can be calculated on this basis.

As consequence of these area ratios the are different opening pressures whether proceeding from A → B or from B → A.

ORDERING CODE

KEL	Logic element 2/2
**	**16** = NG16 **25** = NG25
*	Function: see table 1 Areas ratio: **U** = 1 : 1 **S** = 12.5 : 1 **B** = 2 : 1 (for version with drilled poppet see CF variant) **F** = 2 : 1 **R** = 2 : 1
*	Opening pressure (bar) (Tab.1 pressure values) (Tab.2 spring's colour and code)
**	Calibrated orifices: **00** = blind **08** = 0.8 mm **09** = 0.9 mm **10** = 1.0 mm **12** = 1.2 mm **14** = 1.4 mm
**	**00** = No variant **V1** = FKM **CF** = With drilled poppet only for KEL**B
2	Serial No.

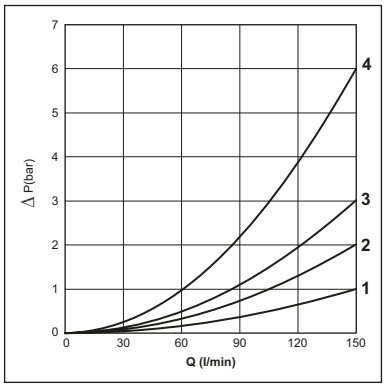
TAB. 1 - SYMBOL, FUNCTION, AREA RATIO AND OPENING PRESSURE

Function	Symbol	Area ratio	Code	Opening pressure (bar)	
				A→B	B→A
Directional (U) (normally used for relief valve)		**A1 : A3** 1 : 1	KEL**UL00 1KEL**UM00 KEL**UH00 KEL**UJ00	**L** = 0.3 **M** = 1.6 **H** = 4 **J** = 9	
Directional (U) with orifice		**A1 : A3** 1 : 1	KEL**UL** KEL**UM** KEL**UH**	**L** = 0.3 **M** = 1.6 **H** = 4	
Directional (S)		**A1 : A2** 12.5 : 1	KEL**SL00 KEL**SM00 KEL**SH00	**L** = 0.3 **M** = 0.6 **H** = 1.5	**L** = 4 **M** = 8 **H** = 20
Directional (S) with orifice		**A1 : A2** 12.5 : 1	KEL**SL** KEL**SM** KEL**SH**	**L** = 0.3 **M** = 0.6 **H** = 1.5	**L** = 4 **M** = 8 **H**= 20
Directional (B) (normally used for check valve)		**A1 : A2** 2 : 1	KEL**BL00 1KEL**BM00 KEL**BH00	**L** = 0.5 **M** = 2 **H** = 2.5	**L** = 1 **H** = 5
Flow control (F)		**A1 : A2** 2 : 1	KEL**FL** KEL**FM** KEL**FH**	**L** = 0.5 **M** = 1 **H** = 2.5	**L** = 1 **M** = 2 **H** = 5
With sensitized cover (R)		**A1 : A2** 2 : 1	KEL**RL00 KEL**RM00 KEL**RH00 KEL**RJ00	A → B NG16 **L** = 0.7 **M** = 1.5 **H** = 4	 NG25 **L** = 0.6 **M** = 1.5 **H** = 3.5 **J** = 9

TAB. 2 - SPRING'S COLOUR AND CODE

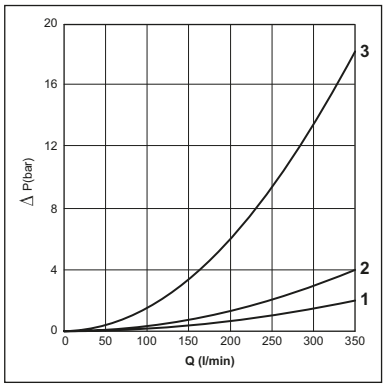
Spring type	U		S		B-F		R	
	NG16	NG25	NG16	NG25	NG16	NG25	NG16	NG25
Cod. **L**	without colour	red	without colour	red	without colour	red	without colour	red
Cod. **M**	green	yellow	red	green	red	green	red	green
Cod. **H**	blue	blue	yellow	yellow	green	yellow	green	yellow
Cod. **J**	without colour							blue

NG 16 PRESSURE DROP



1 = KEL16U
KEL16S
2 = KEL16B
3 = KEL16R
4 = KEL16F

NG25 PRESSURE DROP

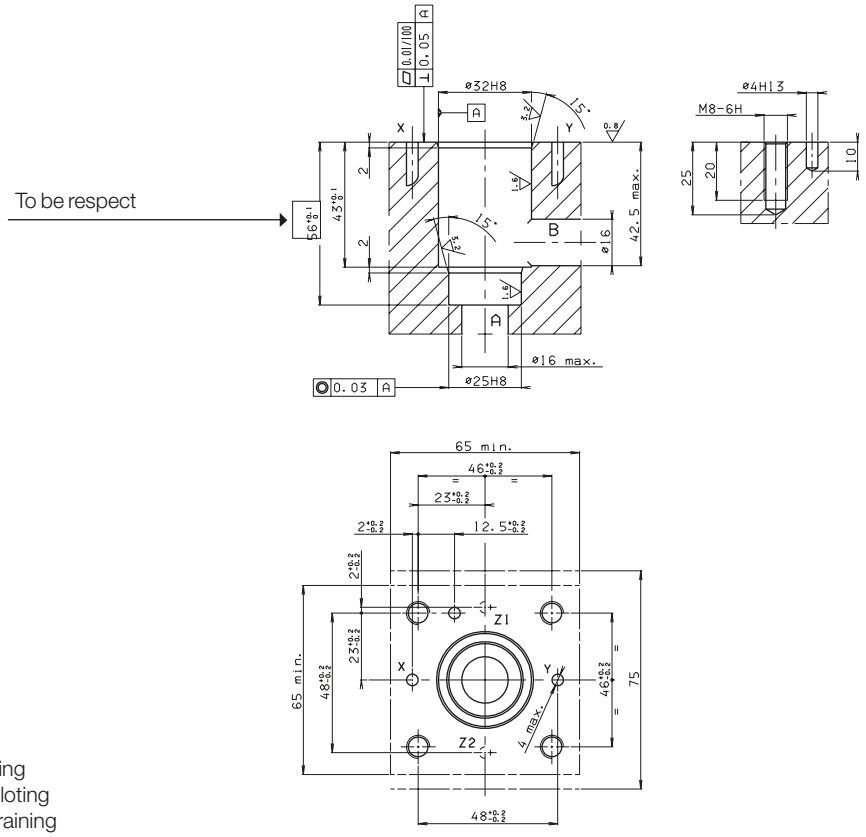


1 = KEL25U
KEL25B
KEL25R
2 = KEL25S
3 = KEL25F

The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C. The tests were performed at a fluid temperature of 50°C.

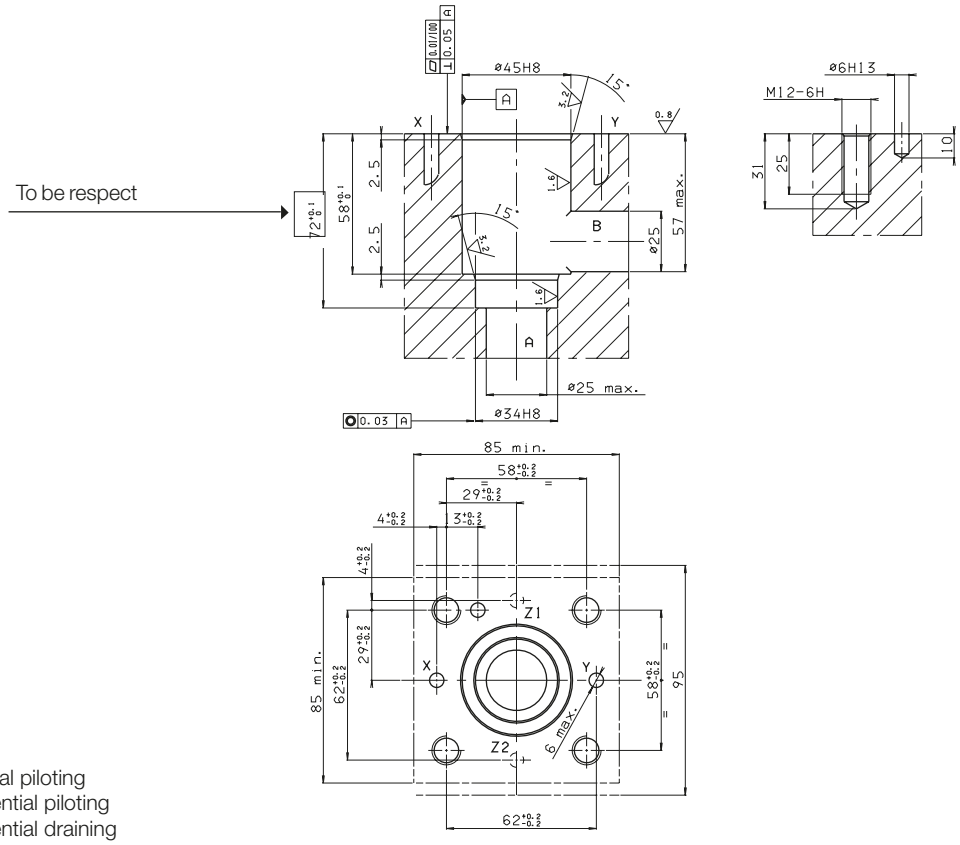
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OVERALL DIMENSIONS OF TWO-WAY VALVE SEAT ISO 7368/BA-06-2-A NG16 (DIN 24342)



X = piloting
Y = draining
Z = additional piloting
Z1 = preferential piloting
Z2 = preferential draining

OVERALL DIMENSIONS OF TWO-WAY VALVE SEAT ISO 7368/BB-08-2-A NG25 (DIN 24342)



X = piloting
Y = draining
Z = additional piloting
Z1 = preferential piloting
Z2 = preferential draining