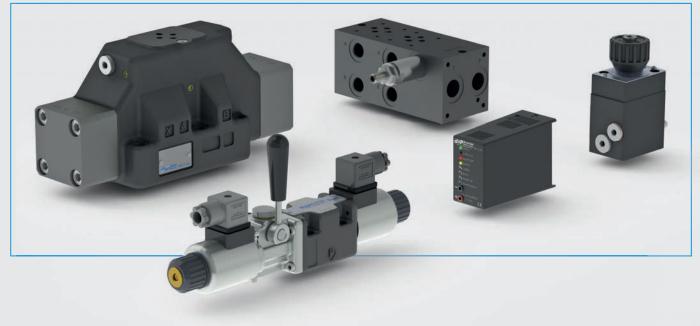


VALVES AND ELECTRONICS

Technical Catalogue

March 2021

web edition





VALVES AND ELECTRONICS TECHNICAL CATALOGUE 2021

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Use of the products in this catalogue must comply with the operating limits given in the technical specifications. The type of application and operating conditions must be assessed as normal or in malfunction in order to avoid endangering the safety of people and/or items.

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INTRODUCTION

Read this instructions carefully before installation. All operations must be carried out by qualified personnel following the instructions.

The user must periodically inspect, based on the conditions of use and the substances used, the presence of corrosion, dirt, the state of wear and correct function of the valves.

Always observe first the operating conditions given in datasheet of the valve.

HYDRAULIC FLUID

Observe the recommendations given in the data sheet of the valve. Use only mineral oil (HL, HLP) according to DIN 51524. Use of other different fluids may damage the good operation of the valve.

VISCOSITY

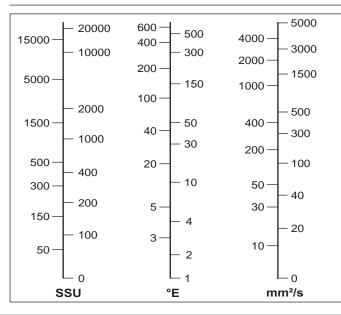
Observe the recommendations given in the data sheet of the valve. The oil viscosity must be in the range of 10 mm²/s to 500 mm²/s. Recommended oil viscosity 46 mm²/s (32 mm²/s for Cartridge valves)

Table 1: ISO viscosity grades

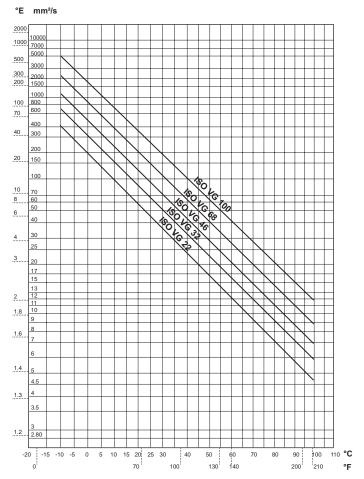
Viscosity grade	Average kinematic viscosity	Kinematic-viscosity limits mm²/s @ 40°C		
	mm²/s @ 40°C	min.	max.	
ISO VG 10	10	9.00	11.0	
ISO VG 15	15	13.5	16.5	
ISO VG 22	22	19.8	24.2	
ISO VG 32	32	28.8	35.2	
ISO VG 46	46	41.4	50.6	
ISO VG 68	68	61.2	74.8	
ISO VG 100	100	90.0	110	

= Values used in the chart "Oil viscosity according to temperature"

CONVERSION TABLE SSU / °E / mm²/s



OIL VISCOSITY ACCORDING TO TEMPERATURE



CONTAMINATION

Oil contamination is the main cause of faults and malfunction in hydraulic systems. Abrasive particles in the fluid erode or block moving parts, leading to system malfunction.

The valves we are offering do not require filtering characteristics any higher than those needed for usual hydraulic components such as pumps, motors, etc.

However, accurate filtering does guarantee reliability and a long life to all the system's hydraulic parts. Reliable performance and long working life for all oil-pressure parts is assured by maintaining the level of fluid contamination within the limits specified in the data sheet of the valve.

Hydraulic fluid must also be cleaned properly before filling the hydraulic circuit, especially when commissioning a new system, as this is when the oil contamination generally peaks due to its flushing effect on the components, and the running-in of the pump.

Maximum contamination level is required on datasheet of the valve according to ISO 4406:1999.

In the following table there is the correspondence between ISO 4406:1999 and old standard NAS 1638 for information purpose:

The standard ISO 4406:1999 defines the contamination level with three numbers that relate with the number of particles of average dimension equal or greater than 4 μ m, 6 μ m e 14 μ m, in 1 ml of fliuid.

In following table there is a reference to reccomended contamination level and correspondence with old NAS 1638 standard.





TECHNICAL INFORMATION

Table 2: Reccomanded contamination level.

	Oil filtratio	n recomm	endations
Type of system	Cleanliness	Absolute	
Type of valve	recomme	nded	filtration
Type of valve	ISO 4406 : 1999	NAS 1638	micron rating
	100 4400 . 1000	(*)	(**)
Systems or components operating at HIGH PRESSURE > 250 bar (3600 psi)			
HIGH DUTY CYCLE APPLICATIONS	18 / 16 / 13	7 - 8	5
Systems or components with LOW			
dirt tolerance			
Systems or components operating at			
MEDIUM / HIGH PRESSURE	19 / 17 / 14	9	10
Systems and components with moderate dirt tolerance	- / /	-	
Systems or components operating at LOW PRESSURE < 100 bar (1500 psi) LOW DUTY CYCLE APPLICATIONS Systems and components with GOOD dirt tolerance	20 / 18 / 15	10 - 11	20

* Contamination class NAS 1638: it is determined by counting the total particles of different size ranges contained in 100 ml of fluid.

** Absolute filtration: it is a characteristic of each filter, it refers the size (in micron) of the largest sperical particle wich may pass through the filter.

WORKING TEMPERATURES

Ambient temperature range: -25°C to +60°C

Fluid temperature range (NBR seals): -25°C to +75°C

Thermal shocks can affect the performance and the expected life of the product, hence it is necessary to protect the product from these conditions.

SEALS

O-rings made in Acrylonitrile Butadiene (NBR) are normally fitted on the valves. The backup rings that protect the O-rings are also made in NBR, or sometimes PTFE. Both the O-rings and the backup rings are suitable for the working temperatures mentioned above.

In the case of fluid temperatures $> 75^{\circ}$ C, FKM seals must be used (identified with "V1" variant).

ELECTRICAL POWER SUPPLY

Solenoid valves coils are designed to operate safely in the voltage range of $\pm 10\%$ of nominal voltage at max. 60°C ambient temperature. The combination of permanent overvoltage and very hot temperatures can stress the solenoid. Therefore always a good heat dissipation and voltage level has to be assured. Faulty coils may only be replaced by new, interchangeable, tested compo-

CONVERSION CHART

nents in original-equipment quality.

Before removing a coil, voltage must be disconnected.

When replacing the coil, be aware to insert O-Rings in order to avoid the entrance of water.

INSTALLATION

The mounting surface must feature surface quality specified in data sheet of the valve: for example for Cetop valves generally is required Ra \leq 1.6µm and flatness \leq 0.03 mm over 100 mm length. Normally in cartridge valve for sealing diameters of the cavities, is required roughness Ra \leq 1.6µm. The surfaces and openings in the assembly plate must be free from impurity or dirt. Make sure the O-Rings fit correctly in their seats.

Fixing screws must comply with the dimensions and the strength class specified in the data sheet and must be tightened at the specified tightening torque.

Complete the electrical wiring. For circuit examples and pin assignments, see the relevant datasheet.

USE AND MAINTENANCE

Observe the functional limits indicated in the technical catalogue On a periodic basis and based on the conditions of use, check for cleanliness, state of wear or fractures and correct performance of the valve.

If the O-rings are damaged, replace them with those supplied by the manufacturer.

To assure the best working conditions at all time, check the oil

and replace it periodically (after the first 100 working hours and then after every 2000 working hours or at least once every year).

Attention: all installation and maintenance intervention must be performed by qualified staff.

TRANSPORT AND STORAGE

The valve must be handled with care to avoid damage caused by impact, which could compromise its efficiency.

In the case of storage, keep the valves in a dry place and protect against dust and corrosive substances.

When storing for periods of more than 6 months, fill the valve with preserving oils and seal it.

WARRANTY AND SUPPLY CONDITIONS

For the general warranty and supply conditions, please consult the specific sales contract or the "General terms and conditions of sale" document IOP 7-2-05. Downloaded from the website: www.brevinifluidpower.com

Type SI units			Alternative units	Alternative units	
-	Neuter	(N) [kgm/s ²]	Kilogram force	(kgf)	1 kgf = 9.807 N
Force	Newton		pound force	(lbf) [lbf/s ²]	1 lgf = 4.448 N
	millimeter	(mm) [10 m]	inch	(in)	1 in = 25.4 mm
Length	meter	(km) [1000 m]	yard	(yd) [3ft]	1 m = 1.0936 yd
	kilometer	(km) [1000 m]	mile	(mile) [1760 yd]	1 mile = 1.609 km
Torque	Newton meter	(Nm)	pound force.feet	(lbf.ft)	1 lbf.ft = 1.356 Nm
Power kiloWatt (kW)		[1000 Nm/s]	horsepower	(hp)	1 kW = 1.341 hp
			metric horsepower	(CV)	1 kW = 1.36 CV
Pressure MegaPas			bar		1 MPa = 10 bar
	MegaPascal (MPa) [N/mm ²]	psi (lbf/ln²)		1 MPa = 145 psi	
			ton/f/ln ²		1 ton/f/ln ² = 15.45 MPa
	liter/min	(1) (mains)	UK gal/min		1 UK gal/min = 4.546 l/min
Flow rate liter,	liter/min	(I/min)	US gal/min		1 US gal/min = 3.785 l/min
Temperature	Degrees Celsius	(°C)	Farenheit	(°F)	1°F = 1.8 °C+32



1

DIRECTIONAL CONTROL VALVES

CETOP 2/NG04

CETOP 3/NG06

CETOP 3

ATEX 2014/34/UE directive

CETOP 5/NG10

CETOP 5/NG10 High performances

Automatic reciprocating valves

Piloted valves and subplate mounting

Flow diversion valves

	ABBREVIATIONS
AP	HIGH PRESSURE CONNECTION
AS	Phase lag (degrees)
BP	LOW PRESSURE CONNECTION
С	Stroke (MM)
СН	ACROSS FLATS
Сн	INTERNAL ACROSS FLATS
DA	Amplitude decay (dB)
Dp	DIFFERENTIAL PRESSURE (BAR)
F	Force (N)
I%	INPUT CURRENT (A)
Μ	MANOMETER CONNECTION
NG	KNOB TURNS
OR	SEAL RING
Р	Load pressure (bar)
PARBAI	K PARBAK RING
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
Υ	Drainage



1



CETOP 2/NG04



CETOP 2/NG04	Cap. I • 2
AD2E	Cap. I • 4
"A09" DC COILS	Cap. I • 4

CETOP 3/NG06



ATEX 2014/34/UE

ATEX 2014/34/UE DIRECTIVE	Cap. I • 23
AD3XD	Cap. I • 25
AD3XG	Cap. I • 29

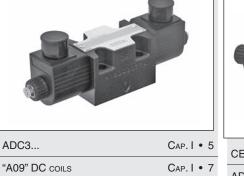
CETOP 5/NG10



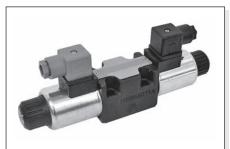
AUTOMATIC RECIPROCATING

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AD5I	Cap. I • 47
AD3RI	Cap. I • 48
AD5RI	Cap. I • 49

PILOTED VALVES AND SUBPLATE MOUNTING



CETOP 3



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AD3EJ*	Cap. I • 12
AD3V	Cap. I • 14
AD3L	Cap. I • 15
CETOP 3 OTHER OPERATORS	Cap. I • 16
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"B14" AC SOLENOIDS	Cap. I • 19
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CETOP 5/NG10	Cap. I • 33
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AD5O AND AD5D	Cap. I • 38
AD5L	Cap. I • 39
"A16" DC coils	Cap. I • 40
"K16" AC SOLENOIDS	Cap. I • 41

CETOP 5/NG10 High performances



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"D19" DC SOLENOIDS	Cap. I • 41
ADP5V	Cap. I • 43
"D19" DC SOLENOIDS	Cap. I • 45



ADPH5	Cap. I • 50
ADH5	Cap. I • 53
BSH5	Cap. I • 56
ADH7	Cap. I • 57
BSH7	Cap. I • 60
ADH8	Cap. I • 62
BSH8	Cap. I • 65

FLOW DIVERSION VALVES



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CDL066 "OEM MACHINERY"	Cap. I • 68
ADL066 "OEM MACHINERY"	Cap. I • 69
BDL066 "OEM MACHINERY"	Cap. I • 70
CDL106 "OEM MACHINERY"	Cap. I • 71
ADL106 "OEM MACHINERY"	Cap. I • 72
"A09" AND "D15" DC COILS	Cap. I • 73
"40W" AND "A16" DC COILS	Cap. I • 74





CETOP 2/NG	04
AD2E	Cap. I • 4
"A09" DC COILS	Cap. I • 4
STANDARD CONNECTORS	Cap. I • 20

DIRECTIONAL CONTROL VALVES CETOP 2/NG4

The directional control valves NG4 are designed for subplate mounting with an interface in accordance with UNI ISO 4401 - 02 - 01 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-02), and are the smallest on the market in their category whilst still featuring excellent performance.

The use of solenoids with wet armatures ensures quiet operation, means that dynamic seals are no longer required and important levels of counter-pressure are accepted on the return line. The solenoid's tube is screwed at valve body directly, while a locking ring nut seal the coil in right position.

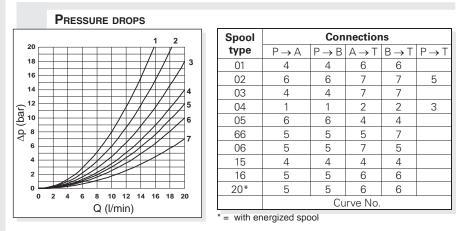
The cast body with a great care in the design and production of the ducts of the 5 chambers have made it possible to improve the spools allowing relatively high flow rate with low pressure drops (Δp).

The spool rest positions are obtained by means of springs which centre it when there is no electrical impulse. The solenoids are constructed to DIN 40050 standards and are supplied by means of DIN 43650 ISO 4400 standard connectors which, suitably assembled, ensure a protection class of IP 65.

The solenoid coils are normally arranged for DIN 43650 ISO 4400 type connectors (standard version). On request, could be available the following coil connection variants: AMP Junior connections; flying leads connections, with or without integrated diode; Deutsch connections with bidirectional integrated diode.

The supply may be in either DC or AC form (with the use of a connector and rectifier) in most common voltage.

The valves are designed for use with DIN 51524 standard hydraulic mineral oils and it is recommended that filters should be fitted to ensure a maximum contamination level of class 10 in accordance with NAS 1638, $\beta_{ss} \ge 75$.



The diagram at the side shows the pressure drop curves for spools during normal usage. The fluid used is a mineral based oil with a viscosity of $46 \text{ mm}^2/\text{s}$ at 40°C ; the tests have been carried out at a fluid temperature of 40°C . For higher flow rates than those in the diagram the losses will be those expressed by the following formula:

 $\Delta p1 = \Delta p \times (Q1/Q)^2$

where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, $\Delta p1$ will be the value of the losses for the flow rate Q1 that is used.

0	RDERING CODE
AD	Directional valve
2	CETOP 2/NG4
E	Electrical operator
**	Spool (tables next page)
*	Mounting (table 1 next page)
*	Voltage (table 2 next page)
**	Variants (table 3 next page)
3	Serial No.





o 1/

	TAB. 1 MOUNTING	à
	Standard	ſ
С	A O B W	Ī
D	a A B	
Е	a OW	
F	WOB T	
SPE	CIALS (WITH PRICE INCREASING)	
G	MA O L	L
н		
I	a A O th	
L		
М	a A B to	

TAB.3 - VARIANTS	
VARIANT	CODE
No variant (without connectors)	S1(*)
Viton	SV(*)
Emergency button	ES(*)
Rotary emergency button	P2(*)(**)
AMP Junior connection	AJ(*)
Solenoid with flying leads (250 mm)	FL
Solenoid with flying leads (130 mm) integrated	
Deutsch connection with bidir. diode	CX
Coil 8W (only 24V)	8W
Other variants available on request.	
(*) Coils with Hirschmann and AMP Juni tion supplied without connectors. The co can be ordered separately, CAP. I • 20.	
(**) P2 Emergency tightening torque ma / 0.6 ÷ 0.9 Kgm with CH n. 22	ax. 6÷9 Nm

STANDARD SPOOLS

Two solenoids, spring centred "C" mounting				
Spool Type		Covering	Transient position	
01		+		
02		-		
03		+		
04*		-		
05		+		
66		+		
06		+		

ONE SOLENOID, SIDE A "E" MOUNTING Covering Transient position Spool AOM Type 01 ÷ 02 03 + 04* -05 ÷

÷

÷

-

+

÷

÷

÷

-

÷

Covering

+

Two solenoids "D" mounting

X1515

XHM

Transient position

FII

XHM

Transient position

TAB.2 - A09 (27 W) COIL DC VOLTAGE ** 12V L 115\/ac/50Hz Μ 24V 120Vac/60Hz Ν 48V* with rectifier Ρ 110V* 230Vac/50Hz z 102V* 240Vac/60Hz х 205V* with rectifier w Without DC coils

LIMITS OF USE (MOUNTING C-E-F)

Voltage codes are not stamped on the plate, their are readable on the coils.

• Mounting type D is only for solenoid valves with detent

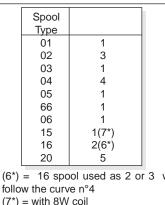
• In case of mounting D with detent, the supply to solenoid must be longer than 100 ms.

• The AMP Junior coil, the Deutsch coil with bidirectional diode and the coil with flying leads (with or without diode) coils are available in 12V or 24V DC voltage only.

* Special voltage

** Technical data see page CAP. I • 4

250 200 L (par) 100 50 0 0 2 4 8 10 12 14 16 18 20 6 Q (I/min)



The tests have been carried out with solenoids at operating temperature and a voltage 10% less than rated voltage with a fluid temperature of 40°C. The fluid used was a mineral oil with a viscosity of 46 mm²/s at 40 C°. The values in the diagram refers to tests carried out with the oil flow in two directions simultaneously (e.g. from P to A and at the same time B to T). In case of valve 4/2 or 4/3 used with flow in one direction only, the limits of use could have variations which may even be negative. Medium switching times Energizing: 20 ms

De-eneraizina: 40 ms

Tests have been carried out by spool normally closed with flow of 10 l/min at 125 bar and a 100% supply, warm standard coil and without any electronic components. These values are indicative and depend on the following parameters: the hydraulic circuit, the fluid used and the variation of pressure, flow and temperature. NOTE: Limits of use are available for C, E, F mounting.

	0	NE SOLENOID,	SIDE B "F	" MOUNTING
1	Spool Type		Covering	Transient pos
3	01		+	
1	02		-	
1 1 1(7*)	03		+	
2(6*) 5	04*		-	HHX

66

06

15

16

05

66

06

15

16

Spool

Туре

20*

MANG

MANda

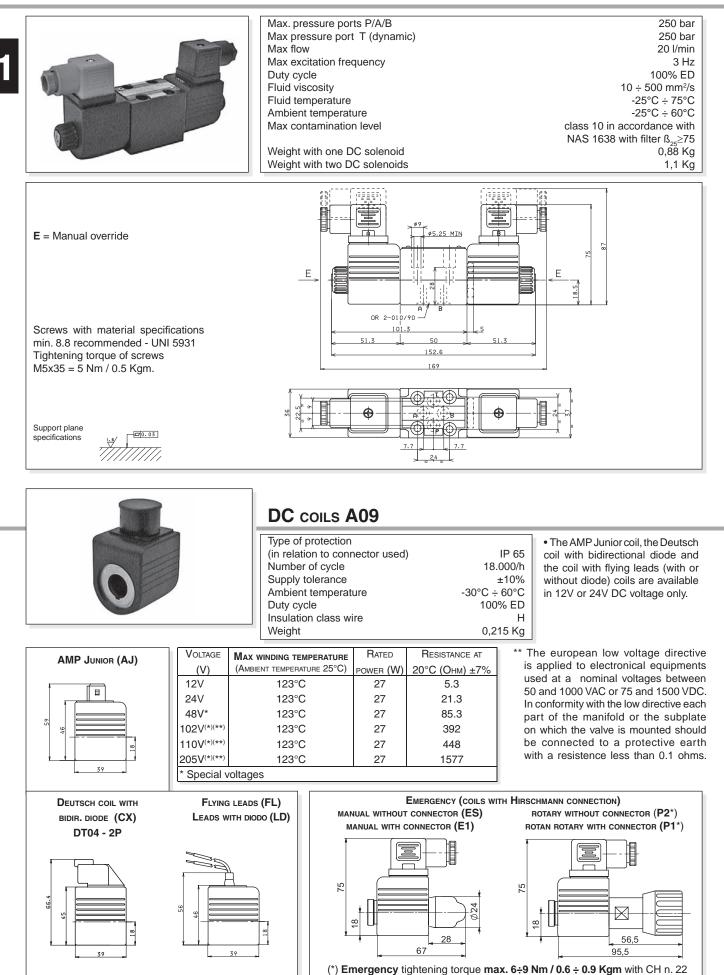
a A B to

 $(6^*) = 16$ spool used as 2 or 3 way, follow the curve n°4

SPOOLS WITH PRICE INCREASING



AD2E... DIRECTIONAL CONTROL SOLENOID OPERATED VALVES CETOP 2/NG4



VALV/AD2E003_E/20-2017





ADC3E	
"A09" DC COILS	Cap. I • 7
STANDARD CONNECTORS	Cap. I • 20

ADC3... DIRECTIONAL CONTROL VALVES CETOP 3 SOLENOID OPERATED WITH REDUCED OVERALL SIZE

The NG6 directional control valves are designed for subplate mounting with an interface in accordance with UNI ISO 4401 - 03 - 02 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-03).

The use of solenoids with wet armatures allows an extremely safe construction completely dispensing with the need for dynamic seal. The solenoid tube is screwed directly onto the valve casting whilst the coil is kept in position by a ring nut.

The operation of the directional valve is electrical. The centring is achieved by means of calibrated length springs which, once the impulse is over, immediately reposition the spool in the neutral position. To improve the valve performance, different springs are used for each spool.

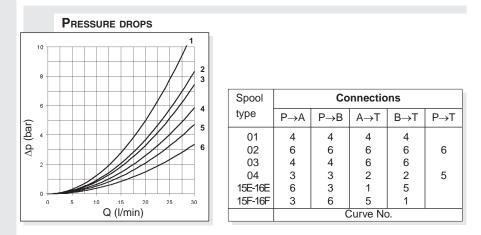
The solenoids, constructed with a protection class of IP65 in accordance with BS 5490 standards, are available in direct current form and different voltage. The electrical controls are equipped with an emergency manual control inserted in the tube.

The ADC3 valve uses shorter solenoids than the standard AD.3.E to reduce the overall dimensions.

The solenoid coils are normally arranged for DIN 43650 ISO 4400 type connectors (standard version). On request, could be available the following coil connection variants: AMP Junior connections; flying leads connections, with or without integrated diode; Deutsch connections with bidirectional integrated diode.

The recommended fluids are hydraulic mineral based oils in accordance with DIN 51524 and it is recommended that filters should be fitted to ensure a maximum contamination level of class 10 in accordance with NAS 1638, $\beta_{ze} \ge 75$.

Max. pressure ports P/A/B/T	250 bar
Max flow	30 l/min
Max excitation frequency	3 Hz
Duty cycle	100% ED
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max contamination level	class 10 in accordance
	with NAS 1638 with filter B ₂₅ ≥75
Weight with one DC solenoid	1,25 Kg
Weight with two DC solenoids	1,5 Kg



The diagram at the side shows the pressure drop curves for spools during normal usage. The fluid used is a mineral oil with a viscosity of $46 \text{ mm}^2/\text{s}$ at 40 C° ; the tests have been carried out at a fluid temperature of 40 C° . For higher flow rates than those in the diagram, the losses will be those expressed by the following formula:

 $\Delta p1 = \Delta p x (Q1/Q)^2$

where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, $\Delta p1$ will be the value of the losses for the flow rate Q1 that is used.





ORDERING CODE ADC 3 Ε ** * * ** 1

Directional valve

- CETOP 3/NG6 Electrical operator
- Spool (tables at the side)
- Mounting (table 1)
- Voltage (table 2)
- Variants (table 3)
- Serial No.

	TAB.1 - MOUNTIN
	Standard
С	
Е	az A O W
F	
SPI	ECIALS (WITH PRICE INCREASING)
G	M A O VB
н	

• The AMP Junior coil, the Deutsch

coil with bidirectional diode and the

coil with flying leads (with or without

diode) coils are available in 12V or

** Technical data see page CAP.

24V DC voltage only.

* Special voltage

|•7

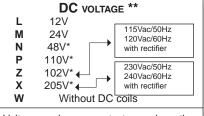
STANDARD SPOOL

	•			
Two solenoids, spring centred "C" Mounting				
Spool type		Covering	Transient position	
01		+		
02		-		
03		+		
04*		-		

0	ONE SOLENOID, SIDE A "E" MOUNTING			
Spool type		Covering	Transient position	
01		+		
02		-		
03		+		
04*		-		
15		-		
16		+		

0	ONE SOLENOID, SIDE B "F" MOUNTING				
Spool type		Covering	Transient position		
01		+			
02		-			
03		+			
04*	wt IXFe	-			
15	MXIIIPP	-			
16	w XIIIce	+			

TAB.2 - A09 (27 W) COIL



Voltage codes are not stamped on the plate, their are readable on the coils.

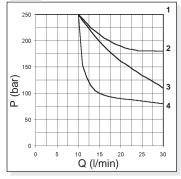
TAB.3 - VARIANTS

Variant	Code
No variant (without connectors)	S1(*)
Viton	SV(*)
Emergency button	ES(*)
Rotary emergency button	P2 (*)(**)
Rotary emergency button (180°)	R5 (*)(**)
Variant with lever for emergency button	LF(*)
AMP Junior connection	AJ(*)
Coil with flying leads (250 mm)	FL
Coil with flying leads (130 mm) with diode	LD
Deutsch connection with bidirectional dio	de CX
Other variants available on request.	

(*) Coils with Hirschmann and AMP Junior connection supplied without connectors. The connectors can be ordered separately, CAP. I • 20.

(**) P2 and R5 Emergency tightening torque max. 6+9 Nm / 0.6 + 0.9 Kgm with CH n. 22

LIMITS OF USE (MOUNTING C-E-F)



Spool	n°	
type	curve	
01	2	
02	1	
03	3	
04	3	
15	4	
16	1(4*)	

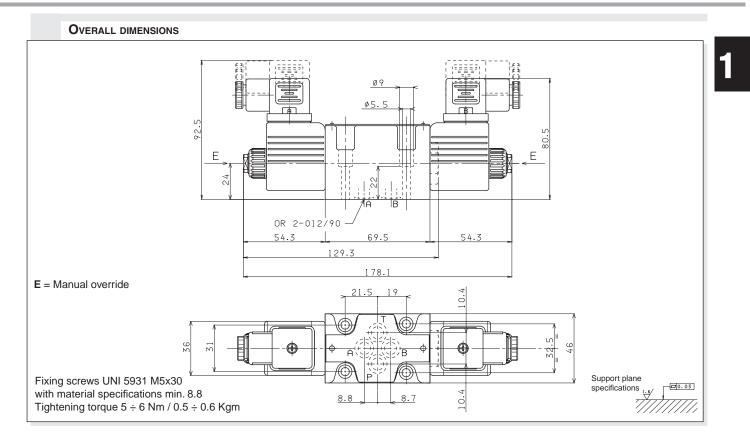
 $(4^*) = 16$ spools used for 3 way valve, follow the curve n°4

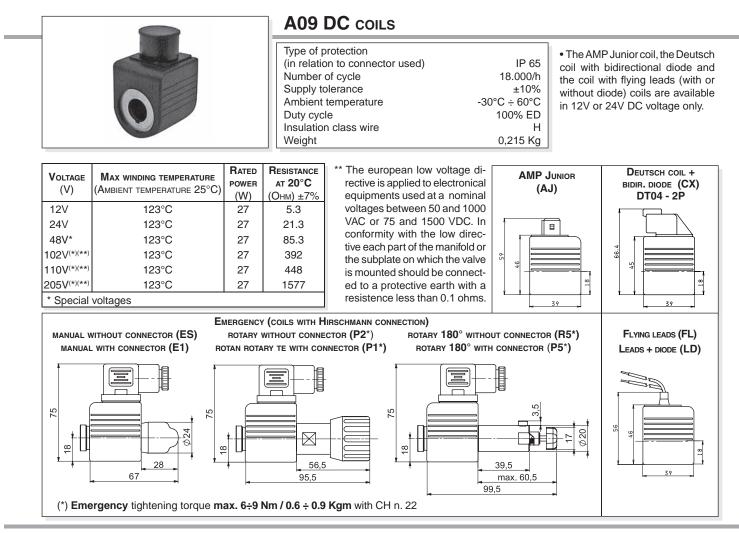
The tests have been carried out with solenoids operating temperature and a voltage 10% less than rated voltage with a fluid temperature of 50 C°. The fluid used was a mineral oil with a viscosity of 46 mm²/s at 40 degrees C. The values in the diagram refer to tests carried out with the oil flow in two directions simultaneously (e.g. from P to A and at the same time B to T).

In the cases where valves 4/2 and 4/3 are used with the flow in one direction only, the limits of use could have variations which may even be negative (See curve No 4 and Spool No 16). The tests were carried out with a counter-pressure of 2 bar at T port.



ADC3... SOLENOID OPERATED WITH REDUCED OVERALL SIZE CETOP 3/NG6





VALV/ADC3001_E/19-2017







CETOP 3/NG06				
STANDARD SPOOLS	Cap. I • 10			
AD3E	Cap. I • 11			
AD3EJ*	Cap. I • 12			
AD3EKJ	Cap. I • 13			
AD3V	Cap. I • 14			
AD3L	Cap. I • 15			
OTHER OPERATOR	Cap. I • 16			
AD3P	Cap. I • 17			
AD3O	Cap. I • 17			
AD3M	Cap. I • 18			
AD3D	Cap. I • 18			
"D15" DC Coils	Cap. I • 19			
"B14" AC SOLENOIDS	Cap. I • 19			
STANDARD CONNECTORS	Cap. I • 20			
"LE" VARIANTS	Cap. I • 21			
L.V.D.T.	Cap. I • 22			

DIRECTIONAL CONTROL VALVES CETOP 3/NG6

INTRODUCTION

The directional control valves NG6 are designed for subplate mounting with an interface in accordance with UNI ISO 4401 - 03 - 02 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-03), and can be used in all fields on account of their high flow rate and pressure capacities combined with compact overall dimensions.

The use of solenoids with wet armatures allows a very practical, safe construction completely dispensing with dynamic seals; the solenoid tube is screwed directly onto the valve chest whilst the coil is kept in position by means of a lock nut.

The special, precise construction of the ports and the improvement of the spools enables relatively high flow rates to be accommodated with a minimal pressure drop (Δp). The operation of the directional valves may be electrical, pneumatic, oleodynamic, mechani-

cal or lever.

The centre position is obtained by means of calibrated length springs which reposition the spool in the centre or end of travel position once the action of the impulse is over.

The solenoids are constructed with a protection class of IP66 to DIN 40050 standards and are available in either AC or DC form in different voltage and frequencies.

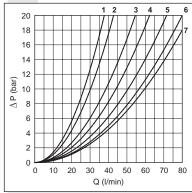
The new type DC coil "D15", of cause their high performance, allows to increasing the limits of use respect to last series.

All types of electrical control are available, on request, with different types of manual emergency controls.

The solenoid coils are normally arranged for DIN 43650 ISO 4400 type connectors; is available on request these variant coils: with AMP Junior connections, with AMP junior and integrated diode, with Deutsch DT04-2P connections or solenoid with flying leads. Connectors with built in rectifiers or pilot lights are also available.

The valves are designed for use with DIN 51524 standard hydraulic mineral oils and it is recommended that filters should be fitted to ensure a maximum contamination level of class 10 in accordance with NAS 1638, $B_{ys} \ge 75$.

PRESSURE DROPS



The diagram at the side shows the pressure drop curves for spools during normal usage. The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C; the tests have been carried out at a fluid temperature of 40°C. For higher flow rates than those in the diagram, the losses will be those expressed by the following formula:

$\Delta p1 = \Delta p \times (Q1/Q)^2$

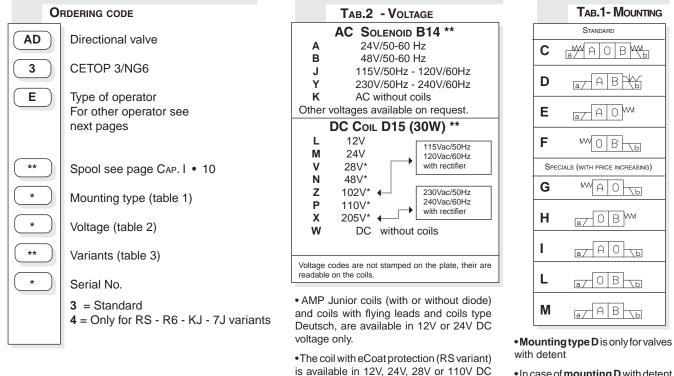
where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, $\Delta p1$ will be the value of the losses for the flow rate Q1 that is used.

Spool	Connections					
type	P→A	P→B	A→T	B→T	$P \rightarrow T$	
01	5	5	5	5		
02	7	7	7	7	6	
03	5	5	6	6		
04	2	2	2	2	4	
44	1	1	2	2	3	
05	7	7	5	5		
06	5	5	7	5		
66	5	5	5	7		
07		2	6			
08	6	6				
09		5		5		
	Curve No.					

Spool	Connections					
type	P→A	P→B	$A \rightarrow T$	$B \rightarrow T$	$P \rightarrow T$	
10	5	5	5	5		
11	5			5		
22		5	5			
12		5		6		
13		5	6	6		
14	4	3	3	3	4	
28	3	4	3	3	4	
15-19*	5	5	6	6		
16	5	5	4	4		
17-21*	3	4				
20*	4	4	4	4		
	Curve No.					

(*) Value with energized solenoid





voltage only.

* Special voltage

** Technical data see page Cap. I • 19

• In case of **mounting D** with detent a maximum supply time of 2 sec is needed (only for AC coils).

TAB.3 - VARIANTS

VARIANT	CODE	•	PAGE
No variant (without connectors)	S1(*)		
Viton	SV (*)		
Emergency control lever for directional control valves type ADC3 and AD3E	LE-LF-AX-CE	(*)♦	Cap. I • 21
Emergency button	ES(*)		Cap. I • 19
Rotary emergency button	P2(*)		Cap. I • 19
Rotary emergency button (180°)	R5(*)		Cap. I • 19
Preset for microswitch (E/F/G/H mounting only) (see below note ◊)	M1(*)	•	Cap. I • 11 - Cap. I • 15
5 micron clearance	SQ(*)	•	
Spool movement speed control (only VDC) with Ø 0.3 mm orifice	3S(*)	•	Cap. I • 12
Spool movement speed control (only VDC) with ø 0.4 mm orifice	JS(*)	•	Cap. I • 12
Spool movement speed control (only VDC) with ø 0.5 mm orifice	5S(*)	٠	Cap. I • 12
Spool movement speed control (only VDC) with ø 0.6 mm orifice	6S(*)	•	Cap. I • 12
AMP Junior coil - for12V or 24V DC voltage only	AJ(*)		Cap. I • 19
AMP Junior coil and integrated diode - for12V or 24V DC voltage only	AD(*)		Cap. I • 19
Coil with flying leads (175 mm) - for12V or 24V DC voltage only	SL		Cap. I • 19
Hirschmann coil eCoat surface treatment - for 12V, 24V, 28V or 110V DC voltage only	RS(*)		Cap. I • 19
Deutsch DT04-2P connection eCoat surface treatment - for 12V, 24V DC voltage only	R6		Cap. I • 19
High corrosion resistance valve - Hirschmann connector	KJ		Cap. I • 13
High corrosion resistance valve - Deutsch DT04-2P connector - for 12V, 24V DC voltage only	7J		Cap. I • 13
Deutsch DT04-2P coil - for12V or 24V DC voltage only	CZ		Cap. I • 19
Other variants available on request.			
 ◊ = Maximum counter-pressure on T port: 8 bar - Microswitch type MK code 1319098 must b ♦ = Variant codes stamped on the plate 	e ordered sepa	ratel	у.

(*) Coils with Hirschmann and AMP Junior connection supplied without connectors. The connectors can be ordered separately, Cap. I • 20.



Two solenoids, spring centred "C" mounting				
Spool type		Covering	Transient position	
01	a XIIII	+		
02	MATTER 1	-		
03	MATTER	+		
04*		-	THEHX	
44*		-		
05	#XHIK	+		
66	·XIII	+		
06	*XHIIK	+		
07*	MATER	+		
08*		+		
09*		+		
10*		+		
22*	MXHEM	+		
11*		+		
12*		+		
13*	· XIIIIK	+		
14*		-	THER	
28*		-	XEEE	
ONE SOLENOID, SIDE A "E" MOUNTING				

ONE SOLENOID, SIDE A "E" MOUNTING							
Spool type		Covering	Transient position				
01		+					
02		-					
03		+					
04*		-					
44*		-					
05		+					
66		+					
06		+					
08*		+					
10*		+					
12*		+					
15		-					
16		+					
17		+					
14*		-					
28*		-					

DIRECTIONAL CONTROL VALVES STANDARD SPOOLS CETOP 3/NG6

Νοτε

(*) Spool with price increasing

- With spools 15 / 16 / 17 only mounting E / F are possible
- 16 / 19 / 20 / 21 spool not planned for AD3E...J*

• For lever operated the spools used are different.

Available spools for this kind of valve see AD3L..

0	ONE SOLENOID, SIDE B "F" MOUNTING						
Spool type		Covering	Transient position				
01		+					
02		-					
03		+					
04*	w H	-					
44*	wt t XFe	-					
05		+					
66		+					
06		+					
08*		+					
09*		+					
10*		+					
22*	w	+	EIZE				
12*		+					
13*		+					
07*	white	+					
15		-					
16		+					
17		+					
14*		-	EIXIX				
28*		-					

Two solenoids "D" mounting						
Spool type		Covering	Transient position			
19*	a XII Ku	-				
20*		+				
21*		+				



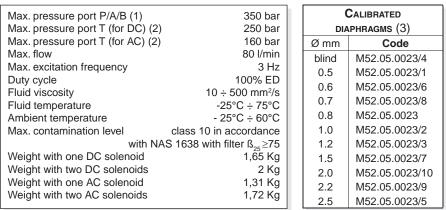
AD3E... DIRECTIONAL CONTROL VALVES SOLENOID OPERATED CETOP 3/NG6



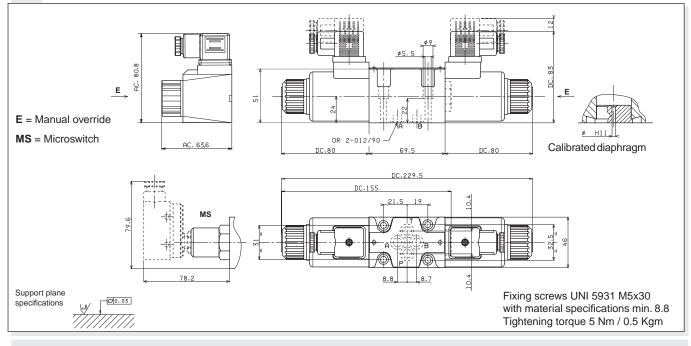
A max. counter-pressure of 8 bar at T is permitted for the variant with a microswitch (**M1**). (1) Dynamic pressure allowed on P for 1 million of cycles. (2) DC: Dynamic pressure allowed for 2 millions of cycles.

AC: Dynamic pressure allowed for 350.000 of cycles. For dynamic pressure of 100 bar are allowed 1 milion cycles.

OVERALL DIMENSIONS



(3) For high differential pressure please contact our technical department.



LIMITS OF USE (MOUNTING C-E-F)

The tests have been carried out with solenoids at operating temperature and a voltage 10% less than rated voltage with a fluid temperature of 40°C. The fluid used was a mineral oil with a viscosity of 46 mm²/s at 40°C. The values in the diagram refers to tests carried out with the oil flow in two directions simultaneously T = 2 bar (e.g., from P to A and the same time B to T). In the case where valves 4/2 and 4/3 were used with the flow in one direction only, the limits of use could have variations which may even be negative. Rest times: the values are indicative and depend on following parameters: hydraulic circuit, fluid used and variations in hydraulic scales (pressure P, flow Q, temperature T). The limit of use for AC solenoids were detected with 50 Hz power.

Direct current:	Energizing De-energizing	30 ÷ 10 ÷		Alte	ernating co	current: Energizing 8 ÷ 30 ms. De-energizing 15 ÷ 55 ms.
NOTE: The operating	limits shown are valid	for mour	ntings C,	E, F.		
DIRECT CURR	ENT SOLENOIDS (DC)		Spool type 01 02 03 04 44 05 06-66 11-22 14-28 15 16	DC 1 3 2 1 1 5 4 7 8 6	noids AC 9 9 10 15 9 16 13 17 12 14 11 rves	ALTERNATING CURRENT SOLENOIDS (AC) $ \begin{array}{c} 320 \\ 280 \\ 280 \\ 240 \\ 200 \\ 200 \\ $



Valves type AD3E...J* with spool movement speed control

These ON-OFF type valves are used a lower spool movement speed than usual for conventional solenoid valves is required to prevent impacts which could adversely affect the smooth running of the system. The system consist of reducing the transfer section for the fluid from one solenoid to the other by means of calibrated orifices.

• This version can only be used with a direct current (DC) and also involves a reduction in the limits of use so that we suggest to always test the valve in your application

- To order AD3...J* version valves, specify the orifices code.
- The operation is linked to a minimum counter-pressure on T line (1 bar min.)

• The switching time referred to the spool travel detected by a LVDT transducer can vary for the NG6 valve from a minimum of 100 to a maximum of 300 ms depending on 5 fundamental variables:

1) Diameter of the calibrated orifices (see table)

2) Hydraulic power for clearance referring to flow and pressure values through valve

- 3) Spool type
- 4) Oil viscosity and temperature
- 5) Counter-pressure at T line

Max. pressure ports P/A/B	320 bar
Max. pressure port T (*)	250 bar
Max. flow	30 l/min
Max. excitation frequency	2 Hz
Duty cycle	100% ED
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Weight with one DC solenoid	1,65 Kg
Weight with two solenoids DC solenoids	2 Kg

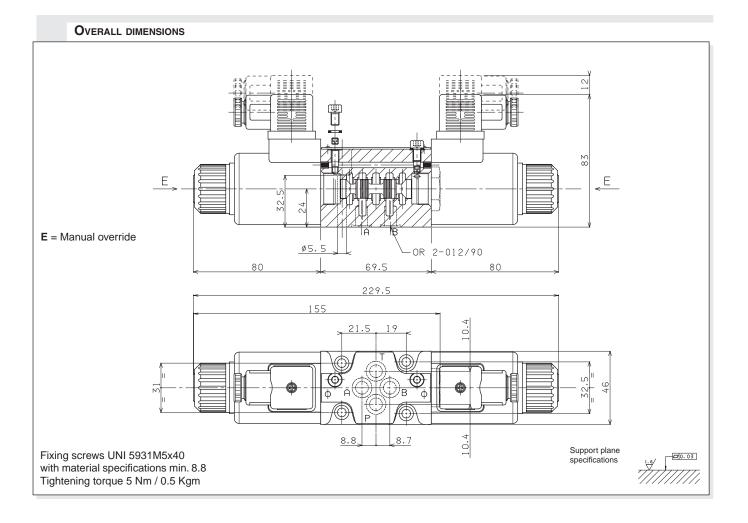
(*) Pressure dynamic allowed for 2 millions of cycles.

CALIBRATED					
ORIFICES AVAILABLE					
M4x4	Code				
M89.10.0028	3S (J3+S1)*				
M89.10.0029	JS (J4+S1)*				
M89.10.0006	5S (J5+S1)*				
M89.10.0030	6S (J6+S1)*				
	ORIFICES AVAILA M4x4 M89.10.0028 M89.10.0029 M89.10.0006				

* Old code

• Possible mountings: C / E / F / G / H

• 16 / 19 / 20 / 21 spools not planned for AD.3.E...J*







AD3E...KJ / 7J HIGH CORROSION RESISTANCE

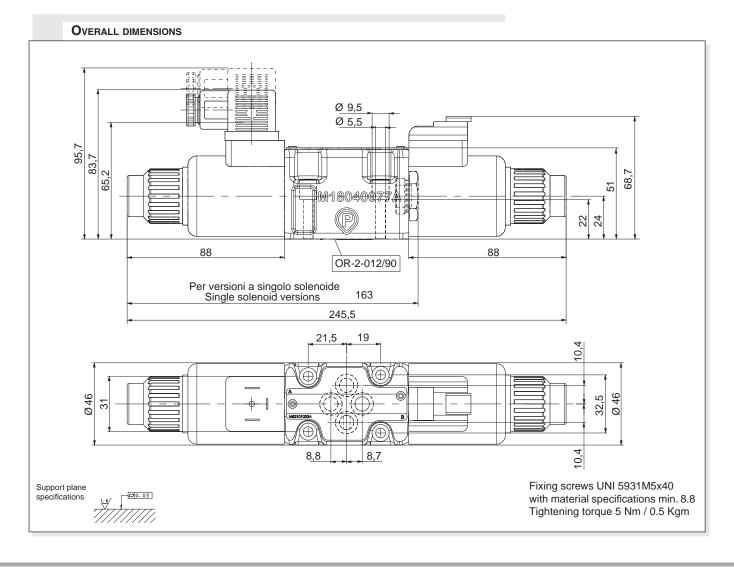


• This variant has a Zinc-Nickel surface treatment on metallic parts for a higher corrosion resistance

• Coil windings are sealed and outer metal housing has eCoat surface treatment

• The complete valve outstand more than 700 hours exposure of Salt Spray Test (test performer according to UNI EN ISO 9227 and evaluation according to UNI EN ISO10289).

• The plastic blind retainer is assembled as standard to protect the end surface of solenoid tube







AD3V					
"D15" DC COILS	Cap. I • 19				
STANDARD CONNECTORS	Cap. I • 20				
LVDT	Cap. I • 22				

AD3V... CETOP 3/NG6 WITH PROXIMITY SENSOR LVDT

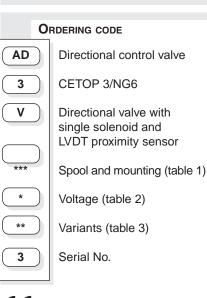
The single solenoid directional valves type AD.3.V are used in applications where the monitoring of the position of the spool inside the valve is requested to manage the machine safety cycles in according with the accident prevention legislation. These directional valves are equipped with an horizontal positioned inductive sensor on the opposite side of the solenoid, which is capable of providing the first movement of the valve when the passage of a minimum flow is allowed. Integrated in safety systems, these valves intercept actuator movements that could be dangerous for the operators and for the machine.

Max. operating pressure ports P/A/B (*) 350					
Max. operating pressure					
port T dynamic (**)	250 bar				
Max. flow	60 l/min				
Max. excitation frequency	3 Hz				
Duty cycle	100% ED				
Fluid viscosity	10 ÷ 500 mm²/s				
Fluid temperature	-25°C ÷ 75°C				
Ambient temperature	-25°C ÷ 60°C				
Type of protection					
(in relation to connector used)	IP 66				
Weight	1,7 Kg				
(*) Dynamic pressure allowed on P for 800.000 cycles.					

(**) Pressure dynamic allowed for 2 millions of cycles.

Possible mountings: E / F / H

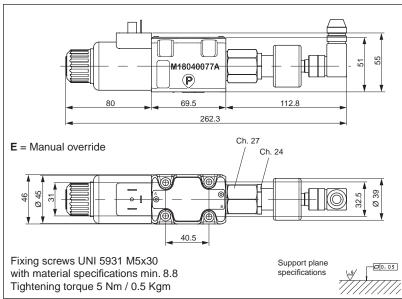
• The valve is supplied with DC solenoid only

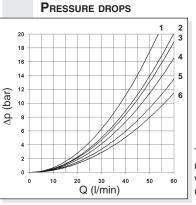


registered mark for industrial environment with reference to the electromagnetic compatibility. European norms: - EN50082-2 general safety norm - industrial

environment - EN 50081-1 emission general norm - resi-

dential environment





TAB.2 - VOLTAGE D15 Coil (30W) ** 12V Τ. Μ 24V 115Vac/50Hz v 28V* 120Vac/60Hz 48V* Ν with rectifier Ζ 102V*• 230Vac/50Hz Ρ 110V* 240Vac/60Hz R 205V* with rectifier w Without DC coils and connectors Voltage codes are not stamped on the plate their are readable on the coils. * Special voltage

** Technical data see Cap. I • 19

Connections Spool type P→A P→B $A \rightarrow T$ $B \rightarrow T$ $P \rightarrow T$ 01 5 5 5 5 5 02 6 6 6 6 06 5 5 6 5 16 5 5 4 4 17 1 3 66 5 5 5 6 32 Curves No.

The diagram at side shows the Δp curves for spool in normal usage. The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C; the tests have been carried out at a fluid temperature of 40°C.

Tab1 - Standard spools for AD3V

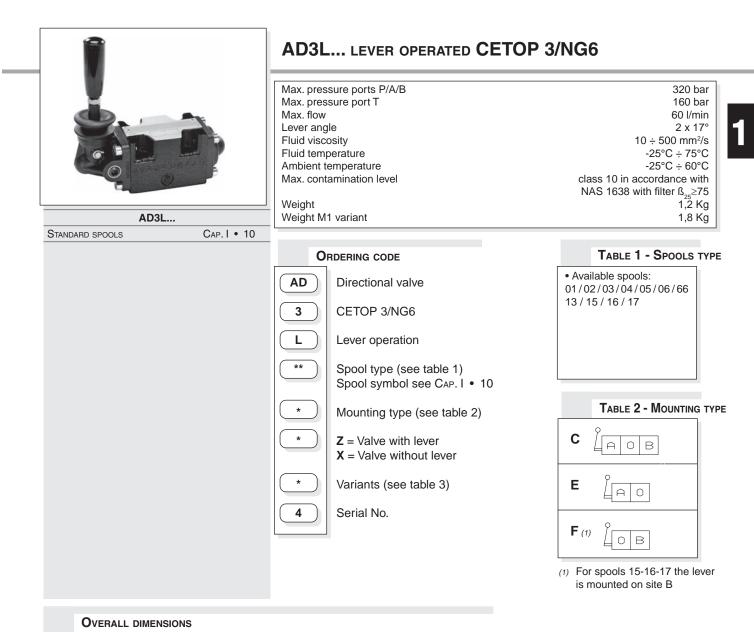
POSSIBLE MOUNTING: E / F / H							
Spool type		Covering	Transient position				
01E		+					
01F		+					
02E		-					
06H*		+					
16E		+					
17F		+					
66F		+					
32E		+					
(*) Spo	(*) Spool with price increasing						

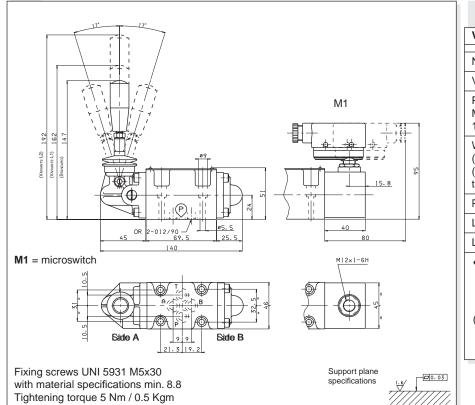
TAB.3 - VARIANTS

No variant (without connectors)	S1(*)
Viton	SV(*)
Emergency button	ES(*)
Without proximity connector LVDT	S3
Without coils and proximity connector	S4
AMP Junior coil	AJ(*)
AMP Junior coil and integrated diode	AD(*)
Coil with flying leads (175mm)	SL
Deutsch DT04-2P Coil type	CZ
Other variants available on request.	

(*) Coils with Hirschmann and AMP Junior connection supplied without connectors. The connectors can be ordered separately, Cap. I • 20.







No variant Viton Preset for microswitch Microswitch type MK code 1319098 can be ordered separately. With detent (*) (mechanical connection) (Springs are different from those for standard versions)	E
Viton Preset for microswitch Microswitch type MK code 1319098 can be ordered separately. With detent (*) (mechanical connection) (Springs are different from those for standard versions) Preset for microswitch + Detent (*) Lever length 162 mm Lever length 192 mm • Variant codes stamped on the pla	ode (♦)
Preset for microswitch M Microswitch type MK code 1319098 can be ordered separately. With detent (*) (mechanical connection) (Springs are different from those for standard versions) Preset for microswitch + Detent (*) Lever length 162 mm Lever length 192 mm • Variant codes stamped on the plane	00
Microswitch type MK code 1319098 can be ordered separately. With detent (*) (mechanical connection) II (Springs are different from those for standard versions) Preset for microswitch + Detent (*) M Lever length 162 mm Lever length 192 mm • Variant codes stamped on the pla	V1
(mechanical connection)I(Springs are different from those for standard versions)IPreset for microswitch + Detent (*)NLever length 162 mmILever length 192 mmI• Variant codes stamped on the plane	M1 (♦)
Lever length 162 mm Lever length 192 mm • Variant codes stamped on the pla	01 (♦)
Lever length 192 mm Variant codes stamped on the pla	//D (♦)
 Variant codes stamped on the pla 	L1
	L2
(*) max. 150.000 cycles.	ite

VALV/AD3L004_E/20-2020





ALTRI COMANDI	
STANDARD SPOOLS	Cap. I • 10
AD3P	Cap. I • 17
AD3O	Cap. I • 17
AD3M	Cap. I • 18
AD3D	Cap. I • 18

DIRECTIONAL CONTROL VALVES OTHER OPERATOR CETOP 3/NG6

INTRODUCTION

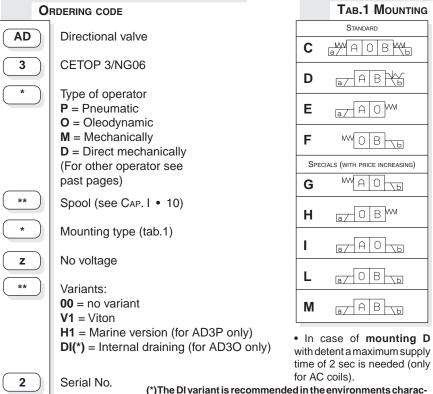
The directional control valves NG6 are designed for subplate mounting with an interface in accordance with with UNI ISO 4401 - 03 - 02 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-03), and can be used in all fields on account of their high flow rate and pressure capacities combined with compact overall dimensions.

The use of solenoids with wet armatures allows a very practical, safe construction completely dispensing with dynamic seals; the solenoid tube is screwed directly onto the valve chest whilst the coil is kept in position by means of a lock nut.

The special, precise construction of the ports and the improvement of the spools enables relatively high flow rates to be accommodated with a minimal pressure drop (Δp).

The centre position is obtained by means of calibrated length springs which reposition the spool in the centre or end of travel position once the action of the impulse is over.

The valves are designed for use with DIN 51524 standard hydraulic mineral oils and it is recommended that filters should be fitted to ensure a maximum contamination level of class 10 in accordance with NAS 1638, $\beta_{25} \ge 75$.



(*)The DI variant is recommended in the environments characterised by the presence of dust or any type of contamination.

									-				
	1 2	Spool		Co	nnectio	ns		Spool		Co	nnectio	ns	
20 — 18 —	3	type	P→A	Р→В	A→T	B→T	P→T	type	P→A	Р→В	A→T	B→T	P→T
16 —	4	01	5	5	5	5		11	4			6	
14 -	5	02	6	6	6	6	5	22		4	6		
(par) 10 –	6	03	5	5	6	6		12		5		6	
<u>a</u> 10 –		04	1	1	2	2	4	13		5	6	6	
d∆ ∗		05	5	5	5	5		14	2	1	1	1	2
6		06	5	5	6	5		28	1	2	1	1	2
0		66	5	5	5	6		15 - 19	4	4	6	6	
4		07		4	6			16	5	5	4	4	
2		08	6	6				17 - 21	1	3			
°+	10 20 30 40 50 60	09		5		5		18	5	5			
	Q (I/min)	10	5	5	5	5		20	4	4	4	4	
	· · /			(Curve No).				C	Curve No).	

The diagram at the side shows the pressure drop curves for spools during normal usage. The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C; the tests have been carried out at a fluid temperature of 40°C. For higher flow rates than those in the diagram, the losses will be those expressed by the following formula:

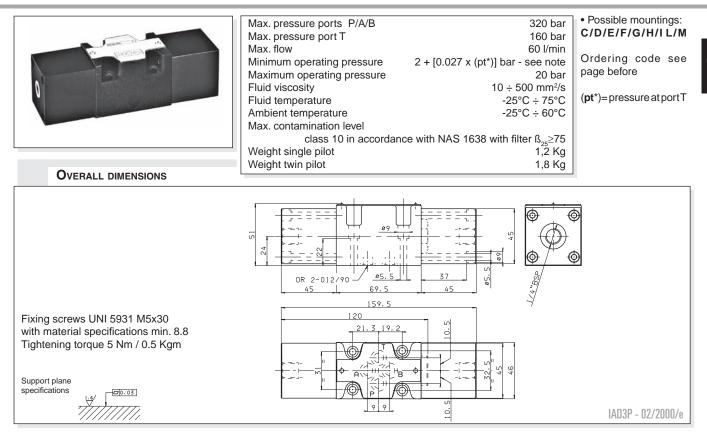
 $\Delta p1 = \Delta p x (Q1/Q)^2$

where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, $\Delta p1$ will be the value of the losses for the flow rate Q1 that is used.

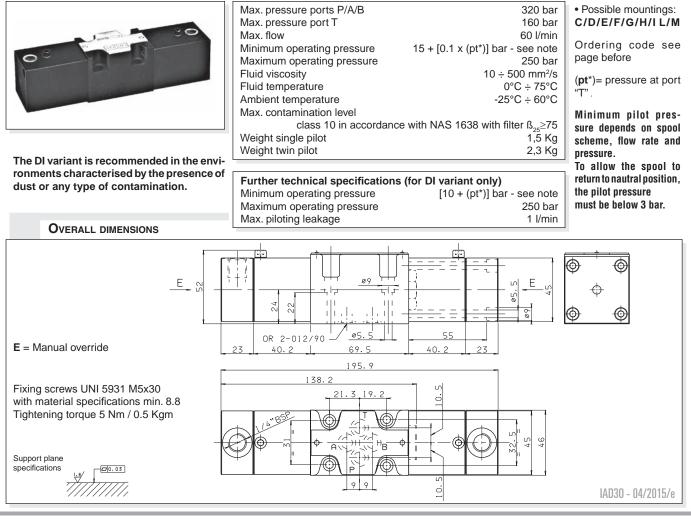
PRESSURE DROPS



AD3P... PNEUMATIC OPERATION TYPE VALVES CETOP 3/NG6

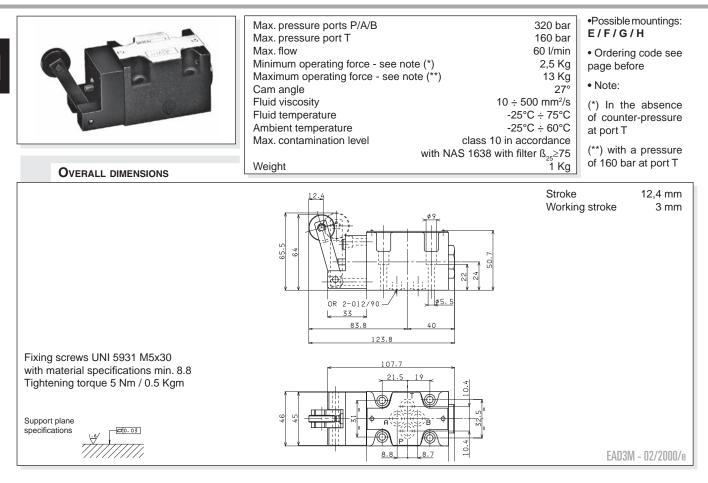


AD3O... OLEODYNAMIC OPERATION TYPE VALVES CETOP 3/NG6

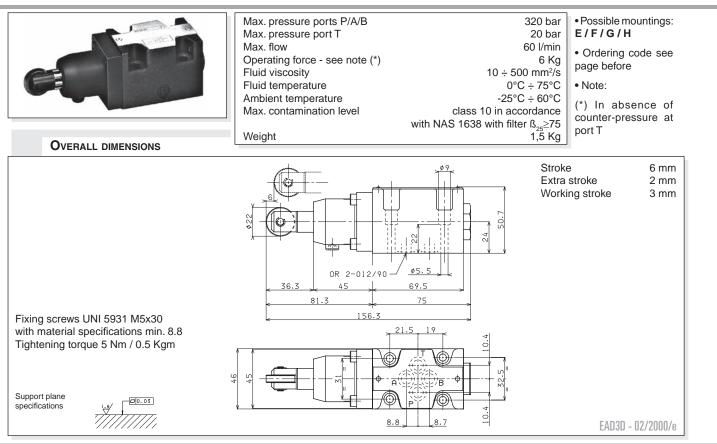


VALV/AD3P002_E/04-2015

AD3M... MECHANICALLY OPERATED TYPE VALVES CETOP 3/NG6

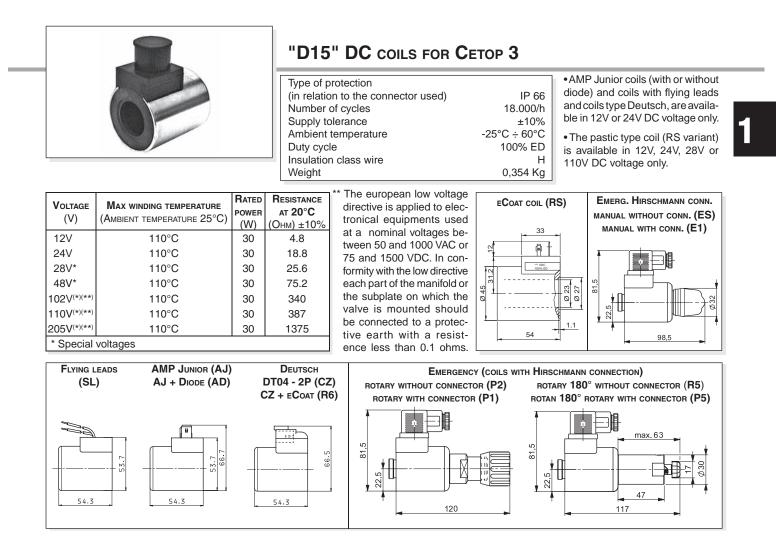


AD3D... DIRECT MECHANICALLY OPERATED TYPE VALVES CETOP 3/NG6



VALV/AD3M002_E/05-2017







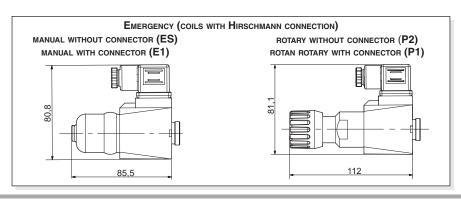
"B14" AC SOLENOIDS FOR CETOP 3

Type of protection (in relation to the connector used)	IP 65
Number of cycles	18.000/h
Supply tolerance	+10% / -10%
Ambient temperature	-30°C ÷ 60°C
Duty cycle	100% ED
Insulation class wire	Н
Weight	0,436 Kg

Voltage	MAX. WINDING TEMPERATURE	RESISTANCE AT 20°C	RATED POWER.	PICKUP CURRENT
(V)	(Ambient temperature 25°C)	(Онм) ±10%	(VA)	(A)
24V/50Hz - 24V/60Hz	100°C - 96°C	1.7	54 - 40	5.6 - 5
48V/50Hz - 48V/60Hz	112°C - 98°C	6.8	45 - 34	5.3 - 5
115V/50Hz - 120V/60Hz *	133°C - 101°C	32.5	61 - 51	3.2 - 3.2
230V/50Hz - 240V/60Hz *	120°C - 103°C	134	62 - 52	1.6 - 1.6

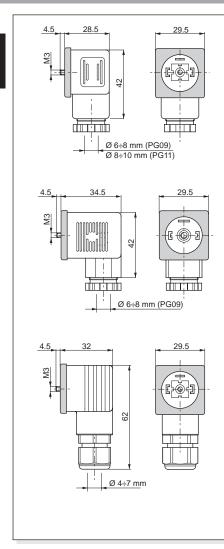
* The european low voltage directive is applied to electronical equip- the manifold or the subplate on which the valve is mounted should be ments used at a nominal voltages between 50 and 1000 VAC or 75 and 1500 VDC. In conformity with the low directive each part of

connected to a protective earth with a resistence less than 0.1 ohms.





CONNECTORS DIRECTIONAL CONTROL VALVES IN ACCORDANCE WITH DIN 43650/ISO4400



Connector	Protection level	Туре	Cable gland	Code
	IP65	Black color	PG09	V86 05 0002
Ctandard		Grey color	PG09	V86 05 0004
Standard		Black color	PG11	V86 05 0006
		Grey color	PG11	V86 05 0008
		12 VAC/VDC	PG09	V86 10 0018
Lens cover with pilot light (bipolar led) (*)	IP65	24 VAC/VDC	PG09	V86 10 0012
		115 VAC/VDC	PG09	V86 10 0020
		230 VAC/VDC	PG09	V86 10 0022

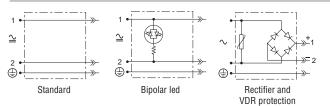
(*) Don't use for proportional versions

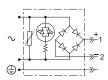
Connector	Protection level	Туре	Cable gland	Code
With rectifier (*)	IDCE	Black color	PG09	V86 20 0002
Inlet voltage 12÷230 VAC Outlet voltage 9÷205 VDC	IP65	Grey color	PG09	V86 20 0004
		12 VAC	PG09	V86 25 0018
Lens cover with pilot light (bipolar	IP65	24 VAC	PG09	V86 25 0019
led) and rectifier (*) Inlet voltage 12÷230 VAC		48 VAC	PG09	V86 25 0020
Outlet voltage 9:205 VDC		115 VAC	PG09	V86 25 0021
Outlet voltage 3-203 VDG		230 VAC	PG09	V86 25 0022

(*) Don't use for proportional versions

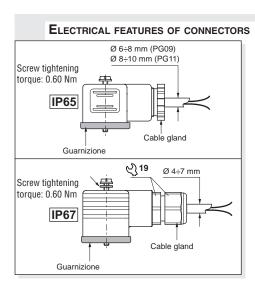
Connector	Protection level	Туре	Cable gland	Code
With protection level IDC7	IP67	Black color	—	V86 28 0001
With protection level IP67		Grey color	_	V86 28 0002

Electrical circuits





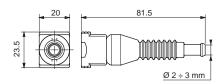
Bipolar led, rectifier and VDR protection



Description	IP65	IP67
AC rated voltage	Max. 250 V	Max. 250 V
DC rated voltage	Max. 300 V	Max. 300 V
Pin conctat nominal current	10A	10A
Pin conctat max. current	16A	16A
Max. section cable	1.5 mm ²	1.5 mm ²
Cable gland PG09 - M16x1,5	Ø cable 6 ÷ 8 mm	Ø cable 4 ÷ 7 mm
Cable gland PG11 - G 1/2" - M20x1,5	Ø cable 8 ÷ 10 mm	—
Protection level	IP65 EN60529	IP67 EN60529
Insulation class	VDE 0110-1/89	VDE 0110-1/89
Operating temperature	-40°C ÷ 90 C°	-20°C ÷ 80 C°

The degrees of protection indicate is guaranteed only if the connectors were properly mounted with his original seals.

AMP JUNIOR CONNECTORS



Connector	Туре	Cable section	Pin conctat max current	Code
AMP Junior connector Timer 2 conctat	Black color	0,5 ÷ 1,5 mm ²	10A	RKRC0808000





VARIANTS (*) - EMERGENCY CONTROL LEVER FOR DIRECTIONAL CONTROL VALVES (ADC/AD3E)

The emergency control lever for solenoid valves, represents a develop in terms of safety and flexibility among applied hydraulic components.

Thanks to his flexibility, the component was designed to be inserted between the valve body and the spool, providing total interchangeability between the different types of solenoid body valves. It is compatible with the standard CETOP 3 and stackable valves with threaded connections –G3/8" or 9/16-18UNF (SAE 6). The component is available for both directional control and proportional valves (for the last type of control please contact our Technical Department) As an emergency lever applied to solenoid valves, the control can be used as a safety device in conformity with the industry standards , also playing an useful role in the event of power cuts. The control can be used in agricultural and mobile fields; the manual action can be used to carry out periodic maintenance work on mobile components of the vehicle , in perfectly safe working conditions.

(*) VARIANTS

Variant	Description
LE	Standard coil with Hirschmann connection or without coil (W voltage)
LF	Standard coil without Hirschmann connection(*)
AX	AMP Junior coil(*)
CE	Deutsch coil

Max operating pressure port T: dynamic 160 bar static 210 bar Max operating pressure port P for series connection configuration 160 bar • MOUNTING TYPE: C / F / H • SPOOLS TYPE: 01/02/03*/04/16/17/66

MOUNTING COMPATIBILITY

Directional control valve

Directional control valve

* The spool 03 is allowed only on AD3E. Not permitted with ADC3

DESCRIPTION

CODE VALVE

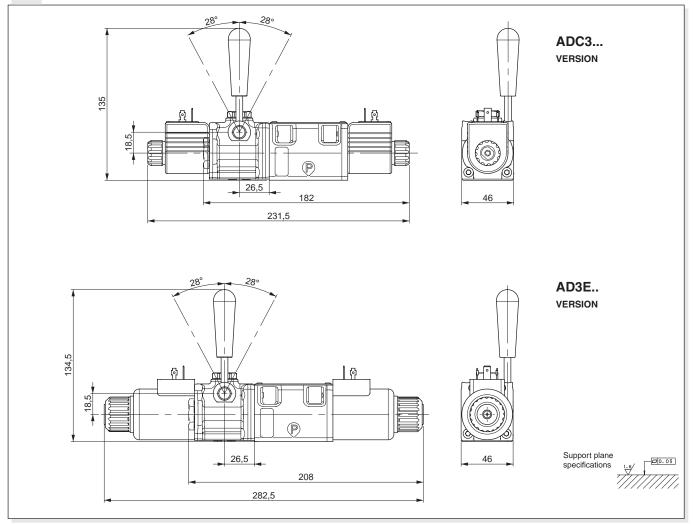
ADC3...

AD3E...

Other variants available on request.

(*) Coils with Hirschmann and AMP Junior connection supplied without connectors. The connectors can be ordered separately, Cap. I • 20.

OVERALL DIMENSION





COIL

A09

D15

VOLTAGE

27 W

30 W



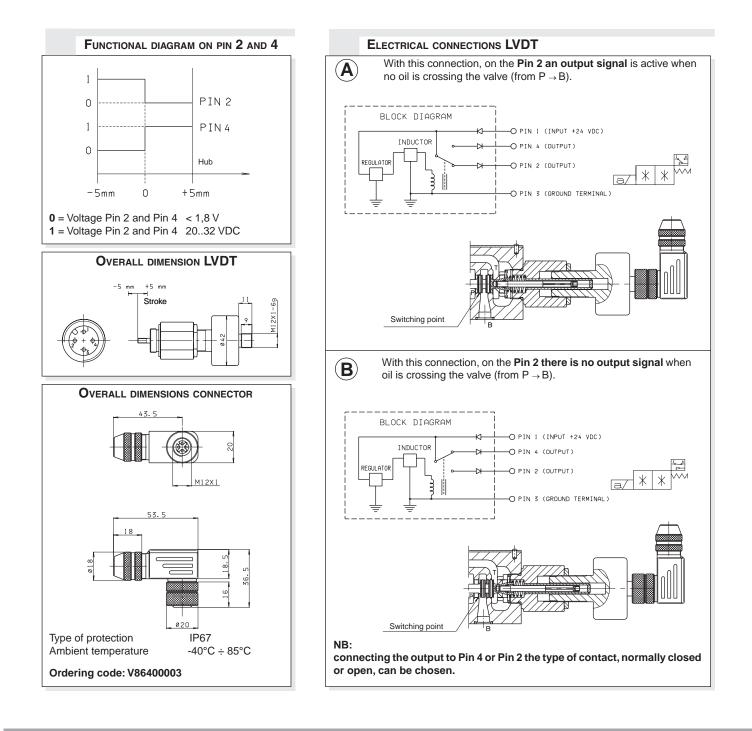


PROXIMITY SENSOR TYPE LVDT

Supply voltage	2032 VDC
Polarity reversal protection	yes
Switching point hysteresis	≤ 0,05 mm
Reproducibility	± 0,02 mm
Max. output current	\leq 400 mA; duty ratio 100%
Protection against short circuit	yes
Operating temperature	-25°C ÷ 80°C
Connection type	connector
Protection according to DIN	IP65
Max. pressure	400 bar

CE certificate according to 89/336/EEC EMC is provided. A screened cable is needed.

The LVDT position transducers allow to check exactly the very instant when the passage of a minimum flow is allowed.







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SERIES AD3XD	Cap. I • 25
SERIES AD3XG	Cap. I • 29

DIRECTIONAL CONTROLE CETOP 3 IN ACCORDANCE WITH 2014/34/UE ATEX DIRECTIVE

2014/34/UE ATEX EC DIRECTIVE (EXPLOSIVE ATMOSPHERE)

INTRODUCTION

Since 30/06/2003 products introduced into the market (or started-up) inside the EU, destined to be used in potentially explosive environments, must be in compliance with the 2014/34/UE Directive through special marking. The directive regarding ATEX products 2014/34/UE is therefore the regulation instrument that the European Union uses to obtain legislative harmonisation between the States and guarantee free circulation of goods inside the European Community itself.

The directive affirms that to eliminate obstacles from commerce it is necessary to guarantee a high level of protection and, with this aim, define the essential requirements on the subject of safety and health. The dispositions base themselves on the principle of the "new approach" (NA), for which the essential safety requirements of products must be established depending on the risk evaluation concurrent at the time of their use.

The 2014/34/UE Directive is applied to the manufacture specifications of all those products (electrical and not) destined to be used in potentially explosive environments caused, by the dangers deriving from the presence of dust or gas, with the scope of reducing the risk of use that could be derived.

The term **product** refers to appliances, protection systems, devices, components and relative combinations, as defined in 2014/34/UE Directive.

The term **appliances** intends machines, materials, fixed or mobile devices, control elements, instruments detection and prevention systems. Alone or combined these are destined for production, transport, deposit, measurement, adjustment and conversion of energy, and to the transformation of material and which, by way of the powerful triggering sources, risk causing an explosion. As a consequence, even intrinsically safe appliances re-enter within the field of application of the directive.

Ther combination of two or more appliance parts, as well as any other components, makes up a whole unit that can be considered a product and therefore re-enters within the field of application of the 2014/34/UE Directive. If the whole unit requires adequate **installation** (therefore it is not immediately ready for use) the attached instructions should guarantee maintenance of compliance to the 2014/34/UE Directive on installation, without further evaluations of conformity. The installer must follow the instructions correctly.

When a combination of appliances leads to a **plant** this may not re-enter within the field of application of the directive. Each part must be certified and in compliance with the directive (as well as being subject to the relative evaluation of conformity, EC marking, etc.).

The plant manufacturer must therefore presume the conformity of the various components (each supplied with conformity certificate released by the respective manufacturer) and limit their evaluation only to any additional risks that become important in the final combination. Nevertheless, if the plant manufacturer inserts parts without EC marking or components not supplied with the certificate it will be obligatory to carry out further conformity evaluation of the whole unit.

The 2014/34/UE Directive envisions **obligations of the person** who introduces products into the market and/or starts them up, whether they are manufacturer's, his agent's, importer's or any other responsible person. The dispositions and obligations envisioned by the directive for **introduction into the market** have been applied, since 30 June 2003, to every individual product, independently from the date and place of manufacture. It is the manufacturers responsibility to guarantee conformity of all products, where these re-enter within the field of application of the directive.

The directive does not govern the use of the appliances; rather it establishes that the products can only be used if in compliance with safety requirements at the time of their introduction into the market or of their start-up. "**Start-up**" means the first use of the products subject of the 2014/34/UE Directive on EU territory by a final user. Nevertheless, a product that is immediately ready for use and does not need assembly or installation, and whose distribution conditions (deposit, transport, etc.) are not important for performance, is considered started-up at the time of introduction into the market.

Among the main potential causes/sources of triggering an explosion, such as sparks, flames, electric arcs etc.., **maximum surface temperature** also plays an important role. The dispositions of the directive establish evaluation criteria for the maximum temperature admissible depending on the type of explosive atmosphere in which the appliance must operate.

For environments characterised by the presence of **gas-air**, some temperature values are supplied to which the appliances must refer. They are indicated by the letter T followed by a number. The criterion to apply is that for which the temperature of the appliance must never exceed 80% of the value indicated for its own category.

For environments characterised by the presence of **dust-air**, to prevent setting on fire of the airborne dust, the surface temperature of the appliances must be decidedly lower than the predictable temperature of catching fire of the air+dust mixture. Therefore, during planning the maximum working surface temperature must be declared directly (in degrees centigrade).

Increases in temperature deriving from an accumulation of heat and chemical reactions must also be taken into consideration. The thickness of the deposited layer of dust must also be considered and, if necessary, limit the temperature, to prevent an accumulation of heat.



CLASSIFICATIONS OF AREA - MIX - GROUP AND RELATIVE CATEGORY - ACCORDING TO ATEX DIRECTIVES

The 2014/34/UE Directive is a "new approach" directive based on risk analysis. Its objective is to minimise the risks deriving from the use of some products indoors or in relation to a potentially explosive atmosphere. The probability of an explosive atmosphere manifesting must be considered not only as "one-off" or from a static point of view: all operative conditions that can derive from the transformation process must be taken into consideration.

• An **explosive atmosphere** for the 2014/34/UE Directive is made up from a mixture of inflammable substances (as gas, vapours, mists and dust), with air, in determined atmospheric conditions in which, after triggering, the combustion propagates together with the unburned mixture.

• An atmosphere susceptible to transforming into an explosive atmosphere because of local and/or operative conditions is defined **potentially explosive atmosphere**.

Explosive atmospheres are not only formed in the presence of obviously dangerous substances such as fuel, solvents etc., but also in the presence of apparently harmless products such as wood dust, metal dusts, flour, grain, sugar etc. Therefore it can concern not only industries in the chemical or oil industry sectors, but also industries in the foodstuffs, textile, manufacturing etc... It is important to consider that to re-enter within the 2014/34/UE Directive a product must be applied in presence of one or more of the characteristic elements listed above: presence of inflammable substances and air, in atmospheric conditions that favour the propagation of combustion. The directive does not define the atmospheric conditions itself. The relative norms indicate a temperature range, but this does not exclude that the products may be planned and evaluated specifically to occasionally function outside of this range, introducing the opportune construction transformations.

To define a **conformity evaluation procedure** adequate for the directive, the Manufacturer must, on the basis of the declared use, establish the products functioning conditions (this means to say, envision the type of working area, the type of explosive mixture with which it will come into contact and the level of probability that an explosive atmosphere verifies itself); successively he must establish to which Group the product belongs and individualise the category inside the Group.

With the Atex 99/92/EC Directive (For the safety of workers) the working conditions in which products in compliance with Atex 99/4/ EC Directive will function are indicated here. These are expressed in "**Areas**" and defined according to the level of probability that a potentially explosive atmosphere is verified, respectively for every type of atmosphere (gas-air mix or dust-air mix).

Area 0 and 20 Places in which an explosive atmosphere is constantly present or present for long periods or frequently.

Area 1 and 21 Places in which an explosive atmosphere is probable. It is verified in normal functioning and exercise conditions.

Area 2 and 22 Places in which an explosive atmosphere has low probability of being verified or, if it occurs only lasts for a brief period of time.

GAS-AIR-TYPE EXPLOSIVE MIXTURE (G)

The products destined to work in environments characterised by this type of explosive atmosphere will be respectively indicated for Area **0**, **1 or 2** depending on the Group and category of origin (see below) and are marked with the letter G.

DUST-AIR-TYPE EXPLOSIVE MIXTURE (D)

The products destined to work in environments characterised by this type of explosive atmosphere will be respectively indicated for Area **20**, **21 or 22** depending on the Group and category of origin (see below) and are marked with the letter D.

GROUP I

Includes the appliances destined to be used in underground jobs in the mines and their surface plants, exposed to the risk of the release of firedamp and/or combustible dust. The subdivision into categories depends on the fact if the power supply must be interrupted or not if an explosive atmosphere manifests due to a mixture of air and gas, vapours mists (D) or a mixture of air and dust (G).

Category **M1 Very high protection level.** These products must be able to remain operative, for safety reasons, in the presence of an explosive atmosphere and present specific performances or protection configurations for breakdown in case of explosion.

Category M2 High protection level. The power supply to these products must be interrupted in the presence of an explosive atmosphere. Protection means must be incorporated to guarantee the level of protection during normal functioning and also in oppressive working conditions or resulting from great stressi.

GROUP II

Includes appliances destined to be used in different environments (from the mines) in which there is a probability that an explosive atmosphere manifests itself. Their subdivision into categories depends on two factors: the place, where the product will be used and if the probability that a potentially explosive atmosphere, owing to the mixture of air and gas, vapours, mists (D) and the mixture of air and dust (G), comes about in a constant or occasional manner and if it does occur, does this possibility remain for long or brief period of time.

Category 1 Very high protection level. These products must be planned to function in compliance with operative parameters established by the Manufacturer in environments in which there is a high probability that explosive atmospheres are always detected or manifest often or for long periods of time. They must present specific performances or protection configurations for breakdown in case of explosion.

Category 2 High protection level. These products must be planned to function in compliance with operative parameters established by the Manufacturer in environments in which there is a high probability that explosive atmospheres can manifest. Protection against explosions relative to this category must function in a way to guarantee the required safety level even in the presence of functioning defects of the appliances or in dangerous operative conditions, which frequently must be taken into consideration.

Category 3 Normal protection level. These products must be planned to function in compliance with operative parameters established by the Manufacturer in environments in which there is a slight probability that explosive atmospheres can manifest, and however only rarely or for a brief period of time. This type of product belonging to the category in question must guarantee the safety level required in normal functioning conditions.



1



AD3XD			
ATEX DIRECTIVE	Cap. I • 23		
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TAB.1 ASSEMBLY	Cap. I • 26		
TAB.2 VOLTAGES	Cap. I • 26		
TAB.3 SPOOL	Cap. I • 26		
LIMITS OF USE	Cap. I • 26		
DENTIFICATION NAMEPLATE	Cap. I • 27		
SAFETY INSTRUCTIONS	Cap. I • 27		
OVERALL DIMENSIONS	Cap. I • 28		

AD3XD... DIRECTIONAL CONTROLE CETOP 3 IN ACCORDANCE WITH 2014/34/UE ATEX DIRECTIVE

SOLENOID VALVES FOR USE IN WORKPLACES WHERE EXPLOSIVE ATMOSPHERES MAY OCCUR DUE TO THE PRESENCE OF GAS, VAPOUR OR MIST AND DUST.

AD3.XD solenoid valves are classified in:

Group II appliances (to be used in workplaces, apart from mines, where there is the probability of explosive atmospheres);

Category 2 (high protection level), for use in workplaces where it is probable that an explosive atmosphere may form in normal working conditions and classified by the presence of explosive mixtures of gas-dust type (letter **GD**) for zones **1**, **2** and **21**, **22**.

Group I (They are intended to be used in mines with gas firedamp);

Category M2 (high level of protection), they are intended for use in underground environment in mines and their surface installations, exposed to the likely risk of the release of firedamp and / or combustible dust under normal operating conditions.

These valves are therefore designed especially and manufactured in compliance with the ATEX 2014/34/UE Directive and according to European regulations EN 1127-1, EN 1127-2, EN 13463-1 and EN 13463-5.

Belonging to the "NG06 direction control" range, these valves are prepared for plate-mounting with attachment surface in compliance with UNI ISO 4401 - 03 - 02 - 0 - 94 (former CETOP R 35 H 4.2-4-03). They are activated electrically and the centre position is ensured by springs with gauged lengths, which once the pulse or command ceases, re-position the spool in the centre or at the end of travel position.

The coils used for these valves are subject to separate conformity certification, according to the ATEX Directive (EC-type). For further specifications, please consult the documents that are always supplied with the valve.

Before marking and marketing the valves of the AD3XD series, undergo tests and inspections according to the in-house Manufacturing System and to the Certified Company Quality System in compliance with ISO 9001:2008. All of the AD3XD valve series undergo 100% functional testing. These tests and inspections guarantee that the products sold comply with all the information reported in the Technical Specifications File registered and declared by marking with AD3X/ATEX/10.

0	RDERING CODE	TECHNICAL SPECIF	ICATIONS	
AD	Directional Control Valve	Description	AD3XD	T6 version (mine)
3	CETOP 3/NG06	Valve marking	C E 🖾 II 2GD/I M2 cT5	€ € 1 2 GD/I M2 cT6
XD	Solenoid valves built pursuant to ATEX Directive-2014/34/UE. With coils in explosion-proof version (Ex d) and IECEx conformity marked	Max. pressure on lines P/ Max. pressure on line T (Max. flow rate Max.excitation frequency Duty cycle Hydraulic fluids Fluid viscosity		320 bar 250 bar 60 l/min 3 Hz 100%ED mineral oils DIN 51524 10 ÷ 500 mm²/s
**	Spools 01/02/03/04/16 (tab.3). For further hydraulic diagrams, contact our Customer Service	Fluid temperature (*) Ambient temperature Max. contamination level Weight (one solenoid) Weight (two solenoids)	-20°C ÷ +40°C -20°C ÷ +40°C NAS 1638: class 10 with filter ß25 ≥ 75 2,37 kg 3,82 kg	-20°C ÷ +40°C -20°C ÷ +40°C NAS 1638: class 10 with filter ß25 ≥ 75 2,37 kg 3,82 kg
*	Assembly C / E / F / G / H (tab.1). For further assembly instructions, contact our Customer Service Voltage (tab.2) Variants	Soilenoid rated power: Degree of protection: Power supply tolerance: Power supply cable: Solenoid marking (**): Surface temperature:	6,5 ÷ 11W IP 67 ±10% standard length 3 m with cable gla consult documents supplied with s function of the power. Consult doc solenoid.	nd olenoid
	Variants 00 = None V1 = Viton LE = Emergency lever T6 = Suitable for temperature class I M2 Group T6 (<85°C) (mine)	atmospheres IIC across the range department.	c fluids, which do not constitute an effective ig e of temperatures and pressures required by the king for protection class according to Explosion rmity mark.	e unit marking, contact our technical
2	Serial number			

E



AD3XD... DIRECTIONAL CONTROLE CETOP 3 IN ACCORDANCE WITH 2014/34/UE ATEX DIRECTIVE

	TAB.1 ASSEMBLY			
		STANDARD		
с		Two solenoids centred		
Е	a A O W	One solenoid (side A)		
F		One solenoid (side B)		
Spe	Specials (with increased price)			
G	MAON			
н	a OBW			

Тав.2	VOLTAGES	

AC Voltage		
A	24V 50Hz/60Hz	
С	110V 50HZ/60Hz	
D	220V 50Hz/60Hz	
I	230V 50Hz/60Hz	
DC Voltage		
L	12V	
M	24V	
Р	110V	
N	48V	

The tension symbol is always printed on the nameplate.

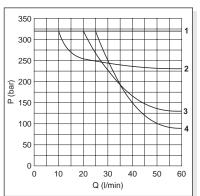
	TAB.3 SPOOL				
	Two soleno	ids - Assen	nbly C		
Spool type		Covering	Transient position		
01		+			
02		-			
03		+			
04*		-			

One solenoid - Assembly E				
Spool type		Covering	Transient position	
01		+		
02		-		
03		+		
04*		-		
16		+		

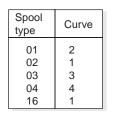
One solenoid - Assembly F				
Spool type		Covering	Transient position	
01		+		
02		-		
03		+		
04*	wtilde	-		
16	~~XIII-	+		

(*) spool with increased price

LIMITS OF USE (MOUNTING C-E-F)



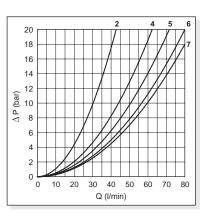
NOTE: the operating limits shown are valid for C fittings, E, F.



The tests have been carried out with solenoids at operating temperature with a voltage 10% less than rated voltage with a fluid temperature of 40°C. The fluid used was a mineral oil with a viscosity of 46 mm²/s at 40°C. The values in the diagram refers to tests carried out with the oil flow in two direction simultaneously (e.g., from P to A and in the same time B to T).

In cases where valves 4/2 e 4/3 were used with the flow in one direction only, the limits of use could have variations which may even be negative.

PRESSURE DROPS



The diagram at the side shows the pressure drop curves for spools during normal usage. The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C; the tests have been carried out at a fluid temperature of 40°C. For higher flow rates than those in the diagram, the losses will be those expressed by the following formula:

$$\Delta p1 = \Delta p \times (Q1/Q)^2$$

where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, $\Delta p1$ will be the value of the losses for the flow rate Q1 that is used.

Spool	Connections				
Spool type	P→A	P→B	A→T	B→T	P→T
01	5	5	5	5	
02	7	7	7	7	6
03	5	5	6	6	
04	2	2	2	2	4
16	5	5	4	4	
	Curve No.				



	13 14	123 4 56			All the solenoid valves are supplied with identification nameplate and Declaration of conformity subject to Directive 2014/34/UE.
]—	A Pmax 320bar	CODE Tamb: -20°C ++40°C LOGO ADDRESS HYDRAULIC Thub: -20°C ++40°C SCHEME 9 IMADE: TN	B		The identification nameplate bears the main technical specifications related to the functional and constructional characteristics of the valve and must therefore be kept intact and visible.
1	CE	Conformity to European Directive	9	T fluid	Working fluid temperature: - 20°C ÷ + 40°C series AD3XD
2	(Ex	Conformity to ATEX Directive 2014/34/UE	10	HYDRAULIC SCHEME	Type of hydraulic control performed by the valve
3	2 	Group II (surface places) Group I (mine)	11	M82200001A	Nameplate code
		Group II (surface places)		M82200001A BATCH	
3	I GD	Group II (surface places) Group I (mine) Category 2 (high protection) Explosive atmosphere: GD : presence of gas, vapour or mist and combustible dust M: presence of firedamp atmo-			Nameplate code Reference number of technical
3	I GD M	Group II (surface places) Group I (mine) Category 2 (high protection) Explosive atmosphere: GD : presence of gas, vapour or mist and combustible dust M: presence of firedamp atmo- spheres	12	BATCH Pmax 320 bar	Nameplate code Reference number of technical order (batch)
3 4 5	I GD M c	Group II (surface places) Group I (mine) Category 2 (high protection) Explosive atmosphere: GD : presence of gas, vapour or mist and combustible dust M: presence of firedamp atmo- spheres Constructional safety Temperature class: T5 (T _{sur} <100 °C)	12	BATCH Pmax 320 bar	Nameplate code Reference number of technical order (batch) Max working pressure Complete reference number of

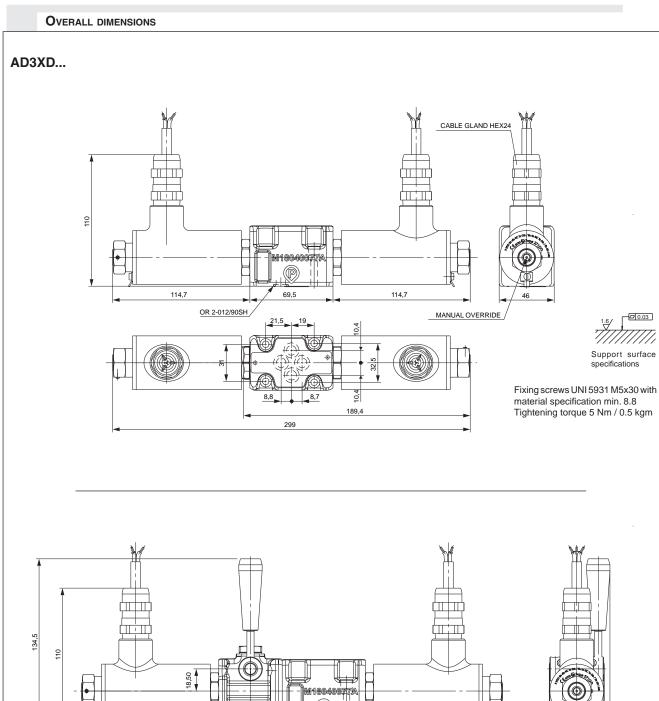
SAFETY INSTRUCTIONS

- Read the instruction handbook supplied with the valves carefully before installation. All maintenances must be carried out following the instructions given in the manual.
- The AD3XD series valves must be installed and serviced in compliance with plant engineering and maintenance regulations for workplaces classified against the risk of explosion due to the presence of gas and dust and gas (for example: CEI EN 60079-14, CEI EN 60079-17, CEI EN 61241-14, CEI EN 61241-17 or other national regulations/standards).
- The valves must be connected to earth using the special anti-loosening and anti-rotation connection element.
- For all safety aspects related to the use of the coils, consult the relative use and maintenance instructions. The electrical appliances/ components must not be opened when live.
- The user must periodically inspect, based on the conditions of use and the substances used, the presence of scale, dirt, the state of wear and tear and correct efficiency of the valves.

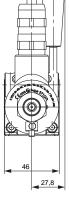
Attention: all installation and maintenance jobs must be carried out by qualified personnel.



AD3XD... DIRECTIONAL CONTROLE CETOP 3 IN ACCORDANCE WITH 2014/34/UE ATEX DIRECTIVE



P 26,5 OR 2-012/90SH 167,7 69,5 114,7 8,7 8,8 è 242,4 352



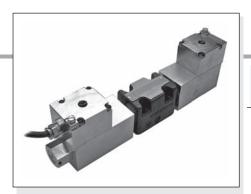


Fixing screws UNI 5931 M5x30 with material specification min.8.8 Tightening torque 5 Nm / 0.5 kgm



I • 28





AD3XG	
ATEX DIRECTIVE	Cap. I • 23
ATEX CLASSIFICATION	Cap. I • 24
SERIES AD3XG	Cap. I • 29
TECHNICAL SPECIFICATIONS	Cap. I • 29
ORDERING CODE	Cap. I • 29
TAB.1 ASSEMBLY	Cap. I • 30
TAB.2 VOLTAGES	Cap. I • 30
TAB.3 SPOOL	Cap. I • 30
LIMITS OF USE	Cap. I • 30
DENTIFICATION NAMEPLATE	Cap. I • 31
SAFETY INSTRUCTIONS	Cap. I • 31
OVERALL DIMENSIONS	Cap. I • 32

ORDERING CODE

AD3XG... DIRECTIONAL CONTROLE CETOP 3 IN ACCORDANCE WITH 2014/34/UE ATEX DIRECTIVE

SOLENOID VALVES FOR USE IN WORKPLACES WHERE EXPLOSIVE ATMOSPHERES MAY OCCUR DUE TO THE PRESENCE OF GAS, VAPOUR OR MIST AND DUST.

AD3XG solenoid valves are classified in:

Group II appliances (to be used in workplaces, apart from mines, where there is the probability of explosive atmospheres);

category 2 (high protection level), for use in workplaces where it is probable that an explosive atmosphere may form in normal working conditions and classified by the presence of explosive mixtures of gas-dust type (letter GD) for zones 1, 2 and 21, 22.

These valves are therefore designed especially and manufactured in compliance with the ATEX 2014/34/UE Directive and according to European regulations EN 1127-1, EN 1127-2, EN 13463-1 and EN 13463-5.

Belonging to the "NG06 direction control" range, these valves are prepared for plate-mounting with attachment surface in compliance with UNI ISO 4401 - 03 - 02 - 0 - 94 (former CETOP R 35 H 4.2-4-03). They are activated electrically and the centre position is ensured by springs with gauged lengths, which once the pulse or command ceases, re-position the spool in the centre or at the end of travel position.

The coils used for these valves are subject to separate conformity certification, according to the ATEX Directive (EC-type). For further specifications, please consult the documents that are always supplied with the valve.

Before marking and marketing the valves of the AD3XG series, undergo tests and inspections according to the in-house Manufacturing System and to the Certified Company Quality System in compliance with ISO 9001:2008. All of the AD3XG valve series undergo 100% functional testing. These tests and inspections guarantee that the products sold comply with all the information reported in the Technical Specifications File registered and declared by marking with AD3X/ATEX/10.

TECHNICAL	SPECIFICATIONS

AD	Directional Control Valve	Description	AD3XG T4	AD3XG T6
3	CETOP 3/NG06	Valve marking	€€ 🖾 II 2 GD cT4	C €
XG	Solenoid valves built pursuant to ATEX Directive-2014/34/UE. With coils in explosion-proof version (Ex d) and IECEx conformity marked.	Max. pressure on lines P/A/B (1) Max. pressure on line T (dynamic) Max. flow rate Max.excitation frequency Duty cycle Hydraulic fluids	80 l/min 3 Hz 100%ED mineral oils DIN 51524	350 bar 250 bar 80 l/min 3 Hz 100%ED mineral oils DIN 51524
**	Temperature Class T4 (T _{sur} <135 °C) T6 (T _{sur} < 85 °C) Spools	Fluid viscosity Fluid temperature (3) Ambient temperature Max. contamination level IS (filter $\beta 25 \ge 75$) Weight (one solenoid) Weight (two solenoids)	10 ÷ 500 mm²/s -30°C ÷ +70°C -40°C ÷ +80°C 30 4406:1999: class 21/19/16 NAS 1638: class 10 3 kg 5 kg	10 ÷ 500 mm²/s -30°C ÷ +70°C -40°C ÷ +50°C ISO 4406:1999: class 21/19/16 NAS 1638: class 10 3 kg 5 kg
*	01/02/03/04/16 (tab.3). For further hydraulic diagrams, contact our Customer Service Assembly C / E / F / G / H (tab.1). For further	Coil rated power Degree of protection Power supply tolerance Power supply cable Coil marking (4):	8,5 W IP 67 ±10% standard length 3m with cable gland	8,5 W IP 67 ±10% standard length 3m with cable gland documents supplied with coil
*	assembly instructions, contact our Customer Service Voltage (tab.2) Variants 00 = None V1 = Viton LE = Emergency lever	 Surface temperature (1) Dynamic pressure allowed on P for 8 (2) Pressure dynamic allowed for 1 millioi (3) AD3XG valves have been certified for Technical department for applications a (4) Coil is provided with marking for prot 2014/34/UE and IECEx certificate of co 	< 135°C 300.000 cycles. n of cycles. or minimum fluid temperatures at fluid temperatures < -25°C. tection class according to Explo	vp to -30°C. Please contact our
1	Serial number			



AD3XG... DIRECTIONAL CONTROLE CETOP 3 IN ACCORDANCE WITH 2014/34/UE ATEX DIRECTIVE

	TAB.1 ASS	EMBLY
		STANDARD
с		Two solenoids centred
Е	a OW	One solenoid (side A)
F		One solenoid (side B)
Spe	cials (with increa	sed price)
G	МА 0 ТР	
н		

TAB.2 VOLTAGES

AC Voltage	for AD3XG
А	24V 50Hz/60Hz
В	48V 50Hz/60Hz
С	110V 50HZ/60Hz
D	220V 50Hz/60Hz
I	230V 50Hz/60Hz
DC Voltage	for AD3XG
L	12V
M	24V
Р	110V
N	48V
U	36V
0	
6	60V
•	60V 125V

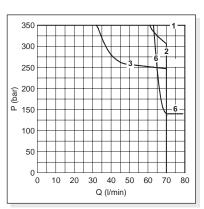
TAB.3 SPOOL

	Two soleno	ids - Assen	nbly C
Spool type		Covering	Transient position
01		+	
02		-	
03		+	
04*		-	

	One solen	oid - Assem	bly E
Spool type		Covering	Transient position
01		+	
02		-	
03		+	
04*		-	
16		+	

	One solend	oid - Assem	bly F
Spool type		Covering	Transient position
01		+	
02		-	
03	while	+	
04*	w(ttX)	-	
16	~~XIIL	+	
		(*) sµ	bool with increased price

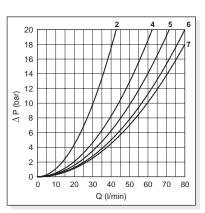
LIMITS OF USE (MOUNTING C-E-F)



NOTE: The limit of use are valid for C, E, F assembly.

Spool type	Curve
01	1
02	1
03	3
04	2
16	6

PRESSURE DROPS



The diagram at the side shows the pressure drop curves for spools during normal usage. The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C; the tests have been carried out at a fluid temperature of 40°C. For higher flow rates than those in the diagram, the losses will be those expressed by the following formula:

The tests have been car-

ried out with solenoids at

operating temperature with a voltage 10% less than

rated voltage with a fluid temperature of 40°C. The

fluid used was a mineral oil

with a viscosity of 46 mm²/s at 40°C. The values in the

diagram refers to tests car-

ried out with the oil flow in

two direction simultaneously (e.g., from P to A and in the

In cases where valves 4/2 e 4/3 were used with the

flow in one direction only,

the limits of use could have variations which may even

same time B to T).

be negative.

$$\Delta p1 = \Delta p \times (Q1/Q)^2$$

where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, $\Delta p1$ will be the value of the losses for the flow rate Q1 that is used.

Spool		Co	nnectio	ns	
type	P→A	P→B	$A \rightarrow T$	$B{\rightarrow}T$	$P \rightarrow T$
01	5	5	5	5	
02	7	7	7	7	6
03	5	5	6	6	
04	2	2	2	2	4
16	5	5	4	4	
		C	Curve No).	





2	A Pmax 350bar H-J_TVR M82101020A [11] 10	1 2 3 4 5 6 C C C C C C AD3X/ATX/10 7 Tamb: -**C + ***C C LOGO ADDRESS Thuda: -+TOC HYDRAULIC SCHEME 9) [8] [5]] [5]	-	All the solenoid valves are supplied with identification nameplate and Declaration of conformity subject to Directive 2014/34/UE. The identification nameplate bears the main technical specifications related to the functional and constructional characteristics of the valve and must therefore be kept intact and visible.
		IMADE_IN			
1	CE	Conformity to European Directive	9	T fluid	Working fluid temperature: - 30°C ÷ + 70°C series AD3XG
1	८ €	Conformity to European Directive Conformity to ATEX Directive 2014/34/UE	9 10		Working fluid temperature: - 30°C ÷ + 70°C series AD3XG Type of hydraulic control performed by the valve
-		Conformity to	_	HYDRAULIC SCHEME	- 30°C ÷ + 70°C series AD3XG Type of hydraulic control performed
2	æ	Conformity to ATEX Directive 2014/34/UE Group II (surface places)	10 11	HYDRAULIC SCHEME	- 30°C ÷ + 70°C series AD3XG Type of hydraulic control performed by the valve
2 3 4	⟨€x⟩ 2	Conformity to ATEX Directive 2014/34/UE Group II (surface places) Category 2 (high protection) Explosive atmosphere: GD : presence of gas, vapour or	10 11	HYDRAULIC SCHEME M82101020A BATCH	- 30°C ÷ + 70°C series AD3XG Type of hydraulic control performed by the valve Nameplate code Reference number of technical
2 3 4	€x) II 2 GD	Conformity to ATEX Directive 2014/34/UE Group II (surface places) Category 2 (high protection) Explosive atmosphere: GD : presence of gas, vapour or mist and combustible dust	10 11 12 13	HYDRAULIC SCHEME M82101020A BATCH Pmax 350	- 30°C ÷ + 70°C series AD3XG Type of hydraulic control performed by the valve Nameplate code Reference number of technical order (batch)
2 3 4 5	 ⟨⊡⟩ II 2 GD c 	Conformity to ATEX Directive 2014/34/UE Group II (surface places) Category 2 (high protection) Explosive atmosphere: GD : presence of gas, vapour or mist and combustible dust Constructional safety Temperature class: T4 (T _{sur} <135 °C) series AD3XG T4	10 11 12 13	HYDRAULIC SCHEME M82101020A BATCH Pmax 350 bar	- 30°C ÷ + 70°C series AD3XG Type of hydraulic control performed by the valve Nameplate code Reference number of technical order (batch) Max.working pressure Complete reference number of

SAFETY INSTRUCTIONS

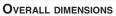
- Read the instruction handbook supplied with the valves carefully before installation. All maintenances must be carried out following the instructions given in the manual.
- The AD3XG series valves must be installed and serviced in compliance with plant engineering and maintenance regulations for workplaces classified against the risk of explosion due to the presence of gas and dust and gas (for example: CEI EN 60079-14, CEI EN 60079-17, CEI EN 61241-14, CEI EN 61241-17 or other national regulations/standards).
- The valves must be connected to earth using the special anti-loosening and anti-rotation connection element.
- For all safety aspects related to the use of the coils, consult the relative use and maintenance instructions. The electrical appliances/ components must not be opened when live.
- The user must periodically inspect, based on the conditions of use and the substances used, the presence of scale, dirt, the state of wear and tear and correct efficiency of the valves.

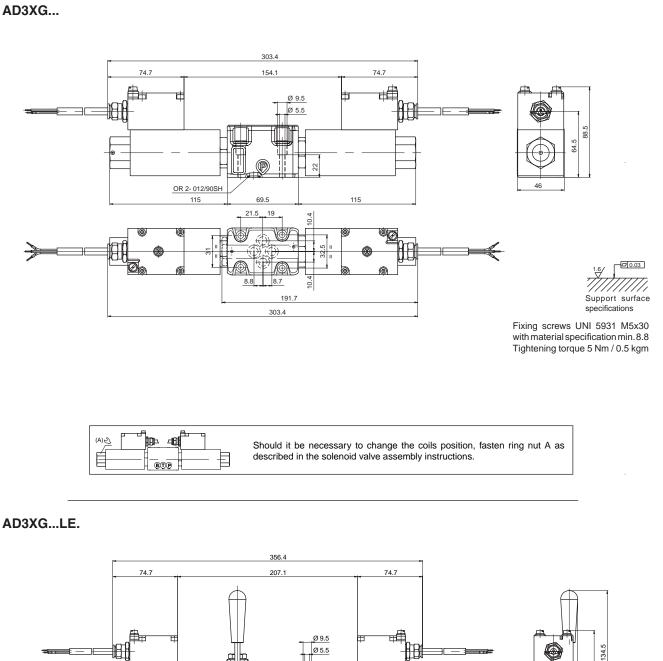
Attention: all installation and maintenance jobs must be carried out by qualified personnel.

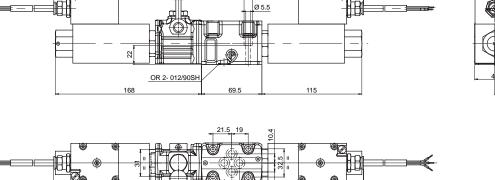


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AD3XG... DIRECTIONAL CONTROLE CETOP 3 IN ACCORDANCE WITH 2014/34/UE ATEX DIRECTIVE







8.8 8.7

356.4



88.5



Fixing screws UNI 5931 M5x30 with material specification min.8.8 Tightening torque 5 Nm / 0.5 kgm



10.4

244.7



CETOP 5/NG10	
STANDARD SPOOLS	Cap. I • 35
AD5E	Cap. I • 36
AD5EJ*	Cap. I • 37
AD5EQ5	Cap. I • 37
AD50	Cap. I • 38
AD5D	Cap. I • 38
AD5L	Cap. I • 39
"A16" DC SOLENOIDS	Cap. I • 40
"K16" AC SOLENOIDS	Cap. I • 40
STANDARD CONNECTORS	Cap. I • 20

DIRECTIONAL CONTROL VALVES CETOP 5

INTRODUCTION

The directional control valves NG10 designed for subplate mounting with an interface in accordance with UNI ISO 4401 - 05 - 04 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-05), and can be used in all fields on account of their excellent capacity and pressure specifications.

The use of solenoids with wet armatures means that the construction is extremely functional and safe completely dispensing with need for dynamic seals. The solenoid dust cover is screwed directly onto the valve casing whilst the coil is kept in position by a ring nut.

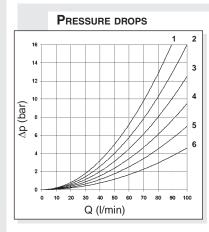
Great care has been taken in the design and the production of the ducts and the improvement of the spools has allowed relatively high flow rates to be accommodated with minimal pressure drops (Δp). The operation of the directional valves can be electrical, pneumatic, oleodynamic, mechanical or lever operated .

The centring position is achieved by means of calibrated length springs which, once the action of impulse is over, return the spool to the centre or end travel position.

The solenoids constructed with protection class in accordance with DIN 40050 standards are available in either direct current (IP65) or alternating current (IP66) with different voltage and frequencies.

All types of electrical controls can be fitted, on request, with different types of manual emergency controls. The electrical supply takes place through connectors meeting DIN 43650 ISO 4400 standards; connectors are also available with built in rectifier or pilot lights.

The valves are designed for use with DIN 51524 standard hydraulic mineral oils and it is recommended that filters should be fitted to ensure a maximum contamination level of class 10 in accordance with NAS 1638, $\beta_{ss} \geq 75$.



The diagram at the side show the pressure drop curves for spools during normal usage. The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C; the tests have been carried out at a fluid temperature of 40°C.

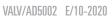
For higher flow rates than those in the diagram, the losses will be those expressed by the following formula:

٨

$$p1 = \Delta p \times (Q1/Q)^2$$

where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, $\Delta p1$ will be the value of the losses for the flow rate Q1 that is used.

Spool	Connections				Connection:			Spool		Co	nnectio	ons	
type	P→A	P→B	A→T	B→T	P→T	type	P→A	Р→В	A→T	B→T	P→T		
01	2	2	5	5		22		4	5				
02	3	3	6	6	3	14	3	3	6	6	2		
03	2	2	6	6		15	2	2	4	5			
04	3	3	4	4	1	16	2	2	4	5			
05	3	3	5	5		17	3	3					
06	2	2	5	5		19	3	3	4	5			
66	2	2	5	5		20	3	3	4	5			
07		1	5			21	3	3					
10	3	3	5	5		28	3	3	6	6	2		
11	4			5									
	Curve No.					C	Curve No).).					





TAB.1 - TYPE OF OPERATOR

- Ε Electrical
 - D Direct mechanical 0 Oleo-pneumatic
- L Lever

Type of operator (tab.1)

Mounting type (tab. 2)

Directional valve

CETOP 5/NG10

ORDERING CODE

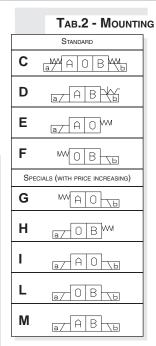
Spools (see tables Cap. I • 35)

Voltage / Specification (tab. 3)

Variants (tab. 4)

Serial No.

TAB.3 - VOLTAGE / SPECIFICATION Operator Voltage Specs. Description Note A 24V/50Hz A C Voltage ** C F A C Voltage ** C F C Voltage ** C F C VoltoGHz* A C Voltage ** C VOLTAGE C VOLTAGE							
Operator Specs. Description Note A 24V/50Hz A	TAB.3 - VOLTAGE / SPECIFICATION						
B 48V/50Hz* J 115V/50Hz - 120V/60Hz Y 230V/50Hz - 240V/60Hz F 240V/50Hz* F 24V/60Hz* K Without AC coils L 12V N 48V* P 110V* DC Voltage ** (Technical data see page I • 40) E M 24V N B 102V* 115Vac/50Hz 120Vac/50Hz DC Voltage ** (Technical data see page I • 40)	Operator	-	Description	Note			
J 115V/50Hz - 120V/60Hz AC Voltage ** (Technical data see page I • 40) F 240V/50Hz* I • 40) F 24V/60Hz* I • 40) K Without AC coils I • 40) L 12V I • 40) P 110V* I • 102V* Z 102V* 115Vac/50Hz 120Vac/50Hz I • 40) V 102V* 115Vac/50Hz I • 40)		Α	24V/50Hz				
Y 230V/50Hz - 240V/60Hz (Technical data see page li-40) F 240V/50Hz* I-40) F 24V/60Hz* I-40) K Without AC coils I-40) L 12V I-40) P 110V* I-10V* Z 102V* 115Vac/50Hz 115Vac/50Hz I-40) I-40) V 102V* I-10V* I 102V* I-10V* Z 115Vac/50Hz I-40) V 205V* 205V* Y 205V* 205V*		В	48V/50Hz*				
Y 230V/50Hz - 240V/50Hz data see page E 240V/50Hz* I • 40) F 24V/60Hz* I • 40) K Without AC coils I • 40) L 12V I • 40) P 110V* DC Voltage ** T 102V* I • 40) Z 102V* I • 40) Y 205V* 205V* Y 205V* 205V*		J	115V/50Hz - 120V/60Hz				
E 240V/50Hz* 1 • 40) F 24V/60Hz* K Without AC coils L 12V M 24V N 48V* P 110V* DC Voltage ** (Technical data see page with rectifier 1 • 40)	E	Y	230V/50Hz - 240V/60Hz	`			
K Without AC coils L 12V M 24V N 48V* P 110V* DC Voltage ** (Technical data see page with rectifier 205V* 205V* 230Vac/50Hz		Е	240V/50Hz*				
L 12V M 24V N 48V* P 110V* DC Voltage ** Z 102V* Uter 1000000000000000000000000000000000000		F	24V/60Hz*				
E M 24V N 48V* P 110V* C 102V* z 102V* z 102V* z 102V* z 020V* y 200V* y 20		κ	Without AC coils				
N 48V* P 110V* Z 102V* 115Vac/50Hz 120Vac/60Hz with rectifier DC Voltage ** (Technical data see page I • 40) 205V* 230Vac/50Hz 205V*		L	12V				
N 48V* P 110V* Z 102V* 115Vac/50Hz 120Vac/60Hz with rectifier DC Voltage ** (Technical data see page I • 40) 205V* x 230Vac/50Hz		М	24V				
Z 102V* 115Vac/50Hz 120Vac/60Hz with rectifier 205V* 230Vac/50Hz 1 40) DC Voltage ** (Technical data see page 1 • 40)		Ν	48V*				
Z 115Vac/50Hz 120Vac/60Hz with rectifier (Technical data see page I • 40) 205V* 230Vac/50Hz		Р	110V*				
230Vac/50Hz		Z	115Vac/50Hz 120Vac/60Hz	(Technical data see page			
with rectifier		x	230Vac/50Hz 240Vac/60Hz				
W Without DC coils		W	Without DC coils				
D Z standard —	D	Z	standard	—			
O Z standard -	0	Z	standard	—			
Z valve with lever —		Z	valve with lever	—			
X valve without lever —	L	Х	valve without lever	—			



• Mounting type D is only for valves with detent

• In case of mounting D with detent a maximum supply time of 2 sec is needed (only for AC coils).

• The springs for the version with detent (mounting D) are different from those for standard versions.

Special voltage

Voltage codes are not stamped on the plate, their are readable on the coils.

TAB.4 - VARIANTS

VARIANT	CODE	•	PAGE
No variant (without connectors)	S1(*)		
Viton	SV(*)		
Emergency button	ES(*)		Cap. I • 40
Preset for microswitch - (E/F/G/H only) see below note ◊	M1(*)	•	Cap. I • 36 - Cap. I • 39
Rotary emergency button	P2(*)		Cap. I • 40
Marine version (AD.5.O)	H1	•	
Spool movement speed control (VDC only) with ø 0.5 mm diameter orifice	5S(*)	•	Cap. I • 37
Spool movement speed control (VDC only) with ø 0.6 mm diameter orifice	6S(*)	٠	Cap. I • 37
Spool movement speed control (VDC only) with ø 0.7 mm diameter orifice	7S(*)	•	Cap. I • 37
Spool movement speed control (VDC only) with ø 0.8 mm diameter orifice	8S(*)	٠	Cap. I • 37
External draining solenoid (electrically operated only)	S5(*)	•	Cap. I • 37
Microswitch+ Detent (for lever operation)	MD	٠	
Detent for lever control	D1	•	

♦ = Variant codes stamped on the plate

(*) Coils with Hirschmann connection supplied without connectors. The connectors can be ordered separately, Cap. I • 20.

AD

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2



DIRECTIONAL CONTROL VALVES CETOP 5

Two	Two solenoids, spring centred "C" mounting					
Spool type		Covering	Transient position			
01		+				
02		-				
03		+				
04*		-				
05		+				
66		+				
06		+				
07*		+				
08*		+				
10*		+				
22*		+				
11*		+				
12*		+				
13*		+				
14*		-	OHEHX			
28*		-				

0	ONE SOLENOID, SIDE A "E" MOUNTING					
Spool type		Covering	Transient position			
01		+				
02		-	XHH			
03		+				
04*		-				
05		+				
66		+				
06		+	XIII			
08*		+				
10*		+				
12*		+	ZI. E			
15		-	XHD			
16		+				
17		+				
14*		-				
28*		-				

ATTENTION

(*) Spool with price increasing

- With spools 15 / 16 / 17 only the mounting E / F are possible
- \bullet 19 / 20 / 21 spool not planned for AD5E...J*

• For lever operated the spools used are different. Available spools for this kind of valve see AD5L..

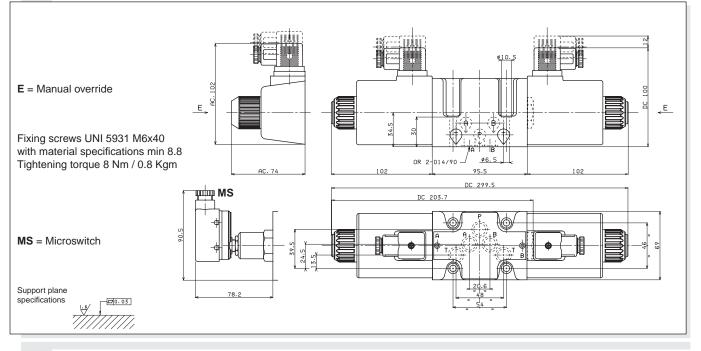
0	ONE SOLENOID, SIDE B "F" MOUNTING						
Spool type		Covering	Transient position				
01		+					
02		-					
03		+					
04*		-					
05		+					
66		+					
06		+					
08*		+					
10*		+					
22*		+	EI%E				
12*		+					
13*		+					
07*		+					
15	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	-					
16	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	+					
17		+					
14*	w HXE	-	EXX				
28*	wt XFP	-					

	Two solenoids "D" mounting					
Spool type		Covering	Transient position			
19*	az XII Ku	-				
20*	a XII W	+				
21*		+				



	Max. pressure ports P/A/B	350 bar
	Max. pressure port T (DC coil) see note (*)	250 bar
	Max. pressure port T (AC coil)	160 bar
	Max. flow	100 l/min
	Max. excitation frequency	3 Hz
	Duty cycle	100% ED
	Fluid viscosity	10 ÷ 500 mm²/s
Min alimante	Fluid temperature	-25°C ÷ 75°C
	Ambient temperature	-25°C ÷ 60°C
	Max. contamination level	class 10 in accordance with NAS
		1638 with filter ß ₂₅ ≥75
	Weight (with one DC solenoid)	Ť4 Kg
A max. counter-pressure of 4 bar at T is permitted	Weight (with two DC solenoids)	5,1 Kg
for the variant with a microswitch (MS).	Weight (with one AC solenoid)	3,5 Kg
	Weight (with two AC solenoids)	4,3 Kg
	(*) Pressure dynamic allowed for 1 million of cycles.	

OVERALL DIMENSIONS

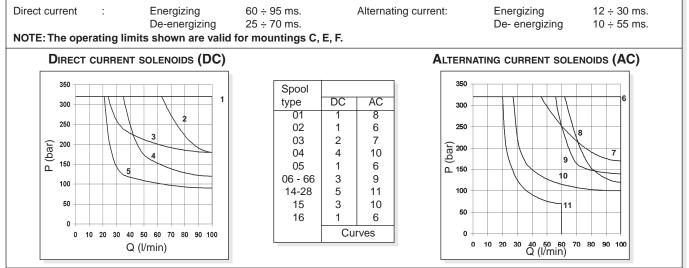


LIMITS OF USE (MOUNTING C-E-F)S

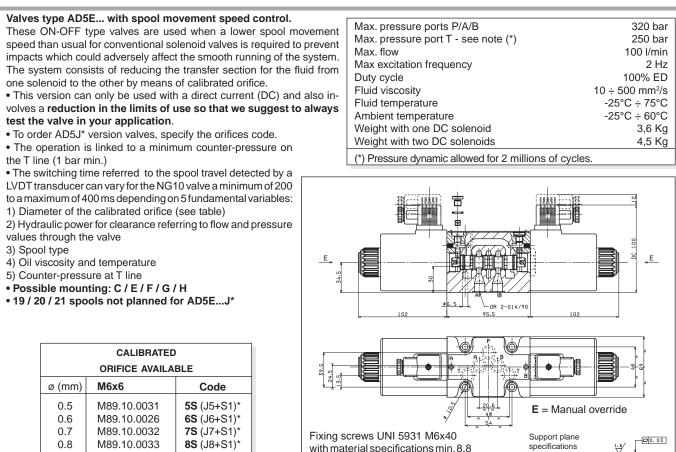
The tests have been carried out with solenoids at operating temperature and a voltage 10% less than rated voltage with a fluid temperature of 40°C. The fluid used was a mineral oil with a viscosity of 46 mm²/s at 40°C. The values in the diagram refer to tests carried out with the oil flow in two directions simultaneously T = 2 bar (e.g. from P to A and the same

The values in the diagram refer to tests carried out with the oil flow in two directions simultaneously T = 2 bar (e.g. from P to A and the same time B to P).

In the cases where valves 4/2 and 4/3 were used with the flow in one direction only, the limits of use could have variations which may even be negative. Rest time: the values are indicative and depend on the following parameters: hydraulic circuit, fluid used and variations in hydraulic scales (pressure P, flow Q, temperature T).







Tightening torque 8 Nm / 0.8 Kgm

Max. flow

Duty cycle

Fluid viscosity

Fluid temperature

Ambient temperature

Weight with one DC solenoid

Weight with two DC solenoids

Max. pressure ports P/A/B/T

Max. excitation frequency

Max. pressure port L (AC coils)

Max. pressure port L (DC coils) see note (*)

* Old code

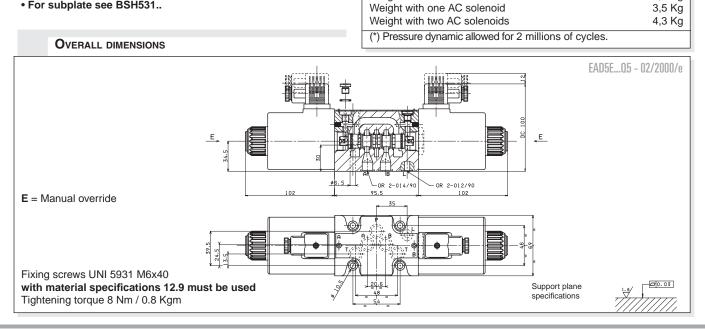
EAD5E...J\$ - 00/2000/e

AD5E...Q5 VALVES WITH EXTERNAL DRAINING SOLENOID - VARIANT Q5

Valves type AD5E...Q5 with external draining solenoid.

This involves valves with solenoid drainage chambers separated by line T in the CETOP 5 interface distinguished by the letter L. This solution makes it possible to operate with a maximum counterpressure at T up to 320 bar using only 12.9 material fixing screws to ensure the maximum safety of the solenoid valve fixing and use of an additional drain. This version can be used for direct current (DC) and alternating current (AC), but involves a reduction in the limits of usage depending on the pressure at T.

• For subplate see BSH531..





320 bar

250 bar

160 bar

2 Hz

100 l/min

100% ED

3,6 Kg

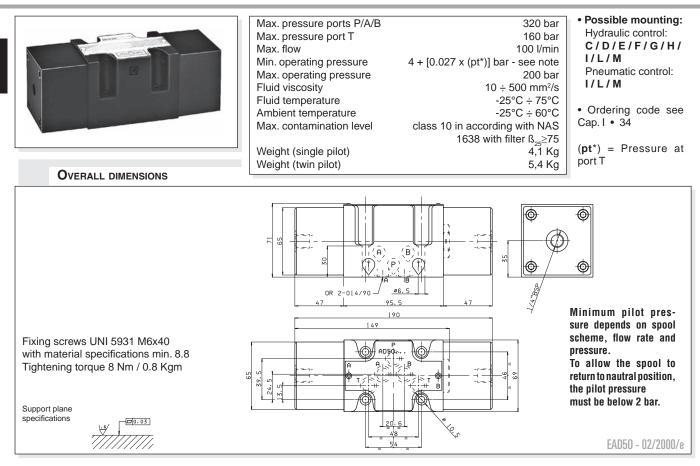
4,5 Kg

10 ÷ 500 mm²/s

-25°C ÷ 75°C

-25°C ÷ 60°C

AD50... OLEO-PNEUMATIC OPERATION TYPE VALVES CETOP 5

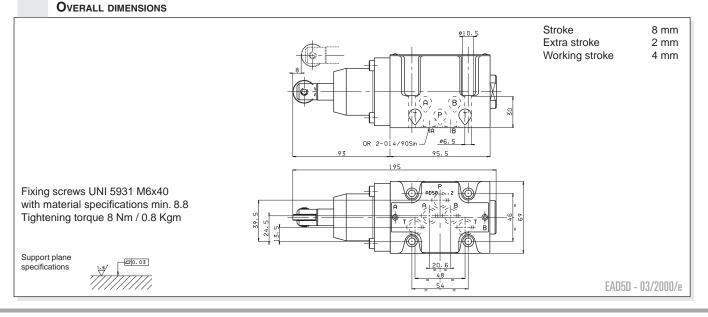


AD5D... DIRECT MECHANICALLY OPERATED TYPE VALVES CETOP 5



- Max. pressure ports P/A/B Max. pressure port T Max. flow Operating force - see note (*) 8 Kg Fluid viscosity 1 Fluid temperature Ambient temperature Max. contamination level class 10 in accorda 1638 w Weight
 - $\begin{array}{c|c} 320 \text{ bar} \\ 20 \text{ bar} \\ 100 \text{ l/min} \\ 8 \text{ Kg see note (**)} \\ 10 \div 500 \text{ mm}^2\text{/s} \\ -25^\circ\text{C} \div 75^\circ\text{C} \\ -25^\circ\text{C} \div 60^\circ\text{C} \\ \text{class 10 in accordance with NAS} \\ 1638 \text{ with filter } \beta_{25} \geq 75 \\ 3.8 \text{ Kg} \end{array} \qquad \begin{array}{c} \text{ Possible} \\ \textbf{E} / \textbf{F} / \textbf{G} \text{ J} \\ \text{ o Orderin.} \\ \text{ orderin.} \\ \text{ on the content of the content o$

Possible mounting:
E/F/G/H
Ordering code see Cap. I • 34
Notes:
(*) In the absence of counter-pressure at port T
(**)10 Kg with a pressure of 20 bar at T







AD5L LEVER OPERATED TYPE VALVES
CETOP 5

Max. pressure ports P/A/B	320 bar	•
Max. pressure port T	160 bar	C
Max. flow	100 l/min	()
Lever angle	2 x 15°	SJ
Fluid viscosity	10 ÷ 500 mm²/s	le
Fluid temperature	-25°C ÷ 75°C	•
Ambient temperature	-25°C ÷ 60°C	l m
Max. contamination level	class 10 in accordance with	
	NAS 1638 with filter ß₂₅≥75	•
Weight	4,7 Kg	s
Weight with M1 variant	5,35 Kg	(n
-		41.

• Possible mounting: C / E / F (with mounting "F" and spools "15-16-17" the lever is on side "B")

There is no D type mounting

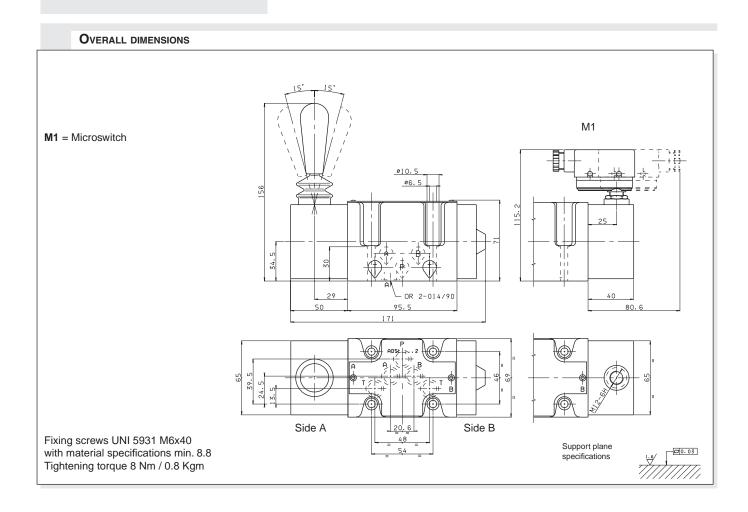
• The variant **D1** specifies the detent (mechanical connection) for lever operation

	AD5L
ORDERING CODE	Cap. I • 34
STANDARD SPOOLS	Cap. I • 35

• Completely different spools are used for these (lever operated) valves than for all other types of operation (e.g. electrical, mechanical, pneumatic operation,)

• Available spools: 01 / 02 / 03 / 04 / 05 / 06 / 66 / 07 / 22 / 13 / 15 / 16 / 17 (for hydraulic symbols see Cap. I • 35).

• Microswitch type MK code 1319098 must be ordered separately.







"A16" DC COILS FOR CETOP 5

Type of protection (in relation to the connector used) Number of cycles Supply tolerance Ambient temperature Duty cycle Insulation class wire Weight

	Max winding temperature Rated power		RESISTANCE AT 20°C
(V)	(Ambient temperature 25°C)	(W)	(Онм) ±7%
12V	106°C	45	3.2
24V	113°C	45	12.4
48V*	-	45	-
102V ^{(*)(**)}	-	45	-
110V ^{(*)(**)}	118°C	45	268
205V ^{(*)(**)}	-	45	-
* Special voltages	\$		

** The european low voltage directive is applied to electronical equipments used at a nominal voltages between 50 and 1000 VAC or 75 and 1500 VDC. In conformity with the low directive each part of the manifold or the subplate on which the valve is mounted should be connected to a protective earth with a resistence less than 0.1 ohms.

EMERGENCY (COILS WITH HIRSCHMA	NN CONNECTION)
MANUAL WITHOUT CONNECTOR (ES) MANUAL WITH CONNECTOR (E1)	ROTARY WITHOUT CONNECTOR $(P2)$ ROTARY WITH CONNECTOR $(P1)$

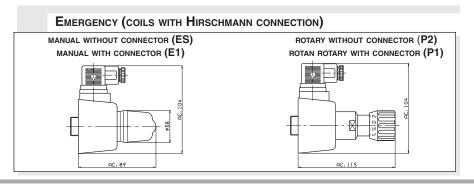


"K16" AC SOLENOIDS FOR CETOP 5

Type of protection (in relation to the connector used)	IP 66
Number of cycles	18.000/h
Supply tolerance	+10% / -10%
Ambient temperature	-54°C ÷ 60°C
Duty cycle	100% ED
Max. pressure static	210 bar
Insulation class wire	H
Weight	0,8 Kg

Voltage	MAX. WINDING TEMPERATURE	RATED	IN RUSH CURRENT	RESISTANCE AT 20°C
(V)	(AMBIENT TEMPERATURE25°C)	POWER(VA)	(VA)	(Онм) ±10%
24V/50Hz	134°C	124	454	0.56
24V/60Hz*	115°C	103.5	440	0.55
48V/50Hz*	134°C	113	453	2.10
115V/50Hz-120V/60Hz ^{(*)(**)}	121°C - 138°C	121-101	471-487	10.8
230V/50Hz-240V/60Hz ^{(*)(**)}	121°C - 138°C	120-101	478-485	43.0
240V/50Hz ^{(*)(**)}	134°C	120	456	47.39
* Special voltage				

** The european low voltage directive is applied to electronical equipments used at a nominal voltages between 50 and 1000 VAC or 75 and 1500 VDC. In conformity with the low directive each part of the manifold or the subplate on which the valve is mounted should be connected to a protective earth with a resistence less than 0.1 ohms.







ADP5E		
"D19" DC SOLENOIDS CAP. I • 43		
STANDARD CONNECTORS	Cap. I • 20	

ADP5E... DIRECTIONAL CONTROL CETOP 5

HIGH PERFORMANCES SOLENOID OPERATED VALVES

The NG10 directional control valves are designed for subplate mounting with an interface in accordance with UNI ISO 4401 - 05 - 04 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-05). The use of solenoids with wet armatures allows an extremely safe construction completely dispensing with the need for dynamic seal. The solenoid tube is screwed directly onto the valve casing whilst the coil is kept in position by a ring nut. Great care has been taken over the design and production of the ducts and the improvement of the spools allows relatively high flow rates to be accommodated for its size with minimal pressure drops (Ap). The operation of the directional valve is electrical. The centring is achieved by means of calibrated length springs which, once the impulse is over, immediately reposition the spool in the neutral position. The solenoids, constructed with a protection class of IP66 in accordance with BS 5490 standards, are available in direct current form and different voltage. The electrical controls are equipped with an emergency manual control inserted in the tube.

The ADP.5.E., valve has certain design features which allow it to "manage" a hydraulic power equal to Q = 120l/min with a P = 320 bar, maintaining a considerable safety margin. These features can be summarized as follows:

- Solenoid D19 with an optimum ratio between the power absorbed (42W) and the magnetic force - Diameter of the spool 18 mm, with carefully designed geometry improved to compensate for the flow forces

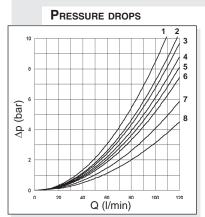
- Compact graphite cast iron valve casing with high mechanical resistance
- Different springs, improved according to the features of the spool

The electrical supply connectors meet DIN 43650 ISO 4400 standards; connectors are also available with built in rectifiers or pilot lights.

The recommended fluids are hydraulic mineral based oils in accordance with DIN 51524 and it is recommended that filters should be fitted to ensure a maximum contamination level of class 10 in accordance with NAS 1638, $\beta_{25} \ge 75$.

For other fluids please contact our technical department.

• The solenoids are in DC voltage only



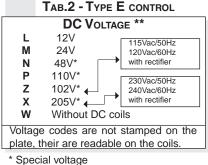
The diagram at the side shows the pressure drop curves for spools during normal usage. The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C; the tests have been carried out at a fluid temperature of 40°C. For higher flow rates than those in the diagram, the losses will be those expressed by the following formula:

 $\Delta p1 = \Delta p \times (Q1/Q)^2$ where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, $\Delta p1$ will be the value of the losses for

the flow rate Q1 that is used.

Spool	Connections				
type	Р→А	Р→В	A→T	B→T	P→T
01	4	4	7	7	
02	6	6	8	8	7
03	3	3	8	8	
04	4	4	2	2	3
05	6	6	6	6	
66	4	4	8	7	
06	4	4	7	8	
14	6	4	8	6	2
15-19	2	2	5 2	6 5 2	
16-20	1	1	2	2	
28	4	6	6	8	2
	Curve No.				

	Tab.1 - Mounting
С	
Е	A OW
F	MO B L
D*	
	(*) Valve with detent



** Technical data see Cap. I • 43

ORDERING CODE

High performances directional control valve

CETOP 5/NG10

Electrical operator

Mounting (table 1)

Voltage (table 2)

Variants (table 3)

Serial No.

Spools (Table next page)

(
$\left(\right)$	5	\sum	
$\left(\right)$	Е	\sum	
$\left(\right)$	**	$\left(\right)$	
$\left(\right)$	*	\sum	
$\left(\right)$	*	\sum	
$\left(\right)$	**	$\mathbf{)}$	
$\left(\right)$	1	\sum	

TAB.3 - VARIANTS	
Variant	CODE
No variant (without connectors)	S1(*)
Viton	SV(*)
Rotary emergency button	P2(*)
Adjustable spool movement	
speed control	4S(*)
With solenoid chamber external	()
drainage (Y)	S5(*)
Spool movement speed control	()
(VDC only) with ø 0.5 mm Ø orifice	5S(*)
Spool movement speed control	()
VDC only) with ø 0.8 mm Ø orifice	8S(*)
<i>,</i> ,	()
Other variants available on request	
(*) Coils with Hirschmann connection	sup-

(*) Coils with Hirschmann connection supplied without connectors. The connectors can be ordered separately, c Cap. I • 20.



* Spools with price increasing

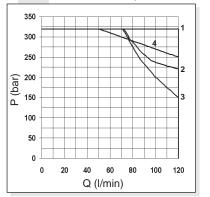
	STANDARD SPOOLS				
Two s	Two solenoids, spring centred "C mounting"				
Spool type		Covering	Transient position		
01		+			
02		-			
03		-			
04*		-			
05		-			
66		-			
06		-			
14*		-			
28*		-			

Two solenoids "D mounting"				
Spool type	Covering Transient position			
19*		-		
20*	az XIII	+		

C	ONE SOLENOID, SIDE A "E MOUNTING"						
Spool type		Covering	Transient position				
01		+					
02		-					
03		-	EHIX				
04*		-					
05		-	(XIHE)				
66		-					
06		-	(XIFIF)				
14*		-	(XIHIG)				
15		-					
16		+					
28*		-					

C	ONE SOLENOID, SIDE B "F MOUNTING"							
Spool type		Covering	Transient position					
01		+						
02		-						
03		-						
04*		-						
05		-						
66		-						
06		-						
14*		-						
15		-						
16		+						
28*		-						

LIMITS OF USE (MOUNTING C-E-F)



Spool	n°	
type	curves	
01	1	
02	1	
03	2	
04	1	
05	1	
66	1	
06	1	
14	3	
15	1	
16	1	
28	3	
19	4	
20	4	

The tests have been carried out with solenoids at operating temperature and a voltage 10% less than rated voltage with a fluid temperature of 50°C.

The fluid used was a mineral oil with a viscosity of 46 mm²/s at 40°C.

The values in the diagram refer to tests carried out with the oil flow in two directions simultaneously (e.g. from P to A and at the same time B to T).

In the cases where valves 4/2 and 4/3 were used with the flow in one direction only, the limits of use could have variations which may even be negative.

The tests were carried out with a counter-pressure of 2 bar at T.



ADP5E... HIGH PERFORMANCES SOLENOID OPERATED VALVE **CETOP 5**

ADP.5.E... 4S variant - These ON-OFF type valves are used when a lower spool movement speed is required than it is generally available with a conventional solenoid valve in order to avoid those shocks which might otherwise compromise proper system operation. This is obtained by forcing the fluid to pass through the gap which exists between the screw thread and the M8x1 tapped thread, restricting in this way the transfer cross section between the 2 solenoid chambers. Using this variant may entail a reduction in the operational limits according to the spool used, up to the complete blocking of the change over itself. The valve operation depends on the presence of a minimum back pressure on the T line (min. 1 bar). The change over time referred to the spool stroke depends on 4 main variables:

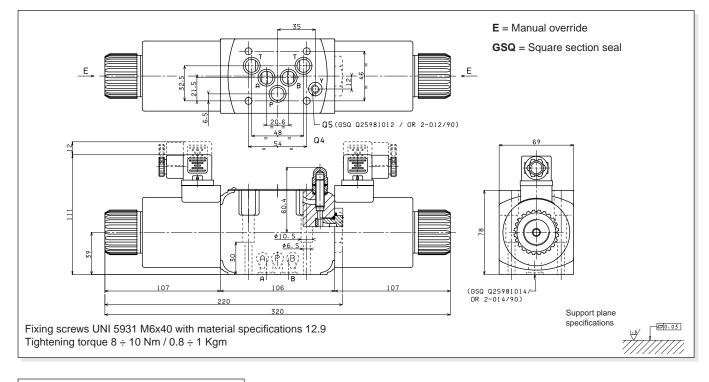
- Applicable hydraulic power, related to the flow rate and pressure drop across the valve;
- Spool type (system configuration);
- Oil viscosity and temperature;
- · Back pressure on T.

	Max. operating pressure: ports P//	A/B 350 bar
	Max. operating pressure: port T (*) 250 bar
	Max. flow	120 l/min
	Max. excitation frequency	3 Hz
	Duty cycle	100% ED
	Fluid viscosity	10 ÷ 500 mm²/s
	Fluid temperature	-25°C ÷ 75°C
	Ambient temperature	-25°C ÷ 60°C
	Max. contamination level	class 10 in accordance
		with NAS 1638 with filter $\beta_{25} \ge 75$
	Weight with one DC solenoid	5 Kg
	Weight with two DC solenoids	6,5 Kg
1		

(*) Pressure dynamic allowed for 2 millions of cycles

Pressure on port T valid in case Y is blocked (no external drainage). Normally the external drainaged is blocked with a plug S.T.E.I M6x6 UNI 5923

ADP.5.E... S5 variant - These are valves with solenoid chambers drainage separated from the T line, obtained on CETOP RO5 interface and characterized by the letter Y. This solution allows operation with up to 320 bar max. back pressure on the T line while using only 12.9 material fixing screws to ensure maximum solenoid valve mounting safety and supplementary drainage.





ROTARY EMERGENCY WITHOUT CONNECTOR (P2) WITH CONNECTOR (P1)

"D19" DC SOLENOIDS

Type of protection (in relation to the connector used)	IP 66
Number of cycle	18.000/h
Supply tolerance	±10%
Ambient temperature	-54°C ÷ 60°C
Duty cycle	100% ED
Max static pressure	210 bar
Insulation class wire	н
Weight	1,63 Kg

Voltage (V)	Max winding temperature (Ambient temperature25°C)	RATED POWER (W)	Resistance at 20°С (Онм) ±10%
12V	105°C	42	3.43
24V	105°C	42	13.71
48V*	105°C	42	55
102V ^{(*)(**)}	105°C	42	248
110V ^{(*)(**)}	105°C	42	288
205V ^{(*)(**)}	105°C	42	1000
* Special	voltage		

The european low voltage directive is applied to electronical equipments used at a nominal voltages between 50 and 1000 VAC or 75 and 1500 VDC. In conformity with the low directive each part of the manifold or the subplate on which the valve is mounted should be connected to a protective earth with a resistence less than 0.1 ohms.

Motion Systems





ADP5V	
"D19" DC SOLENOIDS	Cap. I • 44
STANDARD CONNECTORS	Cap. I • 20
L.V.D.T.	Cap. I • 22

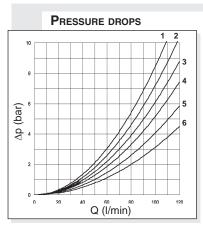
ADP5V... WITH PROXIMITY SENSOR LVDT CETOP 5

The NG10 directional control valves are designed for subplate mounting with an interface in accordance with UNIISO 4401-05 - 04 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-05).

The single solenoid directional valves type ADP5V are used in applications where the monitoring of the position of the spool inside the valve is requested to manage the machine safety cycles in according with the accident prevention legislation. These directional valves are equipped with an horizontal positioned

Max. operating pressure: ports P/A/E	350 bar
Max. operating pressure: port T (*)	250 bar
Max. flow	120 l/min
Max. excitation frequency	3 Hz
Duty cycle	100% ED
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level class 1	0 in accordance
with NAS 1638	with filter ß₂₅≥75
Type of protection	20
(in relation to connector used)	IP 66
Weight	6,2 Kg
(*) Pressure dynamic allowed for 2 m	nillions of cycles

inductive sensor on the opposite side of the solenoid, which is capable of providing the first movement of the valve when the passage of a minimum flow is allowed. Integrated in safety systems, these valves intercept actuator movements that could be dangerous for the operators and for the machine.



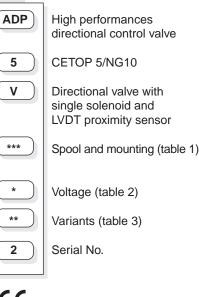
The diagram at the side shows the pressure drop curves for spools during normal usage. The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C; the tests have been carried out at a fluid temperature of 40°C. For higher flow rates than those in the diagram, the losses will be those expressed by the following formula:

An1	- An	v	(Q1/Q	۱2
Δρι	$= \Delta p$	X	(Q1/Q)~

where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, $\Delta p1$ will be the value of the losses for the flow rate Q1 that is used.

Spool type		Connections				
type	P→A	Р→В	A→T	B→T	P→T	
01	3	3	5	5		
02	4	4	6	6	5	
66	3 3	3 3	6	5		
06	3	3	5	6		
16	1	1	2	2		
	Curve No.					

ORDERING	CODE
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registered mark for industrial environment with reference to the electromagnetic compatibility. European norms:

- EN50082-2 general safety norm - industrial environment

- EN 50081-1 emission general norm - residential environment

12V L М 24V 115Vac/50Hz 120Vac/60Hz N 48V* with rectifier **P** 110V* Z 102V* 230Vac/50Hz 240Vac/60Hz **X** 205V* with rectifier W Senza bobina né connettori Voltage codes are not stamped on the plate, their are readable on the coils.

TAB.2 - DC VOLTAGE **

* Special voltage ** Technical data see Cap. I • 45

Тав1 -	STANDARD	SPOOL	FOR	ADP	5V
--------	----------	-------	-----	-----	----

	E / F MOUNTING POSSIBLE				
Spool type		Covering	Transient position		
01E		+			
01F		+			
02E		-			
02F		-			
66E		-			
06F		-	F1HN↓		
16E		+			
16F		+			
32E		+			

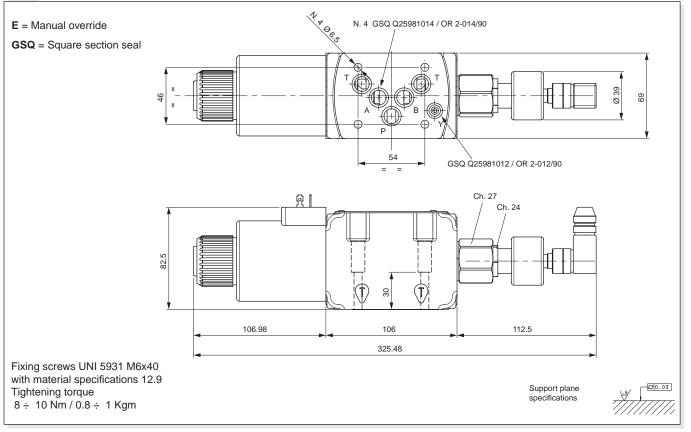
TAB.3 - VARIANTS

VARIANTS	CODE
No variant (without connectors) Rotary emergency button Without proximity connector LVDT Without coils and proximity connector With solenoid chamber external drainage (Y)	S1(*) P2(*) S3 S4
Other variants available on request.	

(*) Coils with Hirschmann connection supplied without connectors. The connectors can be ordered separately, Cap. I • 20.

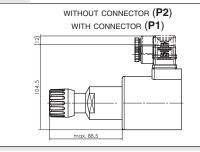








ROTARY EMERGENCY

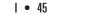


"D19" DC SOLENOIDS

Type of protection (in relation to the connector used)	IP 66
Number of cycle	18.000/h
Supply tolerance	±10%
Ambient temperature	-25°C ÷ 60°C
Duty cycle	100% ED
Max static pressure	210 bar
Insulation class wire	н
Weight	1,63 Kg

Voltage (V)	Max winding temperature (Ambient temperature25°C)	Rated power (W)	RESISTANCE AT 20°C (OHM) ±10%		
12V	105°C	42	3.43		
24V	105°C	42	13.71		
48V*	105°C	42	55		
102V ^{(*)(**)}	105°C	42	248		
110V ^{(*)(**)}	105°C	42	288		
205V ^{(*)(**)}	105°C	42	1000		
* Special	* Special voltage				

* The european low voltage directive is applied to electronical equipments used at a nominal voltages between 50 and 1000 VAC or 75 and 1500 VDC. In conformity with the low directive each part of the manifold or the subplate on which the valve is mounted should be connected to a protective earth with a resistence less than 0.1 ohms. 1







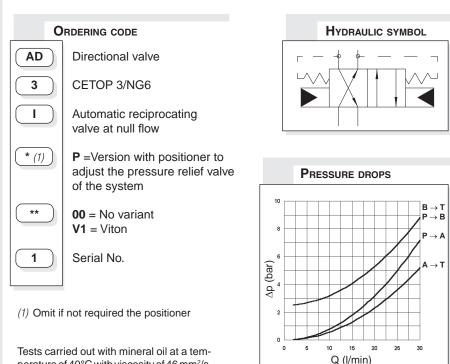
AD3I...

AD3I... AUTOMATIC RECIPROCATING VALVES CETOP 3

These automatic reciprocating valves, with interface UNI ISO 4401 - 03 - 02 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-03), reverse the movement of an actuator every time the flow through the valve stops. With no max.pressure valves inside the body, the spool is moved by two springs and locked by unbalanced pressure inside valve; when no more flow is crossing the valve, the spool changes the position inverting the direction of the actuator.

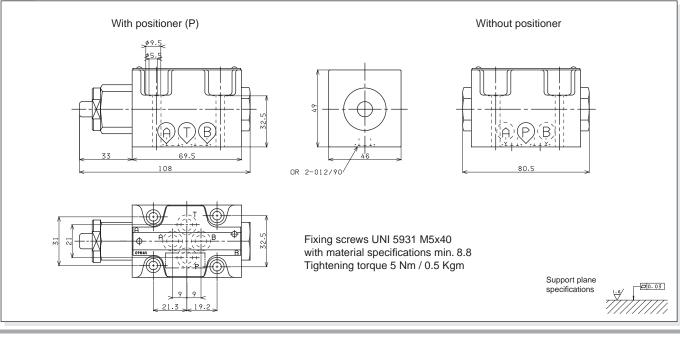
Max. operating pressure port P	320 bar
Max. flow	30 l/min
Minimum permitted flow	3 l/min
Fluid viscosity	20 ÷ 200 mm²/s
Fluid temperature	-20°C ÷ 60°C
Max. contamination level(*) class	s 10 in accordance
with NAS 16	38 with filter ß ₂₅ ≥75
Positioner activating force	130 N
(measured with 1 bar on the T lin	ne)
Weight of version without position	oner 0,95 Kg
Weight of version with positione	r 1 Kg
(*) Max contamination level must the right function of the valve	be respect to obtain

With a preferential starting P \rightarrow B and A \rightarrow T position, these valves are mainly used to control the movement compactors or system where is not possible to use electrical device.



perature of 40°C with viscosity of 46 mm²/s.









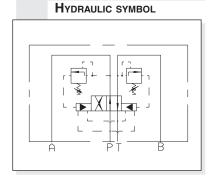
AD3RI... AUTOMATIC RECIPROCATING VALVES CETOP 3

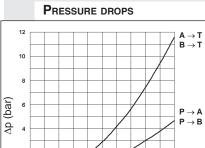
This valve type is characterized by fully hydraulic operation, as it takes advantage of the system pressure rise to cause an automatic and continuous inversion of the utilization. The changeover takes place when the system pressure exceeds the inversion valves calibration pressure, and therefore also in not predetermined positions. At cylinder stroke end, the overall maximum pressure valve should be adjusted on a value 30% higher than the system operating pressure.

The inverter valves pressure calibration values should be 15% lower than that of the overall maximum pressure valve, and 15% higher than the maximum operating pressure.

Note: to operate the push button emergency, a minimum pressure of 3 bar on the actuator is needed.

Max. operating pres	320 bar	
Max. pressure port	160 bar	
Min. recommended	pressure	15 bar
Max. flow		25 l/min
Min. flow		2 l/min
Setting ranges:	Spring 1	15 ÷ 50 bar
	Spring 2	20 ÷ 140 bar
	Spring 3	50 ÷ 320 bar
Fluid viscosity		10 ÷ 60 mm²/s
Fluid temperature		-20°C ÷ 75°C
Max. contamination	10 in accordance	
	with NAS 1638	with filter ß ₂₅ ≥75
Weight		2,3 Kg





15

Q (I/min)

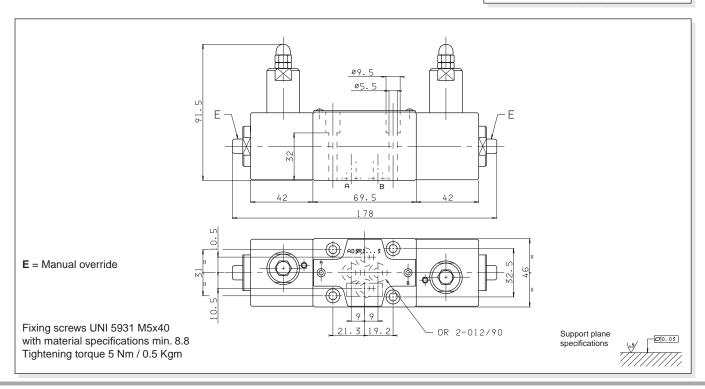
20

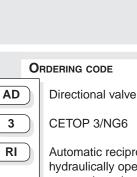
25

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Tests carried out with mineral oil at a temperature of 40°C with viscosity of 46 mm²/s.





211

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3

Automatic reciprocating valve

hydraulically operated automatic reciprocation

Scheme

No voltage

Setting ranges: $1 = 15 \div 50$ bar **2** = 20 ÷ 140 bar $3 = 50 \div 320$ bar

00 = No variant V1 = Viton

Serial No.

VALV/AD5I001 E/03-2017





AD51...

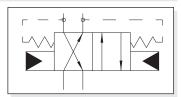
AD5I... AUTOMATIC RECIPROCATING **VALVES CETOP 5**

The operating principle of this type of inverter valve, with interface UNI ISO 4401 - 05 - 04 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-05), is based on the pressure unbalanced created in its interior as a consequence of the fluid flow rate. On starting the system this valve assumes always a preferential position $P \rightarrow B e A \rightarrow T$.

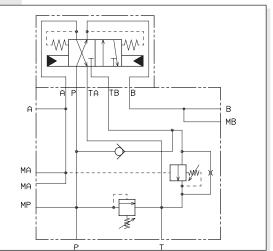
When a pressure is applied to the cylinder which exceeds the system maximum pressure relief valve setting (e.g. end stroke actuator), a hydraulic unbalanced is generated capable of changing over the valve and inverting the cylinder direction of the movement.

Max. operating pressure port P	320 bar			
Max. flow	100 l/min			
Minimum permitted flow	10 l/min			
Fluid viscosity	32 ÷ 60 mm²/s			
Fluid temperature	-20°C ÷ 60°C			
Max. contamination level(*) class 10 in accordance				
with NAS 1638	with filter B ₂₅ ≥75			
Positioner activating force	190 N			
(measured with 1 bar on the T line)				
Weight of version without positioner	3,4 Kg			
Weight of version with positioner	3,6 Kg			

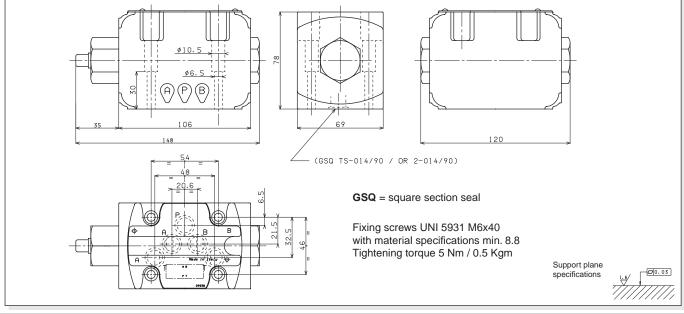
(*) Max contamination level must be respect to obtain the right function of the valve



AD5IP2T1 FOR REGENERATIVE SYSTEM



Version AD5IP2T1 integrated in a regenerative circuit for compactors with roll on-off mobile system, solution useful for all applications where to connect microswitch of proximity is not possible. For any information about our regenerative manifold please contact our technical department. For special subplate BS5RIA see Cap. X • 8.



 $B \rightarrow T$

 $P \rightarrow B$

P. $\rightarrow A$

100

80

60

Q (I/min)

 $A \rightarrow T$



Directional control

at null flow

CETOP 5/NG10

00 = No variant

2T = Variant for regenerative

V1 = Viton

system

(1) Omit if not required the

Tests carried out with mineral oil

at a temperature of 40°C with

viscosity of 46 mm²/s.

Serial No.

Automatic reciprocating valve

P = Version with positioner to adjust the pressure relief valve of the system

16

14

12

6

۵

20

40

(bar) 8 d∆

PRESSURE DROPS

ORDERING CODE

AD

5

I

* (1)

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1

positioner



AD5RI... AUTOMATIC RECIPROCATING VALVES CETOP 5

This valve type is characterized by a fully hydraulic operation, as it takes advantage of the system pressure rise to cause an automatic and continuous inversion of the utilization. The changeover takes place when the system pressure exceeds the inversion valves calibration pressure, and therefore also in not predetermined position. At the cylinder stroke end, the overall maximum pressure valve should be adjusted on a value 30% higher than the system operating pressure.

The inverter valves pressure calibration values should be 15% lower than

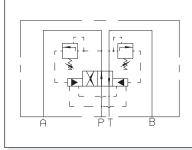
that of the overall maximum pressure valve, and 15% higher than the maxi-

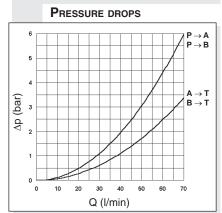
Note: to operate the push button emergency, a minimum pressure of 3 bar on the actuator is needed.

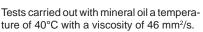
mum operating pressure.

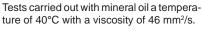
Max. operating pre	320 bar		
Max. pressure port	160 bar		
Min. recommended	l pressure	15 bar	
Max. flow		70 l/min	
Min. flow	Min. flow		
Setting ranges:	Spring 1	15 ÷ 50 bar	
	Spring 2	20 ÷ 140 bar	
	Spring 3	50 ÷ 320 bar	
Fluid viscosity		10 ÷ 60 mm²/s	
Fluid temperature		-20°C ÷ 75°C	
Max. contaminatior	10 in accordance		
	with filter B ₂₅ ≥75		
Weight		5,4 Kg	

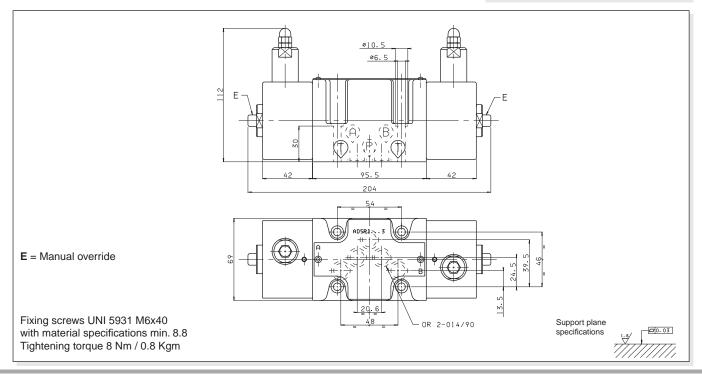
HYDRAULIC SYMBOL



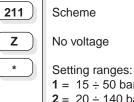








ORDERING CODE AD Directional valve 5 CETOP 5/NG10 RI Automatic reciprocating valve hydraulically operated



**

3

 $1 = 15 \div 50$ bar **2** = 20 ÷ 140 bar $3 = 50 \div 320$ bar

automatic reciprocation

00 = No variant V1 = Viton

Serial No.

VALV/AD5RI003 E/02-2017

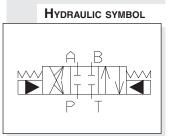




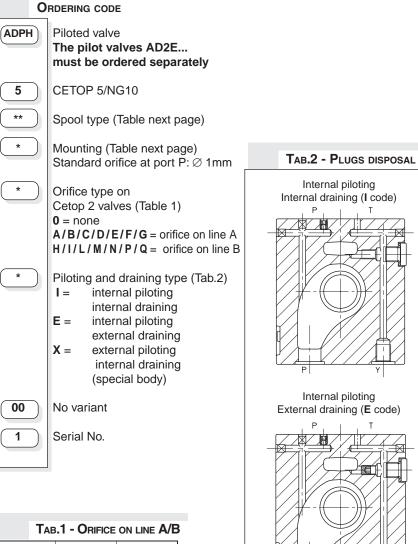
ADPH5... PILOTED VALVES CETOP 5/NG10 WITH CETOP 2/NG4 PILOT VALVE

These ADPH 5 valves are used primarily for controlling the starting, stopping and direction of fluid flow. These kind of distributors are composed by a main stage crossed by the big flow from the pump (ADPH5) and by a cetop 2 pilot directional solenoid valve (AD2E) available with different mounting type .

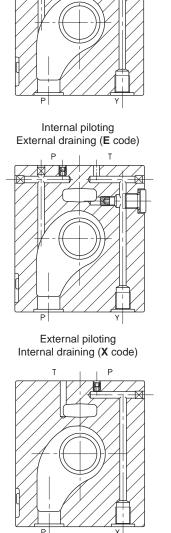
When a short response time is requested, a special version of solenoids with high dynamics is available with the code AD2E****FF2 (please, contact our technical department).



ADPH5	
STANDARD SPOOLS FOR ADPH5	Cap. I • 51
TECH. SPECIFICATIONS ADPH5	Cap. I • 52
CETOP 2/NG04	Cap. I • 2
AD2E	Cap. I • 4
"A09" DC COILS	Cap. I • 4
STANDARD CONNECTORS	Cap. I • 20
AD2E "A09" DC Coils	CAP. I • 4 CAP. I • 4



On line A	On line A	Ø (mm)
0	0	—
Α	Н	0,5
В	I	0,6
С	L	0,7
D	М	0,8
E	N	0,9
F	Р	1,0
G	٥	1,2

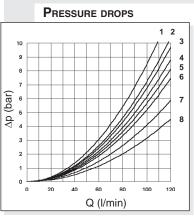




Hydraulic symbols, spools and mounting					
		"A" MOUNTING			
Pilot Piloted		AD.2.E.03.E ADPH.5.**.A			
Scheme					
Spool type		Covering	Transient position		
01		+			
02		-			
03		-	EHX		
04*		-			
06		+			
15		-			
16		+			

		"C" MOUNTING		
Pilot Piloted	AD.2.E.03.C ADPH.5.**.C			
Scheme				
Spool type			Covering	Transient position
01			+	
02			-	
03			-	
04*			-	
06			+	

	(* Spools with price increasing)					
		"B" MOUNTING				
Pilot Piloted		AD.2.E.03.F ADPH.5.**.E				
Scheme						
Spool type		Covering I Transient positio				
01		+				
02		-				
03		-				
04*						
06						
15						
16		+				



The diagram at the side shows the pressure drop curves for spools during normal usage. The used fluid is a mineral oil with a viscosity of 46 mm^2 /s at 40° C; the tests have been carried out at a fluid temperature of 40° C. For flow rates higher than those in the diagram, the losses will be those expressed by the following formula:

$$\Delta p1 = \Delta p \times (Q1/Q)^2$$

where Δp will be the value for the losses for a specific flow rate Q which can be obtained from the diagram, $\Delta p1$ will be the value of the losses for the flow rate Q1 that is used.

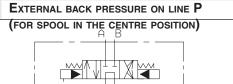
Spool	Connections					
type	P→A	P→B	A→T	B→T	P→T	
01	4	4	7	7		
02	6 3	6	8	8	7	
03	3	3	8	8		
04	4	4	2	2	3	
06	4	4	7	8		
15	2	2	5	5 2		
16	1	1	2	2		
	Curve No.					

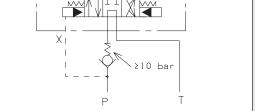


PILOT SOLENOID CONTROL VALVE SPECIFICATIONS

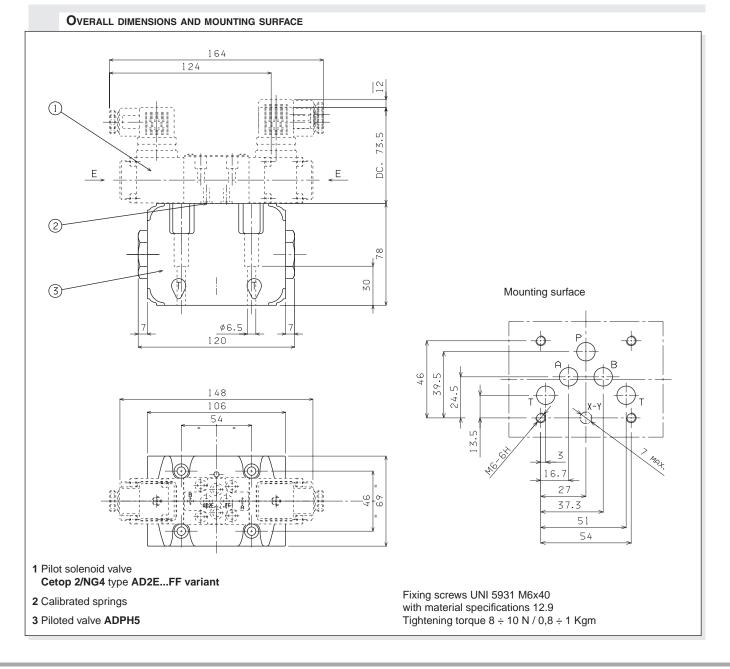
Max. operating pressure: ports P/A/B	250 bar
Max. operating pressure: port T (dynamic)	70 bar
Max. piloting pressure	250 bar
Min. piloting pressure	10 bar
Max. flow	120 l/min
Switching times (*see note below)	Energizing: 20 ms
	De-energizing: 50 ms
Piloting oil volume for engagement	1 cm ³
Hydraulic fluid	mineral oil DIN 51524
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-20°C ÷ 75°C
Max. contamination level	class 10 in accordance
	with NAS 1638 with filter $\beta_{25} \ge 75$
Mounting	plate
Weight ADPH5 without pilot valve	3,4 Kg
Weight ADPH5 with pilot valve with one sol	enoid 4,3 Kg
Weight ADPH5 with pilot valve with two sole	enoids 4,5 Kg

(*) All the tests have been carried out with AD2E pilot valve with variant FF, mounting type C, spool 03, flow 100 l/min,pressure 160 bar, back pressure on the T line of 2 bar and oil temperature 40° C.





When the main spool connect P to T in the centre position, the minimum pressure of 10 bar is needed to move the main spool (see the "Specifications"); for this reason a check valve on the P line (see the drawing above) is necessary.







ADH5						
STANDARD SPOOLS FOR AD	H5 Cap. I • 54					
TECH. SPECIFICATIONS	Cap. I • 55					
SUBPLATES BSH5	Cap. I • 56					
CMP30 CARTRIDGE CATALOGUE						
CETOP 3/NG06	Cap. I • 8					
STANDARD SPOOLS FOR AD.	3.E Cap. I • 10					
AD3E	Cap. I • 11					
"D15" DC COILS	Cap. I • 19					
"B14" AC SOLENOIDS	Cap. I • 19					
STANDARD CONNECTORS	Cap. I • 20					

ORDERING CODE

ADH

5 *

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*

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1

Piloted valve (Pilot valve and any mounting valves should be ordered separately)

CETOP 5/NG10

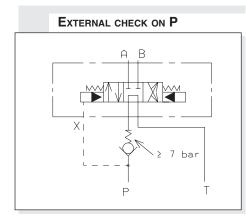
Mounting type (Table next page)

Spool type (Table next page)

Piloting and draining I = X internal / Y internal IE = X internal / Y external EI = X external / Y internal $\mathbf{E} = X \text{ external } / Y \text{ external}$ (see diagram at side)

00 = No variant LC = Main spool stroke limiter

Serial No.



ADH5... 4/3 AND 4/2 PILOTED VALVES CETOP 5/NG10

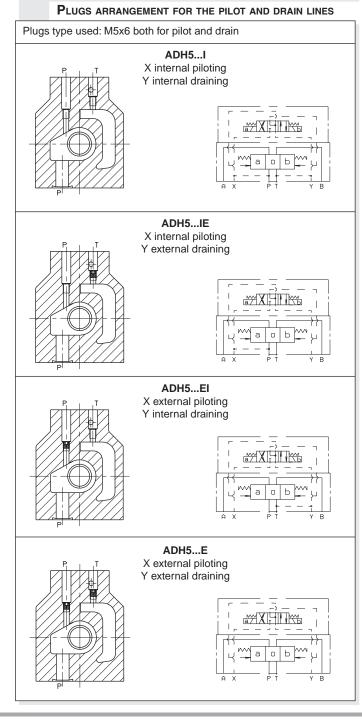
Type ADH.5 distributors are intended for interrupting, inserting and diverting a hydraulic system flow. Normally these distributors are composed of a main stage, crossed by circuit main flow, and of a pilot stage available in several versions.

Various types of controls are available, used either individually or in combination for, among other functions, stroke limitation and main spool movement speed control, in order to optimize the hydraulic system operation where this type of valve is employed.

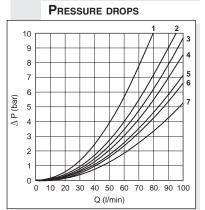
In those case where normally to drain spools are used, it is necessary to remember that the minimum changeover pressure due to the opposing springs is equal to approximately 7 bar (see the operating features table on page I+46) and consequently necessary to insert a check valve in the P way (as shown above).

• Mounting surface in accordance with UNI ISO 4401 - 05 - 05 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-05).

- Pilot operated spool, solenoid controller.
- Stroke control of main spool.
- Presetting for pressure reducing valve mounting.
- · Presetting for single-acting throttle valve mounting.







The diagram an the side shows the pressure drops in relation to spools adopted for normal usage (see table).

Tests carried out at a constant temperature of 40°C.

The fluid used was a mineral based oil with a viscosity of 46 mm²/s at 40°C.

Spool	Connections				
type	P→A	P→B	A→T	B→T	P→T
					1 -> 1
01	3	3	5	5	
02	3	3	6	6	3
03	3	3 3 3	6 6	6	
04	2	2	5	5	1
05	3 3 2 3 3 3	2 3 3	5 5	5	
06-66	3	3	6	6	
07		1	6		
10	3 4	3	6 5 5 5	5	
11	4		5		
22		4	5		
14-28	3	3	7	7	2
15	3	3 3 3	4 4	7 5 5	
16	3 3 3 3	3	4	5	
17	3	3			
	Curve No.				

Spo	OLS AND MOUNTING TYPE			(* Spools with price increasing
	C mounting	A mounting	B mounting	P mounting
Pilot Piloted	AD.3.E.03.C ADH.5.C.**	AD.3.E.03.E ADH.5.A.**	AD.3.E.03.F ADH.5.B.**	AD3E16E/AD3E16F ADH.5.P.**
Scheme				
Spool type				
01				
02				
03				
04*				
05				
66				
06				
07*				XIIII
10*				
11*				
22*				
14*				
28*				
15				
16				
17				



PILOT SOLENOID CONTROL VALVE SPECIFICATIONS

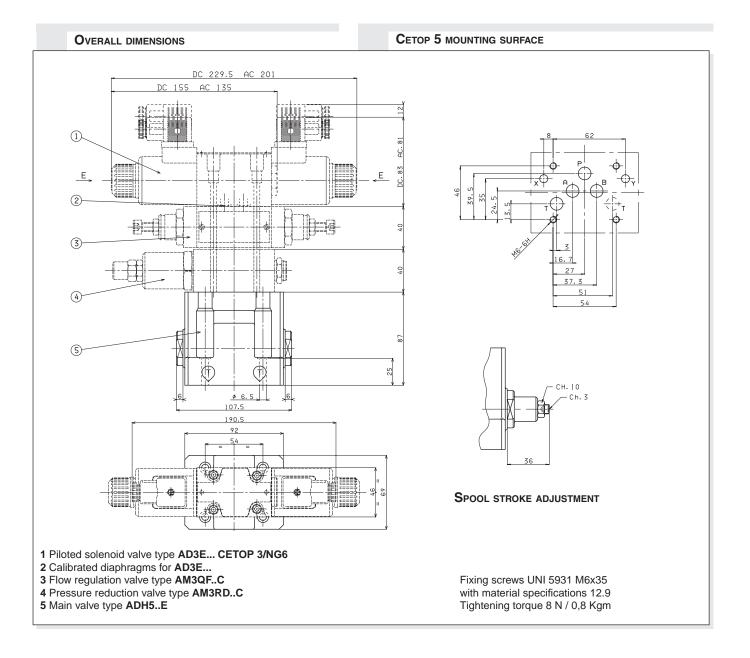
Max. operating pressure ports P/A/B	320 bar
Max. operating pressure port T (int. drainage)	160 bar
Max. pressure on T (ext. drainage)	250 bar
Max. piloting pressure	250 bar
Min. piloting pressure	7 bar
Max. flow	100 l/min
Piloting oil volume engagement 3 position valve	es 0,8 cm ³
Piloting oil volume engagement 2 position valve	es 1,6 cm ³
Hydraulic fluid	mineral oil DIN 51524
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-20°C ÷ 75°C
Max. contamination level	class 10 in accordance with
	NAS 1638 with filter B₂₅≥75
Weight ADH5 without pilot valve	2,7 Kg
Weight ADH5 with pilot valve with 1 AC solenoi	id 4 Kg
Weight ADH5 with pilot valve with 1 DC soleno	id 4,2 Kg
Weight ADH5 with pilot valve with 2 AC solenoi	ids 4,3 Kg
Weight ADH5 with pilot valve with 2 DC soleno	ids 4,7 Kg

FOR DIFFERENT CONTROLS, PLEASE CONTACT OUR TECHNICAL DEPARTMENT

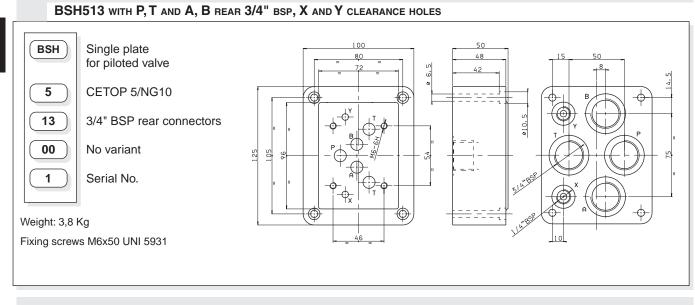
SWITCHING TIMES PILOTED VALVE

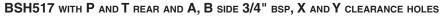
31	SWITCHING TIMES PILOTED VALVE						
OPERATING PRESSURE (bar)	CURRENT	ENERGIZING centre-extern (ms)	DE-ENERGIZING extern-centre (ms)				
50 100 200	ALTERNATING	30 25 20	50				
50 100 200	DIRECT	40 35 30	60				

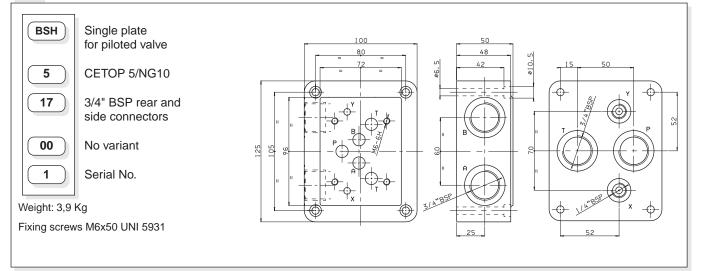
3 position valve. The values are indicative and depend on the hydraulic circuit, the fluid used and the variations in pressure, flow rate and temperature.





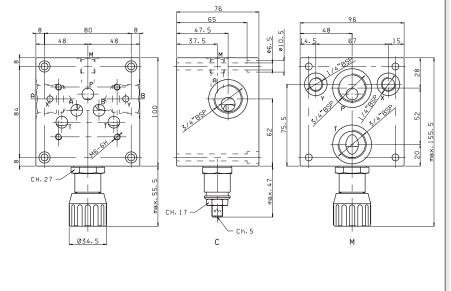






BSH531 with P and T rear, A and B side 3/4" BSP, X and Y clearance holes with maximum pressure valve





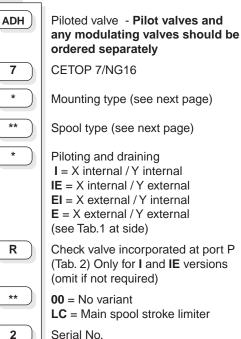
 \bullet For the minimum permissible setting pressure depending on the spring, see minimum setting curve pressure CMP30



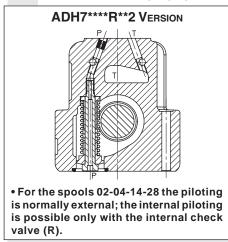


ADH7	
STANDARD SPOOLS FOR ADH7	Cap. I • 58
TECH. SPECIFICATIONS	Cap. I • 59
SUBPLATES BSH7	Cap. I • 60
CETOP 3/NG06	Cap. I • 8
STANDARD SPOOLS FOR AD3E	Cap. I • 10
AD3E	Cap. I • 11
ADC3	Cap. I • 5
"A09" DC COILS	Cap. I • 7
"D15" DC Coils	Cap. I • 19
"B14" AC SOLENOIDS	Cap. I • 19
STANDARD CONNECTORS	Cap. I • 20

ORDERING CODE



TAB. 2 - INTERNAL CHECK ON P



ADH7... 4/3 AND 4/2 PILOTED VALVES CETOP 7/NG16

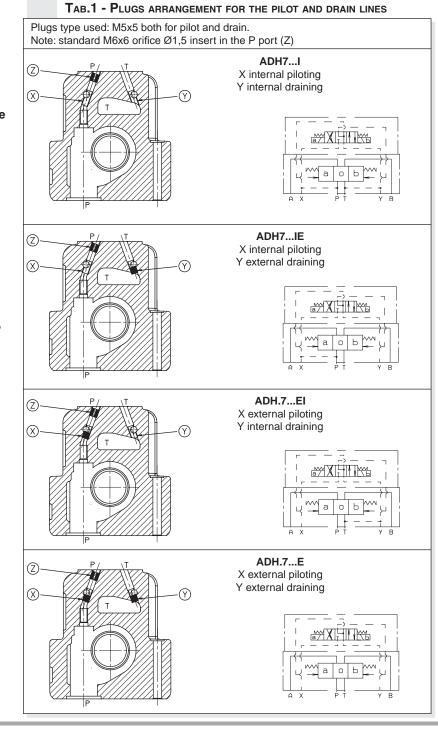
Type ADH.7 distributors are intended for interrupting, inserting and diverting a hydraulic system flow. Normally these distributors are composed of a main stage, crossed by the circuit main flow, and of a pilot stage available in several versions.

Various types of controls are available, used either individually or in combination for, among other functions, stroke limitation and main spool movement speed control, in order to optimize the hydraulic system operation where this type of valve is employed.

In those cases where normally to drain spools are used, it is necessary to remember that the minimum changeover pressure due to the opposing springs is equal to approximately 5 bar (see the operating features table next pages) and it is consequently necessary to specify when ordering the check valve incorporated in the P line, if required (as shown below).

• Mounting surface in accordance with UNI ISO 4401 - 07 - 06 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-07).

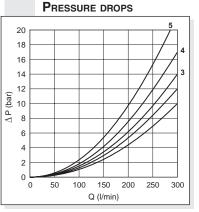
- Pilot operated spool, solenoid controller.
- Stroke control of main spool.
- Presetting for pressure reducing valve mounting.
- Presetting for single-acting throttle valve mounting.



BREVINI

Motion Systems

ng ze

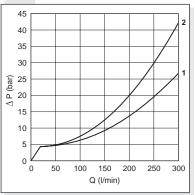


The two diagrams show the "Pressure drops" in relation to spools adopted for normal usage (see table).

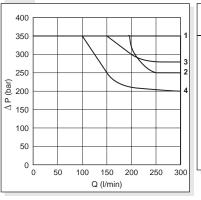
The fluid used was a mineral based oil with a viscosity of 46 mm²/s at 40° C.

Spool		Connections				
type		$\textbf{P} \rightarrow \textbf{A}$	$\textbf{P} \rightarrow \textbf{B}$	$\textbf{A} \rightarrow \textbf{T}$	$\textbf{B} \rightarrow \textbf{T}$	$\textbf{P} \rightarrow \textbf{T}$
01	Energized	2	1	3	3	
02	Energized De-Energized	1	1	3	3	2
03	Energized De-Energized	2	1	3	3	
04	Energized De-Energized	2	2	4	4	5
05	Energized De-Energized	1 2	1 2	2	2	
66	Energized De-Energized	1	1	2	3 4	
10	Energized	2	1	3	3	
14	Energized De-Energized	1	1	3	3	4
28	Energized De-Energized	1	1	3	3	4
23	Energized	2	1	3	3	
	Curve No.					

PRESSURE DROPS FOR INTERNAL CHECK ON P VERSION



The limit of use test has been carried out with external draining and orifice Ø1,5 insert in the P port (Z). The fluid used was a mineral based oil with a viscosity of 46 mm²/s at 40° C.



LIMIT OF USE

Spool type	
01	1
02	2
03	1
04	3
05	1
66	1
10	1
14	4
28	4
23	1

(•) For the "E mounting" the locating spring works only with the steady system (* Spools with price increasing)

	C mounting	A mounting	B mounting	E mounting (•)	P mounting
Pilot Piloted	AD3E03C ADH7C	AD3E03E ADH7A	AD3E03F ADH7B	AD3E16E ADH7E	AD3E16E/AD3E16F ADH7P
Scheme Spool type					
01					
02					
03					
04*					
05					
66					
10*					
14*					
28*					
23*					

SPOOLS AND MOUNTING TYPE



PILOT SOLENOID CONTROL VALVE SPECIFICATIONS

Max. operating pressure ports P/A/B350 barMax. operating pressure port T (int. drainage)160 barMax. operating pressure port T (ext. drainage)250 barMax. piloting pressure210 barMin. piloting pressure*12 barMax flow300 l/min.Piloting oil volume for engagement 3 position valves4 cm³Piloting oil volume for engagement 2 position valves8 cm³Hydraulic fluidmineral oil DIN 51524Fluid viscosity2.8 ÷ 380 mm²/sFluid temperature-20°C ÷ 70°CAmbient temperature-20°C ÷ 50°CMax. contamination levelclass 10 in accordance with NAS 1638 with filter $B_{2s} \ge 75$ Weight ADH7 with pilot valve with 1 AC solenoid8,2 KgWeight ADH7 with pilot valve with 2 AC solenoids8,5 KgWeight ADH7 with pilot valve with 2 AC solenoids8,5 KgWeight ADH7 with pilot valve with 2 DC solenoids9 Kg					
Max. operating pressure port T (ext. drainage)250 barMax. piloting pressure210 barMin. piloting pressure*12 barMax flow300 l/min.Piloting oil volume for engagement 3 position valves4 cm³Piloting oil volume for engagement 2 position valves8 cm³Hydraulic fluidmineral oil DIN 51524Fluid viscosity2.8 ÷ 380 mm²/sFluid temperature-20°C ÷ 70°CAmbient temperature-20°C ÷ 50°CMax. contamination levelclass 10 in accordance with NAS 1638 with filter $B_{25} \ge 75$ Weight ADH7 without pilot valve with 1 AC solenoid8,2 Kg Weight ADH7 with pilot valve with 1 DC solenoidWeight ADH7 with pilot valve with 2 AC solenoids8,5 Kg	Max. operating pressure ports P/A/B	350 bar			
$\begin{array}{cccc} & & & & & & & & & & & & & & & & & $	Max. operating pressure port T (int. drainage)	160 bar			
Min. piloting pressure*12 barMax flow300 l/min.Piloting oil volume for engagement 3 position valves4 cm³Piloting oil volume for engagement 2 position valves8 cm³Hydraulic fluidmineral oil DIN 51524Fluid viscosity $2.8 \div 380$ mm²/sFluid temperature $-20^{\circ}C \div 70^{\circ}C$ Ambient temperature $-20^{\circ}C \div 50^{\circ}C$ Max. contamination levelclass 10 in accordance withNAS 1638 with filter $\beta_{25} \ge 75$ Weight ADH7 without pilot valve with 1 AC solenoid8,2 KgWeight ADH7 with pilot valve with 1 DC solenoid8,4 KgWeight ADH7 with pilot valve with 2 AC solenoids8,5 Kg	Max. operating pressure port T (ext. drainage)	250 bar			
$\begin{array}{llllllllllllllllllllllllllllllllllll$	Max. piloting pressure	210 bar			
Piloting oil volume for engagement 3 position valves4 cm³Piloting oil volume for engagement 2 position valves8 cm³Hydraulic fluidmineral oil DIN 51524Fluid viscosity $2.8 \div 380 \text{ mm}^2/\text{s}$ Fluid temperature $-20^\circ\text{C} \div 70^\circ\text{C}$ Ambient temperature $-20^\circ\text{C} \div 50^\circ\text{C}$ Max. contamination levelclass 10 in accordance withNAS 1638 with filter $\beta_{25} \ge 75$ Weight ADH7 without pilot valve7 KgWeight ADH7 with pilot valve with 1 AC solenoid8,2 KgWeight ADH7 with pilot valve with 1 DC solenoid8,4 KgWeight ADH7 with pilot valve with 2 AC solenoids8,5 Kg	Min. piloting pressure*	12 bar			
Piloting oil volume for engagement 2 position valves8 cm³Hydraulic fluidmineral oil DIN 51524Fluid viscosity $2.8 \div 380 \text{ mm}^2/\text{s}$ Fluid temperature $-20^\circ\text{C} \div 70^\circ\text{C}$ Ambient temperature $-20^\circ\text{C} \div 50^\circ\text{C}$ Max. contamination levelclass 10 in accordance withNAS 1638 with filter $\beta_{25} \ge 75$ Weight ADH7 without pilot valve7 KgWeight ADH7 with pilot valve with 1 AC solenoid $8,2$ KgWeight ADH7 with pilot valve with 1 DC solenoid $8,4$ KgWeight ADH7 with pilot valve with 2 AC solenoids $8,5$ Kg	Max flow	300 l/min.			
Hydraulic fluidmineral oil DIN 51524Fluid viscosity $2.8 \div 380 \text{ mm}^2/\text{s}$ Fluid temperature $-20^\circ\text{C} \div 70^\circ\text{C}$ Ambient temperature $-20^\circ\text{C} \div 50^\circ\text{C}$ Max. contamination levelclass 10 in accordance withNAS 1638 with filter $\beta_{25} \ge 75$ Weight ADH7 without pilot valve7 KgWeight ADH7 with pilot valve with 1 AC solenoid $8,2$ KgWeight ADH7 with pilot valve with 1 DC solenoid $8,4$ KgWeight ADH7 with pilot valve with 2 AC solenoids $8,5$ Kg	Piloting oil volume for engagement 3 position valves 4 cm ³				
$ \begin{array}{c} \mbox{Fluid viscosity} & 2.8 \div 380 \mbox{ mm}^2/s \\ \mbox{Fluid temperature} & -20^\circ \mbox{C} \div 70^\circ \mbox{C} \\ \mbox{Ambient temperature} & -20^\circ \mbox{C} \div 50^\circ \mbox{C} \\ \mbox{Max. contamination level} & class 10 \mbox{ in accordance with} \\ \mbox{NAS 1638 with filter } $\mathbbmssssssssssssssssssssssssssssssssssss$	Piloting oil volume for engagement 2 position valves 8 cm ³				
$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	Hydraulic fluid	mineral oil DIN 51524			
$ \begin{array}{c} \mbox{Ambient temperature} & -20^\circ \mbox{C} \div 50^\circ \mbox{C} \\ \mbox{Max. contamination level} & class 10 in accordance with \\ NAS 1638 with filter \mbox{\mathbb{R}_{25}}{\geq}75 \\ \mbox{Weight ADH7 without pilot valve} & 7 \mbox{ Kg} \\ \mbox{Weight ADH7 with pilot valve with 1 AC solenoid} & 8,2 \mbox{ Kg} \\ \mbox{Weight ADH7 with pilot valve with 1 DC solenoid} & 8,4 \mbox{ Kg} \\ \mbox{Weight ADH7 with pilot valve with 2 AC solenoids} & 8,5 \mbox{ Kg} \\ \end{array} $	Fluid viscosity	2.8 ÷ 380 mm²/s			
$\begin{array}{c} \text{Max. contamination level} & \text{class 10 in accordance with} \\ \text{NAS 1638 with filter } \mathbb{R}_{25}{\geq}75 \\ \text{Weight ADH7 without pilot valve} & 7 \ \text{Kg} \\ \text{Weight ADH7 with pilot valve with 1 AC solenoid} & 8,2 \ \text{Kg} \\ \text{Weight ADH7 with pilot valve with 1 DC solenoid} & 8,4 \ \text{Kg} \\ \text{Weight ADH7 with pilot valve with 2 AC solenoids} & 8,5 \ \text{Kg} \end{array}$	Fluid temperature	-20°C ÷ 70°C			
$\begin{array}{c} NAS 1638 with filter $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $ $$	Ambient temperature	-20°C ÷ 50°C			
Weight ADH7 without pilot valve7 KgWeight ADH7 with pilot valve with 1 AC solenoid8,2 KgWeight ADH7 with pilot valve with 1 DC solenoid8,4 KgWeight ADH7 with pilot valve with 2 AC solenoids8,5 Kg	Max. contamination level	class 10 in accordance with			
Weight ADH7 with pilot valve with 1 AC solenoid8,2 KgWeight ADH7 with pilot valve with 1 DC solenoid8,4 KgWeight ADH7 with pilot valve with 2 AC solenoids8,5 Kg		NAS 1638 with filter B ₂₅ ≥75			
Weight ADH7 with pilot valve with 1 DC solenoid8,4 KgWeight ADH7 with pilot valve with 2 AC solenoids8,5 Kg	Weight ADH7 without pilot valve	7 Kg			
Weight ADH7 with pilot valve with 2 AC solenoids 8,5 Kg	Weight ADH7 with pilot valve with 1 AC solenoid	d 8,2 Kg			
o 1	Weight ADH7 with pilot valve with 1 DC solenoid	d 8,4 Kg			
Weight ADH7 with pilot valve with 2 DC solenoids 9 Kg	Weight ADH7 with pilot valve with 2 AC solenoi	ds 8,5 Kg			
	Weight ADH7 with pilot valve with 2 DC solenoi	ids 9 Kg			

Note: the solenoid valve type **ADC3E...** (with A09 coil) and **AD3E...** (with D15 or B14 coils) could be used both as pilote valve, without any changement of technical features.

FOR DIFFERENT CONTROLS, PLEASE CONTACT OUR TECHNICAL DEPARTMENT

* For valves with internal drain (Y), tank pressure on T must be added to min. piloting pressure.

For version "R" with check valve on P, the cracking pressure of 5 bar is obtained with flow rate > 25 l/min.

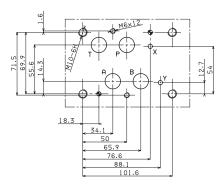
Switching time

Such values refer to a tests carried out with solenoid valve type AD3E03 with P = 100 bar pressure and Q = 100 l/min flow. Orifice Ø1.5 mm, insert on piloting port, using a mineral oil at 40°C. with 46 mm²/s viscosity.

TEMPI DI RISPOSTA VALVOLA PILOTATA

Solenoids	ENERGIZING ±10% (ms)				DE-ENERGIZING ±10%(ms)	
No. Spool	01 - 03				01 - 03	
Scheme	2 positio	2 positions 3 po		ositions	2 positions	3 positions
AC	50			20	25	30
DC	70		35		40	50
No. Spool	02	04		02 - 04	02 - 04	
Scheme	2 posit.	2 p	osit.	3 posit.	2 positions	3 positions
AC	35	6	0	30	25	25
DC	55	8	0	40	40	50





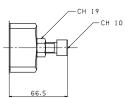
• Piloted valve fixing:

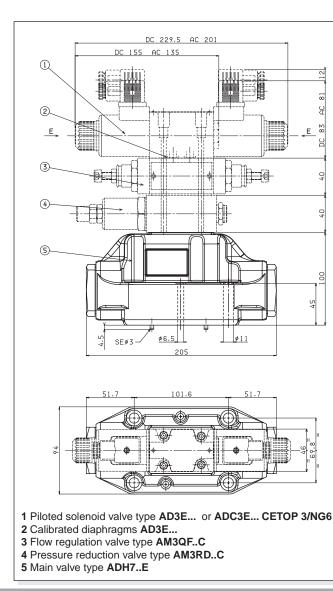
 n° 4 screws T.C.E.I. M10x60 - Tightening torque 40 Nm n° 2 screws T.C.E.I. M6x55 - Tightening torque 8 Nm

· Seals:

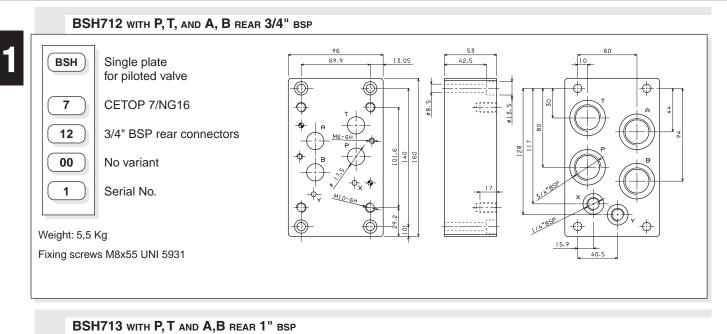
n° 4 OR 2-118 PARKER (type 130) n° 2 OR 2-013 PARKER (type 2043)

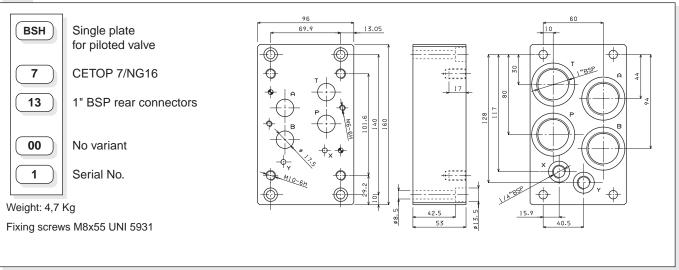
SPOOL STROKE ADJUSTMENT



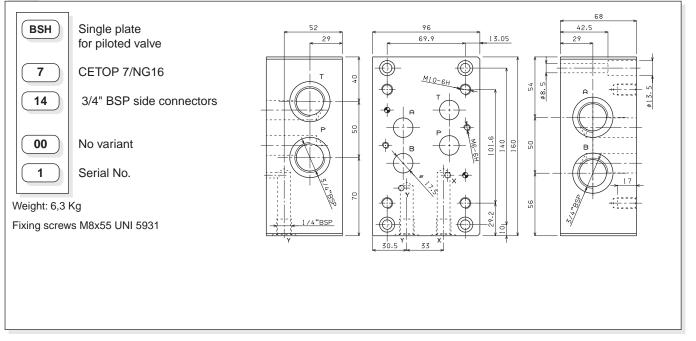








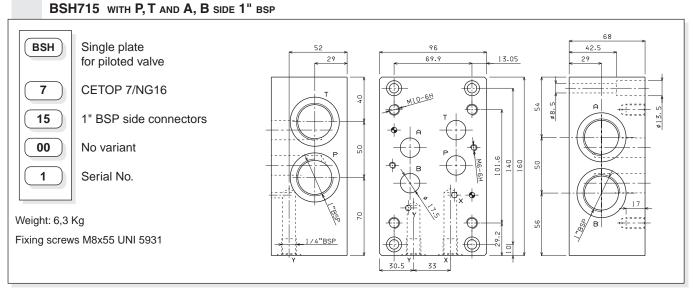
BSH714 WITH P, T AND A, B SIDE 3/4" BSP



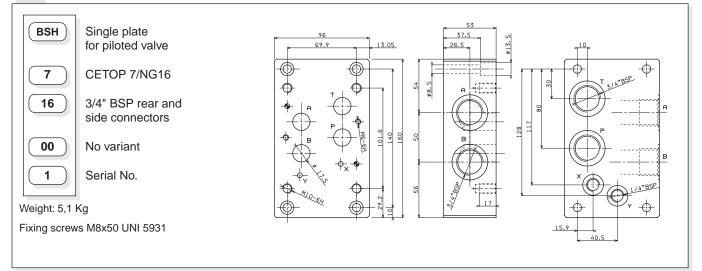


I • 60

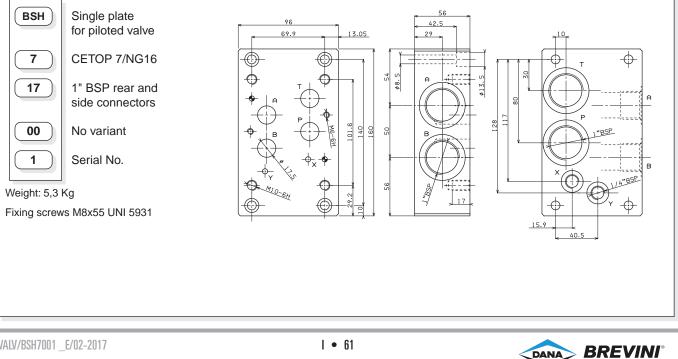




BSH716 with P and T rear, A and B side 3/4" BSP, X and Y rear



BSH717 WITH P AND T REAR, A AND B SIDE 1" BSP, X AND Y REAR



Motion Systems

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ADH8						
STANDARD SPOOLS FOR ADH8	Cap. I • 63					
TECH. SPECIFICATIONS	Cap. I • 64					
BSH8	Cap. I • 65					
CETOP 3/NG06	Cap. I • 8					
STANDARD SPOOLS FOR AD3E	Cap. I • 10					
AD3E	Cap. I • 11					
"D15" DC Coils	Cap. I • 19					
"B14" AC SOLENOIDS	Cap. I • 19					
STANDARD CONNECTORS	Cap. I • 20					

ADH8...4/3 AND 4/2 PILOTED VALVES CETOP 8/NG25

Type ADH.8 distributors are intended for interrupting, inserting and diverting a hydraulics system flow.

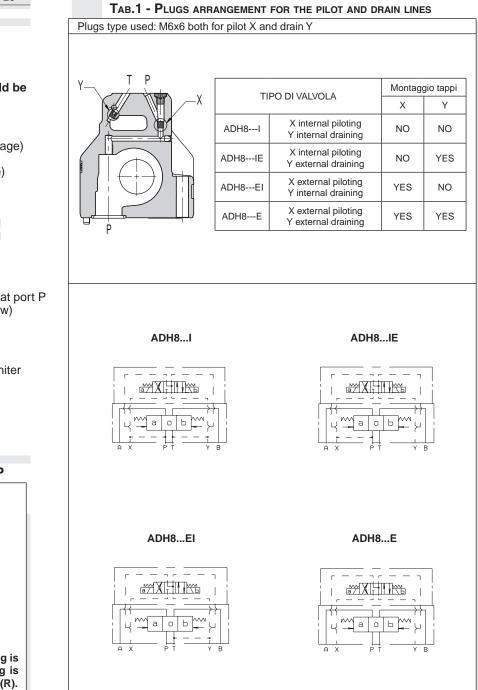
Normally these distributors are composed of a main stage, crossed by circuit main flow, and of a pilot stage available in several versions.

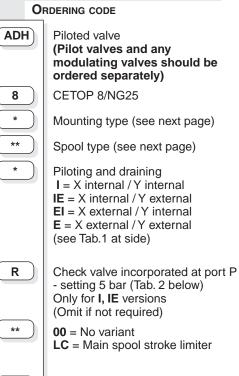
Various types of controls are available, used either individually or in combination for, among other functions, stroke limitation and main spool movement speed control, in order to optimize the hydraulic system operation where this type of valve is employed.

In those cases where normally to drain spools are used, it is necessary to remember that the minimum changeover pressure due to the opposing springs is equal to approximately 5 bar (see the operating features table next pages) and it is consequently necessary to specify when ordering the check valve incorporated in the P line, if required (as shown below).

• Mounting surface in accordance with UNI ISO 4401 - 08 - 07 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-08).

- Pilot operated spool, solenoid controller.
- Stroke control of main spool.
- Presetting for pressure reducing valve mounting.
- Presetting for single-acting throttle valve mounting.



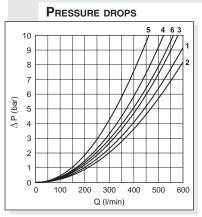


Serial No.

2

TAB. 2 - INTERNAL CHECK ON P





The diagram shows the pressure drops in relation to spools adopted for normal usage (see table).

The fluid used was a mineral based oil with a viscosity of 35 mm²/s at 50° C.

Spool	Connections					
type		$\textbf{P} \rightarrow \textbf{A}$	$\textbf{P} \rightarrow \textbf{B}$	$\textbf{A} \rightarrow \textbf{T}$	$B \to T$	$\textbf{P} \rightarrow \textbf{T}$
01	Energized	1	1	2	3	
02	Energized De-Energized	2	2	1	2	6 (1)
03	Energized De-Energized	1	1	1 4 (2)	2 4 (3)	
04	Energized De-Energized	6	6	3	4	5
05	Energized De-Energized	2 4 (2)	2 4 (3)	2	3	
66	Energized De-Energized	1	1	2	2 4	
10	Energized	1	1	2	3	
14	Energized De-Energized	6	6	3	4	5 (3)
28	Energized De-Energized	6	6	4	3	5 (2)
23	Energized De-Energized	1	2 4	2	3	
	Curve No.					

1

Notes: (1) A/B stopped - (2) B stopped - (3) A stopped

SPOOLS AND MOUNTING TYPE

(•) For the E mounting the locating spring works only with the steady system

	C mounting	A mounting	B mounting	E mounting	P mounting
Pilot Piloted	AD3E03C ADH8C	AD3E03E ADH8A	AD3E03F ADH8B	AD3E16E ADH8E	AD3E16E/AD3E16F ADH8P
Scheme					
Spool type					
01					
02					
03					
04(*) (**)					
05					
66					
10*					
14*					
28*					
23*					

(* Spools with price increasing)

(** The spool 04 is available for operating pressures in the $\ensuremath{P/A/B}$ lines, max. 320 bar)



PILOT SOLENOID CONTROL VALVE SPECIFICATIONS

Max. operating pressure ports P/A/B	420 bar
The spool 04 is available for operating pressures in t	
Max. operating pressure port T (int. drainage)	160 bar
Max. operating pressure port T (ext. drainage)	250 bar
Max. piloting pressure	350 bar
Max. piloting pressure with main spool stroke limite	er (LC variant) 250 bar
Min. piloting pressure*	5 bar
Max. flow with 04-14-28 spools	500 l/min a 210 bar
	450 l/min a 320 bar
Max. flow with all other spools	600 l/min a 210 bar
	500 l/min a 320 bar
Piloting oil volume for engagement 3 position v	
Piloting oil volume for engagement 2 position v	
Hydraulic fluid	mineral oil DIN 51524
Fluid viscosity	2.8 ÷ 380 mm ² /s
Fluid temperature	-20°C ÷ 70°C
Ambient temperature	-20°C ÷ 50°C
Max. contamination level	class 10 in accordance with
	NAS 1638 with filter $\beta_{25} \ge 75$
Weight ADH8 without pilot valve	13,1 Kg
Weight ADH8 with pilot valve with 1 AC soleno	
Weight ADH8 with pilot valve with 1 DC soleno	
Weight ADH8 with pilot valve with 2 AC soleno	
Weight ADH8 with pilot valve with 2 DC soleno	vids 15,1 Kg

FOR DIFFERENT CONTROLS, PLEASE CONTACT OUR TECHNICAL DEPARTMENT

* For valves with internal drain (Y), tank pressure on T must be added to min. piloting pressure.

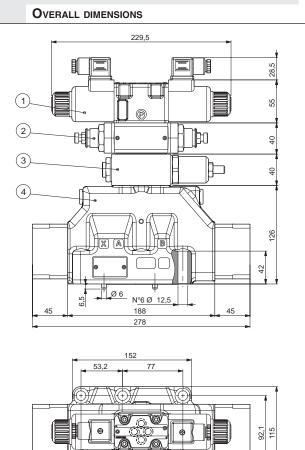
Min. piloting pressure is 5 bar with low flow rate, but it is up to 12 bar with higher flow rate.

For version "R" with check valve on P, the cracking pressure of 5 bar is obtained with flow rate > 25 l/min.

Switching time

Such values refer to a solenoid valve with P = 100 bar pressure using a mineral oil at 50°C with 36 mm²/sec viscosity PA and BT connections.

Switching times piloted valve					
	ENERGIZING ±10% (ms) DE-ENERGIZING ±10% (ms)				
Solenoids	2 posit.	3 posit.	2 posit.	3 posit.	
AC	60	45	90	60	
DC	75	55	90	60	



53

* The piloted valve is provided with a calibrated screw M6 with

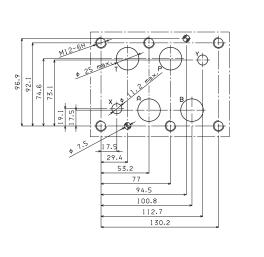
77

2 Flow regulation valve type AM3QF..C 3 Pressure reduction valve type AM3RD..C

1 Piloted solenoid valve type AD3E (CETOP3 NG6)

hole ø1.5, already mounted on the port "P".

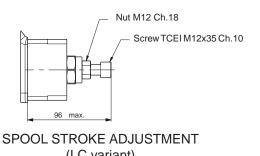
CETOP 8 MOUNTING SURFACE



Piloted valve fixing: n° 6 screws T.C.E.I. M12x60
 Tightening torque: 115 Nm with screw Cl. 12.9**
 69 Nm with screw Cl. 8.8

** Recommended for applications over 350 bar

• Seals: n°4 OR 2-123/3118 type (29.82x2.62) - 90 Shore n°2 OR 2-117/3081 type (20.24x2.62) - 90 Shore



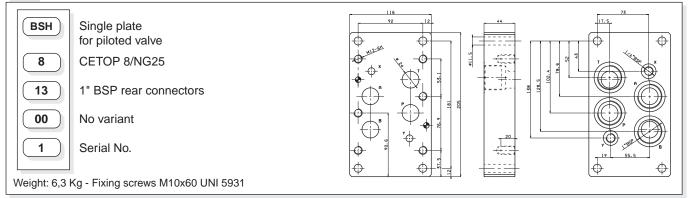




4 Main valve type ADH8*

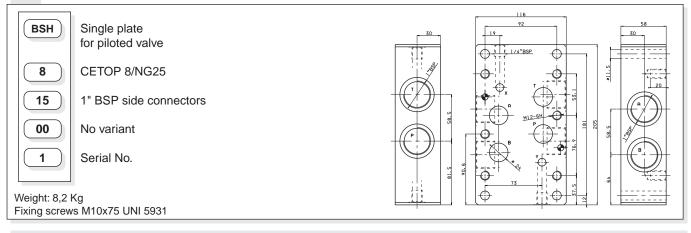


BSH813 WITH P, T AND A, B REAR 1" BSP

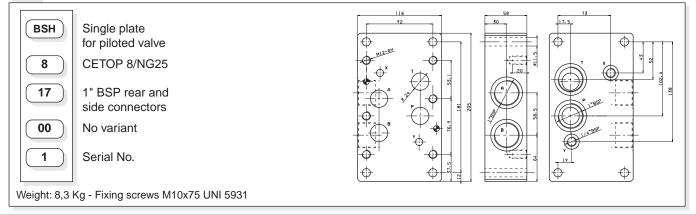


BSH813* WITH P, T AND A, B REAR 1"1/4 BSP OR 1" 1/2 BSP BSH Single plate for piloted valve ሱ ⊕ ψ \oplus 8 CETOP 8/NG25 13* A = 1"1/4 BSP rear connectors B = 1"1/2 BSP rear connectors 00 No variant Φ ¢ 1 Serial No. Weight: 21,7 Kg (BSH.8.13A) - Weight: 21,2 Kg (BSH.8.13B) Fixing screws M12x100 UNI 5931

BSH815 WITH T, P AND A, B SIDE 1" BSP



BSH817 WITH P AND T REAR, A AND B SIDE 1" BSP, X AND Y REAR







CDL046	
A09" DC COILS	Cap. I • 73
CONNECTORS STANDARD	Cap. I • 20

CDL046... STACKABLE CIRCUIT

SELECTOR VALVES

The stackable circuit selector valves, type CDL.04.6, allows one single drive of 5 users with 4 elements connected in series.

As they are moved from high performances solenoids they don't need the external drainage.

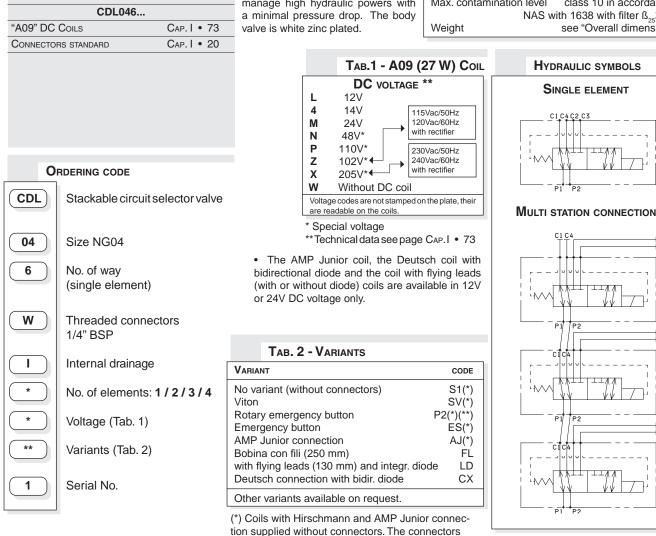
Additionally, beyond having a reduced and compact dimensions, they can manage high hydraulic powers with a minimal pressure drop. The body valve is white zinc plated.

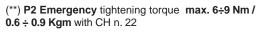
Max. pressure	250 bar
Max. flow	20 l/min
Overlap	positive
Hydraulic fluids	Mineral oils DIN 51524
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in accordance
NAS w	ith 1638 with filter ß ₂₅ ≥75
Weight	see "Overall dimension"

C2

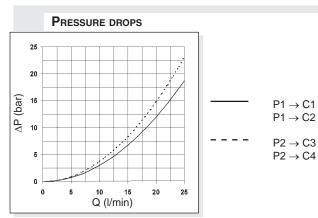
1C2 1C3

1C2





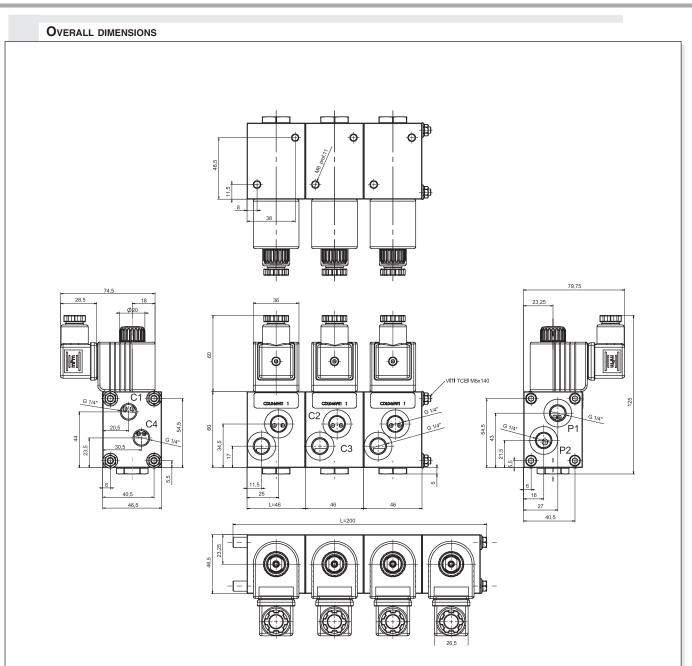
can be ordered separately, CAP. I • 20



LIMITS OF USE 300 250 200 (bar) Energizing 150 Ч 100 De-energizing 50 0 0 10 15 20 Q (I/min)

The tests have been carried out with solenoids at operating temperature and a voltage 10% less than rated voltage with a fluid temperature of 50 C°. The fluid used was a mineral oil with a viscosity of 46 mm²/s at 40 degrees C.





Tighten the screws to a torque of 5 Nm (0.5 Kgm) Fixing screws with material specifications min. 8.8

1

No. of elements	No. of way	L (Length)	Weight (Kg)	Fixing screws	Kit spare part code* (rods and studs)
1	06	46	1.05	—	—
2	08	100	2.20	TCEI M5x95	V89.54.0020
3	10	145	3.30	TCEI M5x140	V89.54.0021
4	12	200	4.45	TCEI M5x194 (special rods)	V89.54.0022

(*) For multiple composition rods and studs are available.

Support plane specifications



0.03



CDL066	
"40W" DC COILS	Cap. I • 74
CONNECTORS STANDARD	Cap. I • 20

ORDERING CODE

The stackable circuit selector valves, type CDL.06.6, allows one single drive of 6 users with 5 elements connected

in series. As they are moved from high performances solenoids they don't need the

SELECTOR VALVES

CDL066... STACKABLE CIRCUIT

external drainage. This valves can manage high hydraulic powers with a minimal pressure drop.

12\/

24V

are readable on the coils.

Without DC coil

L

Μ

w

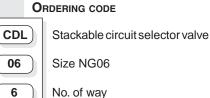
TAB.1 - 40W COIL

DC VOLTAGE

Voltage codes are not stamped on the plate, their

Max. pressure	250 bar
Max. flow	50 l/min
Overlap	negative
Hydraulic fluids	Mineral oils DIN 51524
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in accordance
NAS wit	h 1638 with filter ℬ₂₅≥75
Weight	see "Overall dimension"

:



W

I

*

**

1

No. of way (single element)

Threaded connectors 3/8" BSP

Internal drainage

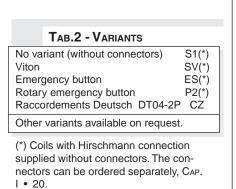
No. of elements: 1/2/3/4/5

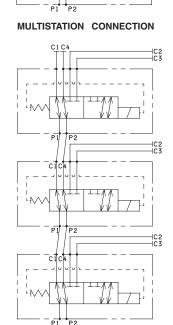
Voltage (Tab. 1)

Variants (Tab. 2)

Serial No.

PRESSURE DROPS



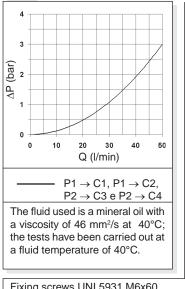


HYDRAULIC SYMBOLS

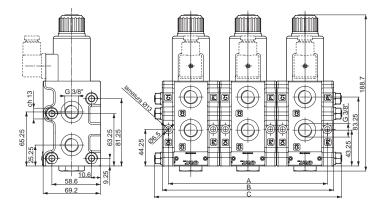
SINGLE ELEMENT

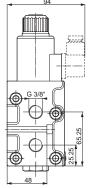
2 C 3

OVERALL DIMENSIONS



Fixing screws UNI 5931 M6x60 with material specifications min. 8.8 Tightening torque for studs 8 Nm / 0.8 Kgm Tightening torque for rods 20 Nm / 2 Kgm





(*) For multiple composition rods and studs are available.



Motion Systems



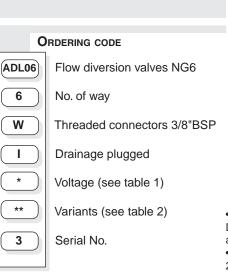
ADL066	
"D15" DC Coils	Cap. I • 73
STANDARD CONNECTORS	Cap. I • 20

ADL066... FLOW DIVERSION VALVES

The 6 way flow diversion valves are special solenoid valves which allow the simultaneous connection of two systems.

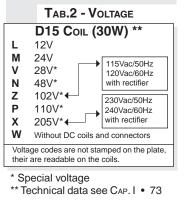
In order to obtain valve's working at pressure of 250 bar up to 320 bar (exeternal drainge) the G 1/8" BSP plug must be removed to Y connector.

Max. pressure (without drainage, Y pluge	d) 250 bar
Max. pressure (external drainage)	320 bar
Max. flow	40 l/min
Overlap	negative
Fluid viscosity 10	÷ 500 mm²/s
Fluid temperature -	25°C ÷ 75°C
Ambient temperature -	25°C ÷ 60°C
Max. contamination level class 10 in	accordance
with NAS 1638 with	filter ß₂₅≥75
Weight	2,4 Kg

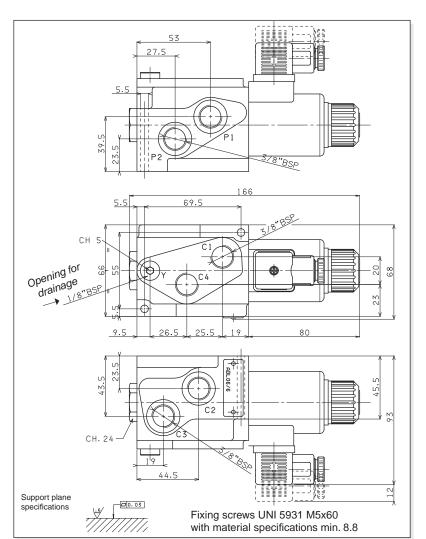


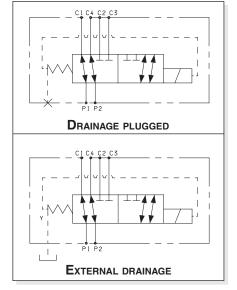
L

*



• AMP Junior (with or without diode) and Deutsch and with flying leads coils, are available in 12V or 24V DC voltage only. • Plastic type coils are available in 12V, 24V, 28V or 110V DC voltage only.

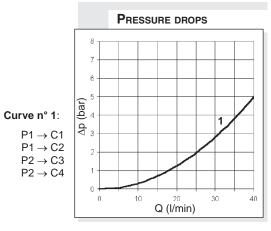




TAB.2 - VARIANTS

No variant (without connectors)	S1(*)
Viton	SV(*)
Emergency button	ES(*)
Rotary emergency button	P2(*)
AMP Junior coil	AJ(*)
AMP Junior coil and integrated diode	AD(*)
Coil with flyning leads (175mm)	SL
Deutsch DT04-2P Coil type	CZ
Plastic type coil D15	RS(*)
Other variants available on request.	

(*) Coils with Hirschmann and AMP Junior connection supplied without connectors. The connectors can be ordered separately, CAP. I • 20.

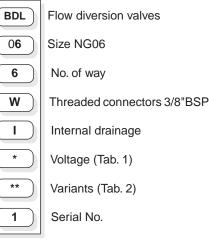


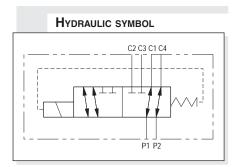


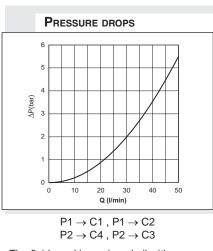


BDL066	
"40W" DC COILS	Cap. I • 74
STANDARD CONNECTORS	Cap. I • 20

ORDERING CODE







The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C; the tests have been carried out at a fluid temperature of 40° C.

BDL066... FLOW DIVERSION VALVES

The 6 way flow diversion valves, type BDL.06.6, are special solenoid valves which allow the simultaneous connection of two systems. With all user ports on the same side, these valves allow to simplify the layout of hydraulic plant. As they are moved from high performances solenoids they don't need the external drainage. This valves can manage high hydraulic

This valves can manage high hydraulic powers with a low pressure drop.

Max. pressure	250 bar
Max. flow	50 l/min
Overlap	negative
Hydraulic fluids	Mineral oils DIN 51524
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in accordance
with N	AS 1638 with filter ß₂₅≥75
Weight	3 Kg

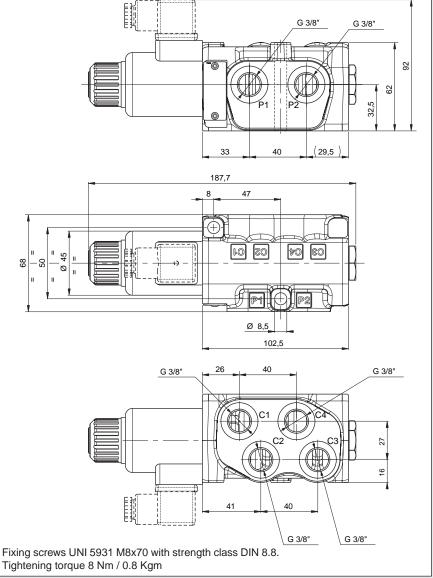
TAB.1 - 40W COIL DC VOLTAGE L 12V M 24V N 48V* W Without DC coils Voltage codes are not stamped on the plate, their are readable on the coils. * Special voltage

TAB.2 - VARIANTS

No variant (without connectors)	S1(*)
Viton	SV(*)
Emergency button	ES(*)
Rotary emergency button	P2(*)
Deutsch DT04-2P Coil type	CZ
Other variants available on request.	

(*) Coils with Hirschmann connection supplied without connectors. The connectors can be ordered separately, CAP. I \cdot 20.

OVERALL DIMENSIONS







CDL106	
"A16" DC COILS	Cap. I • 74
CONNECTORS STANDARD	Cap. I • 20

CDL106... STACKABLE CIRCUIT

SELECTOR VALVES

The stackable circuit selector valves. type CDL.10.6, allows one single drive of 6 users with 5 elements connected in series.

As they are moved from high performances solenoids they don't need the external drainage.

This valves can manage high hydraulic powers with a minimal pressure drop.

Max. pressure	250 bar	
Max. flow	80 l/min	
Overlap	negative	
Hydraulic fluids	Mineral oils DIN 51524	
Fluid viscosity	10 ÷ 500 mm²/s	
Fluid temperature	-25°C ÷ 75°C	
Ambient temperature	-25°C ÷ 60°C	
Max. contamination level	class 10 in accordance	
NAS with 1638 with filter B25375		
Weight	see "Overall dimension"	

TAB.1 - A16 COIL HYDRAULIC SYMBOLS DC VOLTAGE ** SINGLE ELEMENT 12\/ 1 115Vac/50Hz Μ 24V 120Vac/60Hz Ν 48V* with rectifier **ORDERING CODE** 110V* Ρ 230Vac/50Hz Ζ 102V* 240Vac/60Hz Х CDL Stackable circuit selector valve 205V* with rectifier w Without DC coil 10 Size NG10 Voltage codes are not stamped on the plate, their MULTISTATION CONNECTION are readable on the coils. * Special voltage 6 No. of way +C2 ** Technical data see CAP. I • 74 (single element) W =Threaded connectors1/2" BSP * U=Threaded connectors SAE107/8"-14 UNF TAB.2 - VARIANTS No variant (without connectors) S1(*) Internal drainage L Viton SV(*) -1C2 Emergency button ES(*) No. of elements: 1/2/3/4/5 Rotary emergency button P2(*) Other variants available on request. * Voltage (Tab. 1) (*) Coils with Hirschmann connection ** supplied without connectors. The con-Variants (Tab. 2) nectors can be ordered separately, CAP. IC2 I • 20.



PRESSURE DROPS

1

4

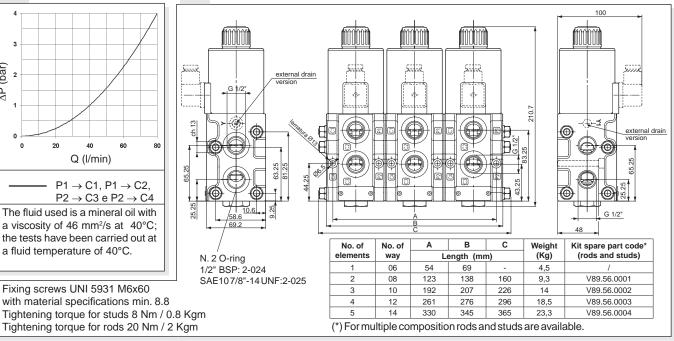
3

2

(bar)

₽









ADL106	
"A16" DC Coils	Cap. I • 74
STANDARD CONNECTORS	Cap. I • 20

ADL106... FLOW DIVERSION VALVES

The 6 way flow diversion valves are special solenoid valves which allow the simultaneous connection of two systems.

In order to obtain valve's working at pressure of 250 bar up to 320 bar (external drainage) the G 1/8" BSP plug must be removed to Y connector.

DC VOLTAGE **

Γ

12V

24V

48V*

110V*

102V*

205V*

* Special voltage

Without DC coil

н

Μ

Ν

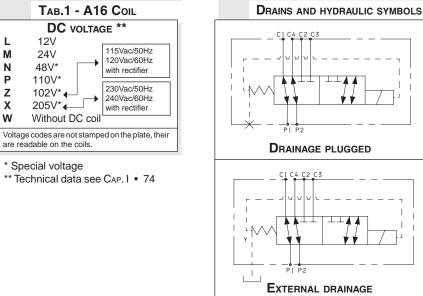
Ρ

Ζ

Х

w

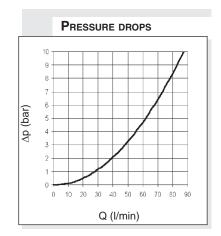
Max. pressure (without drainage, Y plugged) 250 bar		
Max. pressure (external dra	inage) 320 bar	
Max. flow	80 l/min	
Fluid viscosity	10 ÷ 500 mm²/s	
Fluid temperature	-25°C ÷ 75°C	
Ambient temperature	-25°C ÷ 60°C	
Max. contamination level	class 10 in accordance	
with NA	S 1638 with filter ß₂₅≥75	
Weight	3,õ Kg	



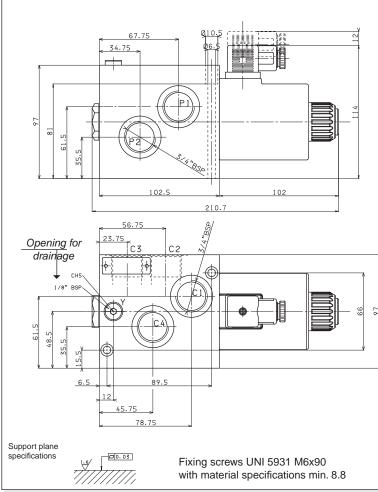
TAB.2 - VARIANTS

No variant (without connectors)	S1(*)
Viton	SV(*)
Emergency button	ES(*)
Rotary emergency button	P2(*)
Other variants available on request.	()

(*) Coils with Hirschmann and AMP Junior connection supplied without connectors. The connectors can be ordered separately, CAP. I • 20.







ADL10 Flow diversion valves NG10 6 No. of way Connectors 3/4"BSP J Т Drainage plugged *

**

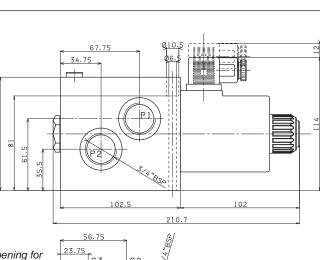
1

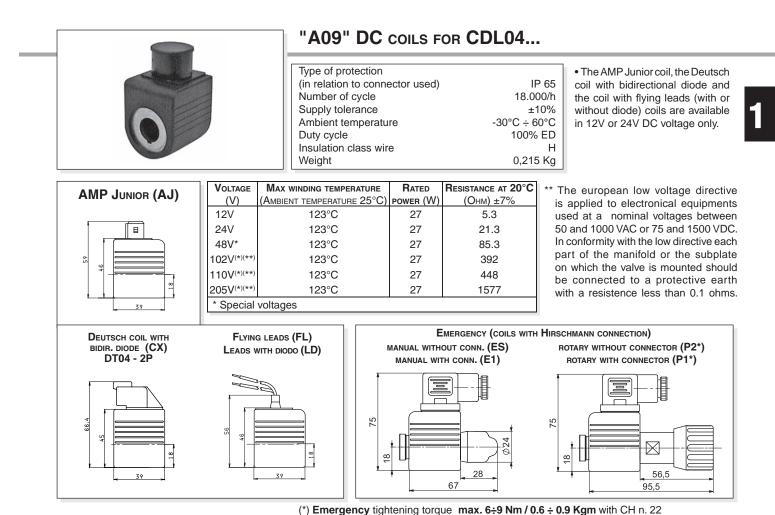
Voltage (see table 1)

Variants (see table 2)

Serial No.

ORDERING CODE





Type of protection

Number of cycles

Supply tolerance

Duty cycle

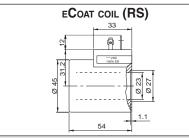
Weight

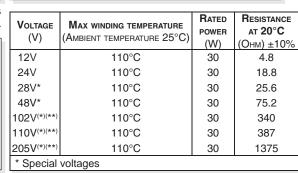
Ambient temperature

Insulation class wire

(in relation to the connector used)

•Emergency, plastic coil, and Amp Junior, leads or deutch coils, are not available for A66 valve.





"D15" DC COILS FOR ADL06... AND A66...

IP 66

±10%

Н

18.000/h

100% ED

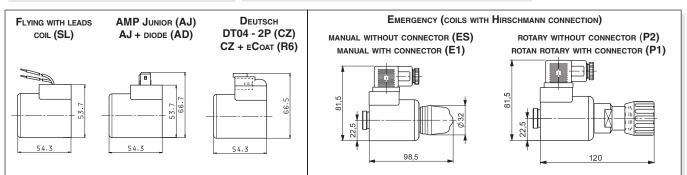
0,354 Kg

-25°C ÷ 60°C

• AMP Junior coils (with or without diode) and coils with flying leads and coils type Deutsch, are available in 12V or 24V DC voltage only.

• The pastic type coil (BR variant) is available in 12V, 24V, 28V or 110V DC voltage only.

* The european low voltage directive is applied to electronical equipments used at a nominal voltages between 50 and 1000 VAC or 75 and 1500 VDC. In conformity with the low directive each part of the manifold or the subplate on which the valve is mounted should be connected to a protective earth with a resistence less than 0.1 ohms.



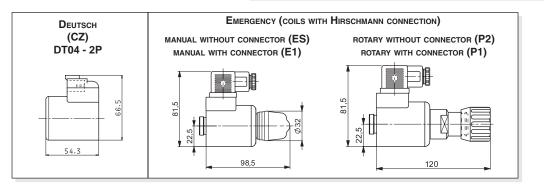




"40W" DC COILS FOR CDL06...

Type of protection	
(in relation to the connector used)	IP 66
Number of cycles	18.000/h
Supply tolerance	+10% / -10%
Ambient temperature	-54°C ÷ 60°C
Duty cycle	100% ED
Insulation class wire	н
Weight	0,354 Kg

Voltage	Max. winding temperature	Rated power	Resistance at 20°С
(V)	(Ambient temperature 25°C)	(W)	(Онм) ±10%
12V	135°C	40	3.6
24V	135°C	40	14.4
			IT40W - 01/2004/i





"A16" DC COILS FOR ADL10 AND CDL10

Type of protection (in relation to the connector used) Number of cycles Supply tolerance Ambient temperature Duty cycle Insulation class wire Weight

> ** The european low voltage directive is applied to electronical equipments used at a nominal voltages between 50 and 1000 VAC or 75 and 1500 VDC. In conformity with the low directive each part of the manifold or the subplate on which the valve is mounted should be connected to a protective earth with a resistence less than 0.1 ohms.

IP 65

±10% -30°C ÷ 60°C

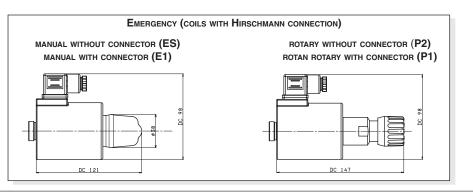
0,9 Kg

Н

18.000/h

100% ED

Voltage	Max winding temperature	RATED POWER	RESISTANCE AT 20°C
(V)	(Ambient temperature 25°C)	(W)	(Онм) ±7%
12V	106°C	45	3.2
24V	113°C	45	12.4
48V*	-	45	-
102V ^{(*)(**)}	-	45	-
110V ^{(*)(**)}	118°C	45	268
205V ^{(*)(**)}	-	45	-





SUBPLATE MOUNTING PRESSURE CONTROL VALVES



2

PV*3 / PV*U3	Cap. II • 2
PV*5 / PV*U5	Cap. II • 4

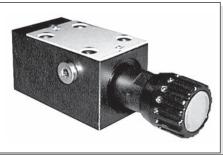
SUBPLATE MOUNTING PRESSURE CONTROL VALVES



DANA	BREVINI®
	Motion Systems

ABBREVIATIONS

AP	HIGH PRESSURE CONNECTION
AS	Phase lag (degrees)
BP	Low pressure connection
С	Stroke (MM)
СН	ACROSS FLATS
Сн	INTERNAL ACROSS FLATS
DA	Amplitude decay (dB)
Dp	DIFFERENTIAL PRESSURE (BAR)
F	Force (N)
1%	INPUT CURRENT (A)
Μ	MANOMETER CONNECTION
NG	KNOB TURNS
OR	SEAL RING
Ρ	LOAD PRESSURE (BAR)
PARBAK	PARBAK RING
PL	PARALLEL CONNECTION
Pr	Reduced pressure (bar)
Q	FLOW (L/MIN)
QP	PUMP FLOW (L/MIN)
SE	ELASTIC PIN
SF	BALL
SR	SERIES CONNECTION
Χ	PILOTING
Υ	Drainage



PVR3 / PVS3...

ORDERING CODE

Check valve (omit if not required)

CETOP 3/NG6

Setting ranges

00 = No variant

V1 = Viton

Serial No.

 $1 = \max. 60$ bar (white spring) $2 = \max. 120$ bar (yellow spring) $3 = \max. 250$ bar (green spring)

Type of adjustment: **M** = Plastic knob **C** = Grub screw

R = Reducing valve **S** = Sequencing valve

PV*

U

3

*

*

**

1

PV*3 / PV*U3 PRESSURE REDUCING AND SEQUENCING VALVES CETOP 3/NG6

These subplate mounting piloted type pressure reducing and sequencing valves ensure a minimum variation in their calibrated pressure value with changing flow rate.

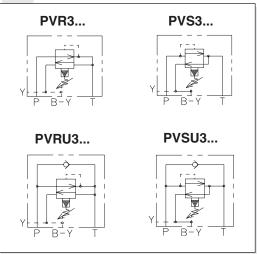
They are normally supplied with internal piloting and internal drainage on B, but they are already provided with a hole on the front cover to allow for external drainage.

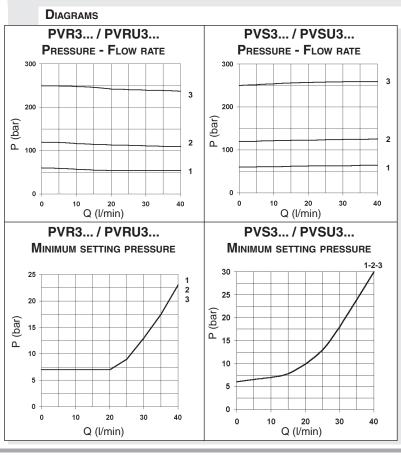
They are available with two different types of adjustment and three calibrated ranges that cover pressure $7 \div 250$ bar, with and without check valve.

The adjustment is carried out by means of a grub screw or a metric plastic knob.

Max. pressure		320 bar	
Setting ranges	Spring 1	max. 60 bar	
	Spring 2	max. 120 bar	
	Spring 3	max. 250 bar	
Maximum allowed ∆p pre	ssure betwo	een	
the inlet and outlet press	ure (PVR or	nly) 150 bar	
Max. flow		40 l/min	
Draining on port T		0.5 ÷ 0.7 l/min	
Hydraulic fluids	Mineral	oils DIN 51524	
Fluid viscosity	1	0 ÷ 500 mm²/s	
Fluid temperature		-25°C ÷ 75°C	
Ambient temperature		-25°C ÷ 60°C	
Max. contamination lever	class 10	in accordance	
with NAS 1638 with filter B ₂₅ ≥75			
Weight (without check va	lve)	1,5 Kg	
Weight (with check valve)	2 Kg	

HYDRAULIC SYMBOLS



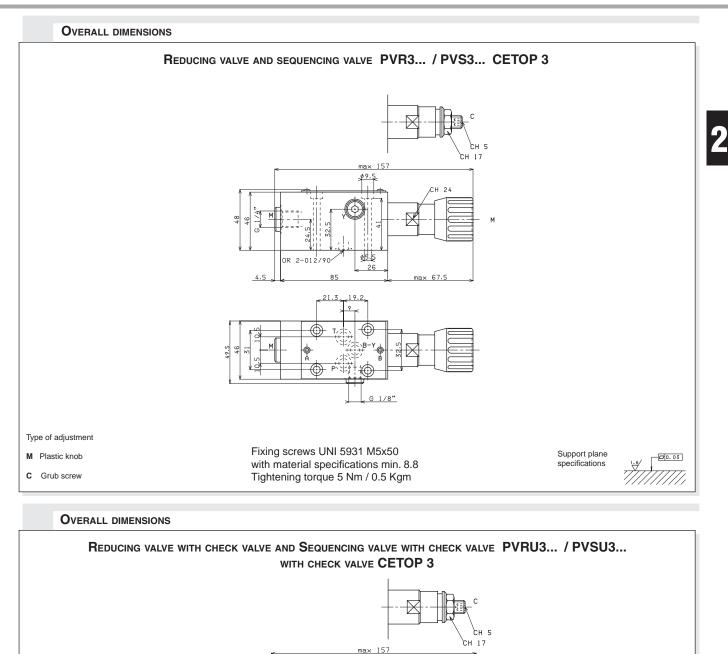


Curves $n^{\circ} 1 - 2 - 3 =$ setting ranges

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



2



\$9.5

\$5.5

 \bigcirc

B

G 1/8"

19.2

26

OR 2-012/90-

ģ

⊕ P`*††;€

Fixing screws UNI 5931 M5x50

with material specifications min. 8.8

Tightening torque 5 Nm / 0.5 Kgm

8

4.5

24

max 67.5

Type of adjustment

M Plastic knob

C Grub screw





0.03

Support plane specifications



PVR5 / PVS5...

PV*3 / PV*U3 PRESSURE REDUCING AND SEQUENCING VALVES CETOP 3/NG6

These subplate mounting piloted type pressure reducing and sequencing valves ensure a minimum variation in their calibrated pressure value with changing flow rate.

They are normally supplied with internal piloting and internal drainage on B, but they are already provided with a hole on the front cover to allow for external drainage.

They are available with two different types of adjustment and three calibrated ranges that cover pressure $7 \div 250$ bar, with and without check valve.

The adjustment is carried out by means of a grub screw or a metric plastic knob.

Max. pressure		320 bar	
Setting ranges	Spring 1	max. 60 bar	
	Spring 2	max. 120 bar	
	Spring 3	max. 250 bar	
Maximum allowed Δp pres	sure betwe	een	
the inlet and outlet pressure	re (PVR or	nly) 150 bar	
Max. flow		40 l/min	
Draining on port T		0.5 ÷ 0.7 l/min	
Hydraulic fluids	Mineral	oils DIN 51524	
Fluid viscosity	1	10 ÷ 500 mm ² /s	
Fluid temperature		-25°C ÷ 75°C	
Ambient temperature		-25°C ÷ 60°C	
Max. contamination lever	class 10) in accordance	
with NAS 1638 with filter ß₂₅≥75			
Weight (without check value	/e)	1,5 Kg	
Weight (with check valve)		2 Kg	

ORDERING CODE



R = Reducing valve **S** = Sequencing valve

Check valve (omit if not required)

CETOP 3/NG6

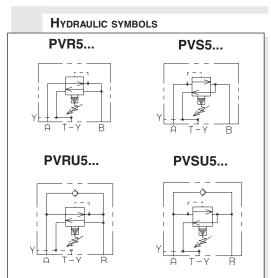
Type of adjustment: **M** = Plastic knob **C** = Grub screw

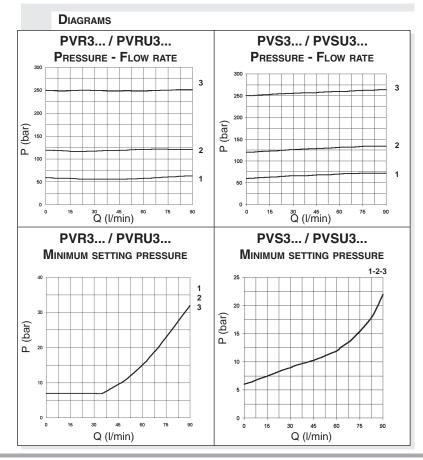
Setting ranges

1 = max. 60 bar (white spring) 2 = max. 120 bar (yellow spring) 3 = max. 250 bar (green spring)

00 = No variant **V1** = Viton

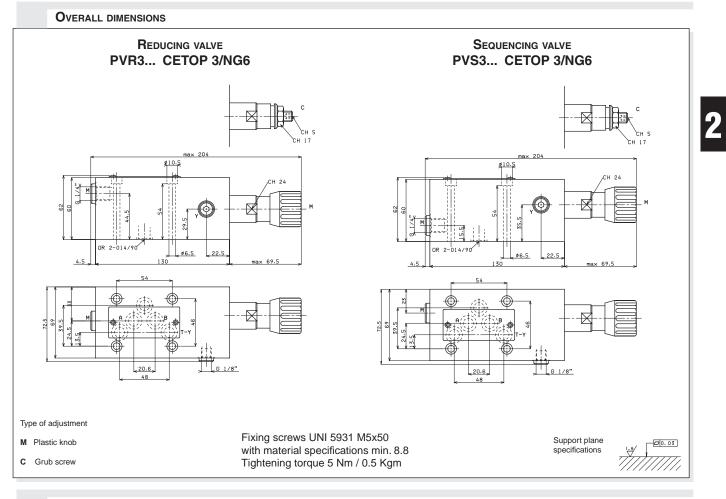
Serial No.



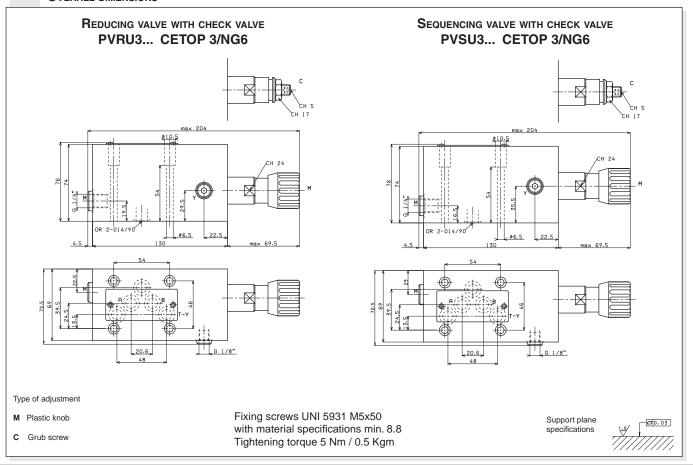


The fluid used is a mineral oil with viscosity of 46 mm²/s at 40°C. The tests were carried out at a fluid temperature of 50° C.





OVERALL DIMENSIONS



II • 5





V*P / V*L			
V*P	Cap. II • 7		
V*PE	Cap. II • 8		
V*L	Cap. II • 9 - Cap. II • 10		
BSVMP	Cap. II • 11		
KEC16/25	Cap. II • 9		
C*P16/25	Cap. II • 9		
CETOP 3/NG06	Cap. II • 8		
STANDARD SPOOLS FC	R AD3E CAP. II • 10		
AD3E	Cap. II • 11		
AM3VM	Cap. II • 9		

V*P PRESSURE CONTROL VALVES PLATE V*L PRESSURE CONTROL VALVES IN LINE

These pressure control valves are available in the basic VMP* maximum pressure, VSP* sequence and VUP* exclusion versions, with a single pressure value and three calibration ranges that cover the band 15÷400 bar. It is possible to use auxiliary pilot valves, which can be the simple standard AD3E solenoid valve, by the mere exchange of covers.

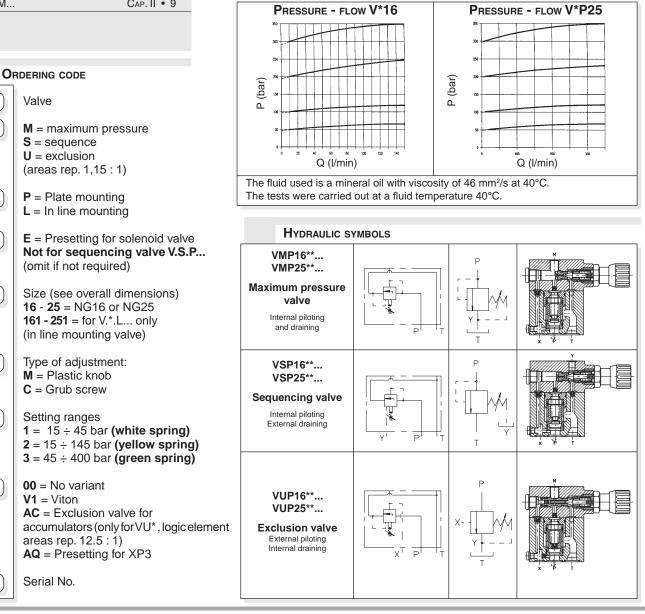
These valves have been fitted with an important safety feature for the operation of the system where they are used; a mechanical end of stroke stop prevents the operator from setting pressure values higher than those specified in the catalogue (it is impossible to compress the spring completely). In the standard configuration these valves are supplied with a 1.6 bar main spring and with calibrated ø1 mm pilot feed orifice (Variant part No. 00).

Pressure max.		400 bar
Setting ranges	Spring 1	15 ÷ 45 bar
	Spring 2	15 ÷ 145 bar
	Spring 3	45 ÷ 400 bar
Max. flow V*P16		150 l/min
Max. flow V*P25		350 l/min
Hydraulic fluids	Minera	al oils DIN 51524
Fluid viscosity		10 ÷ 500 mm²/s
Fluid temperature		-25°C ÷ 75°C
Ambient temperature	e	-25°C ÷ 60°C
Max. contamination I	evel class	10 in accordance
V	vith NAS 1638	with filter ß ₂₅ ≥75
Drainage V*P16		1 ÷ 2 Ī/min
Drainage V*P25		1 ÷ 2.5 l/min
Dynamic pressure at	drainage	Max. 2 bar
Weight V*P16 (without pilot valve) 3,3 Kg		
Weight V*P25 (without pilot valve) 7,4 Kg		
Weight V*L16 (without pilot valve) 4,6 Kg		
Weight V*L161 (without pilot valve) 4,5 Kg		
Weight V*L251 (without pilot valve) 7,7 Kg		
Weight V*L25 (with	out pilot valve) 8,3 Kg

Subplate mounting valves are suitable for covers which do not conform to DIN standards type C*P16/25.. whilst in line mounting valves are suitable for DIN standards covers type KEC16/25...

BREVINI

Motion Systems



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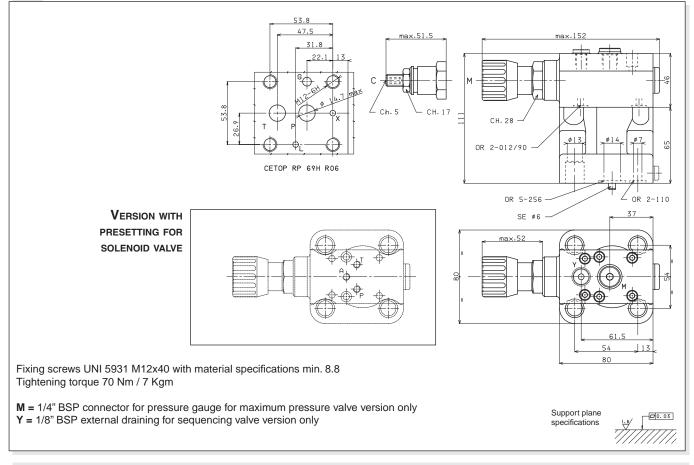
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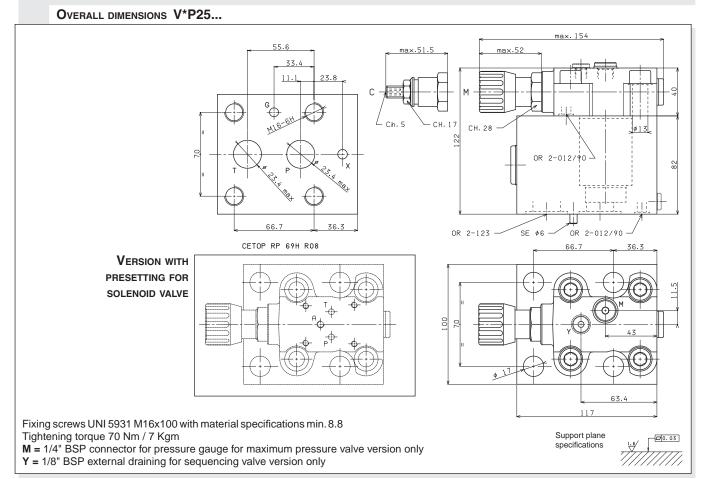
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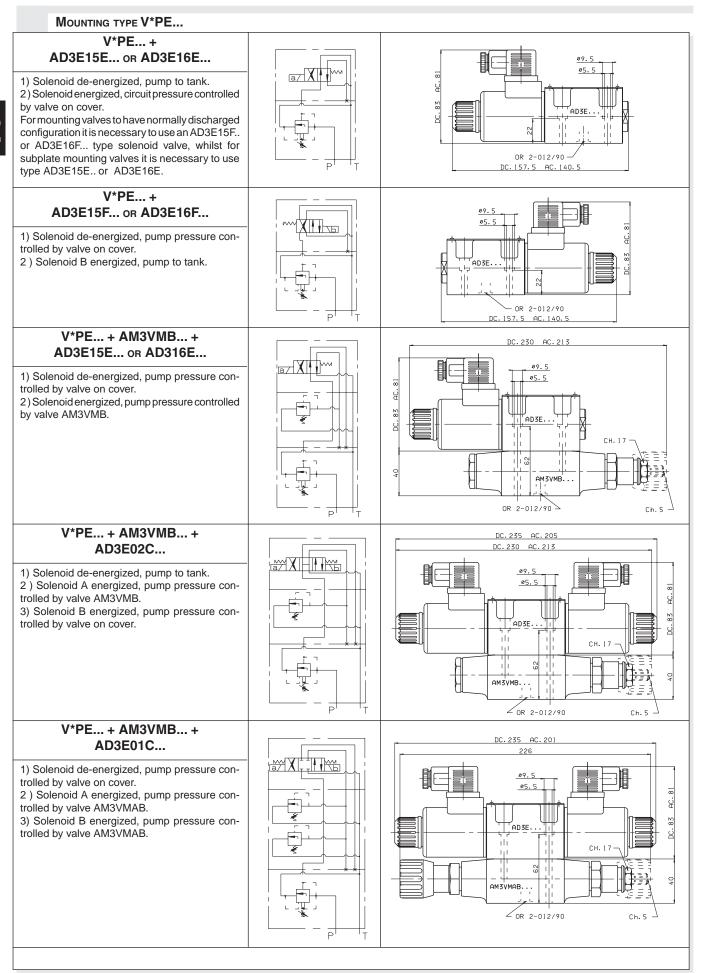




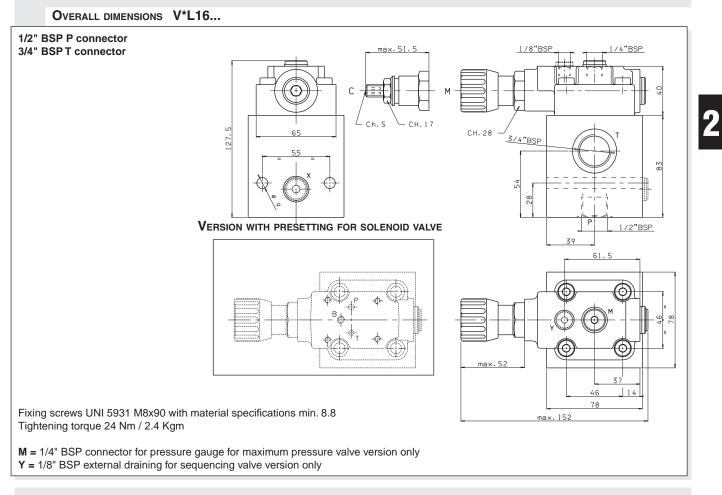




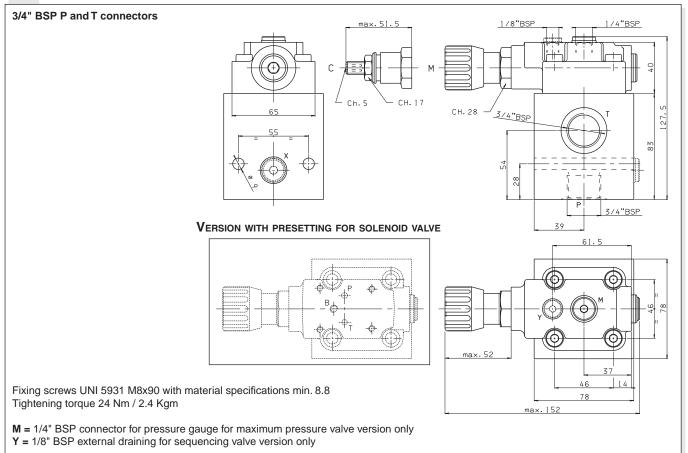








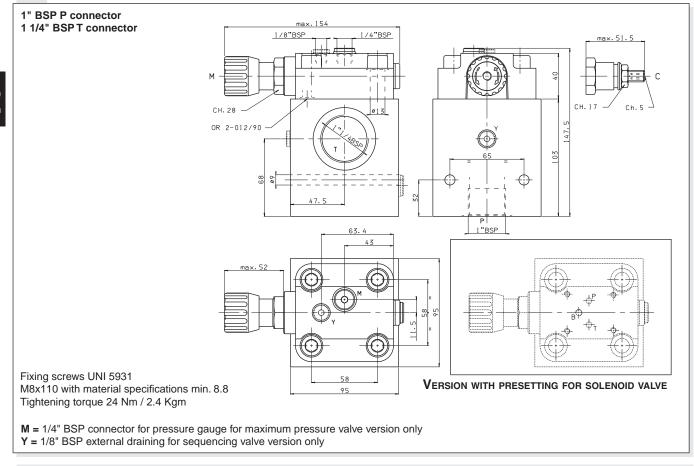
OVERALL DIMENSIONS V*L161...



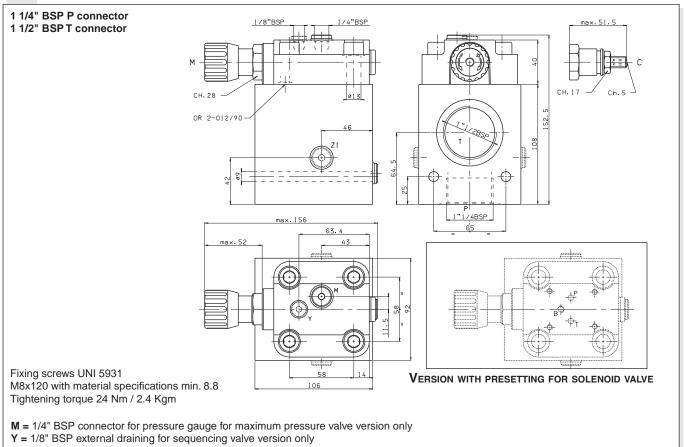
|| • 9



OVERALL DIMENSIONS V*L25...



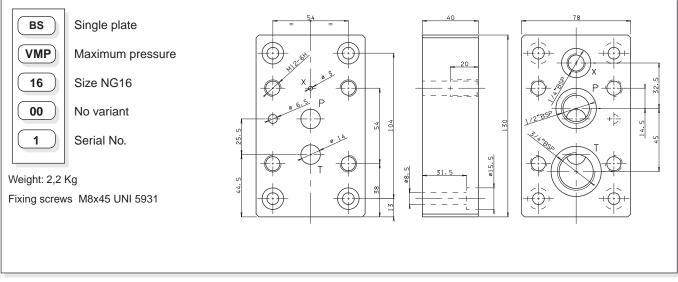
OVERALL DIMENSIONS V*L251...



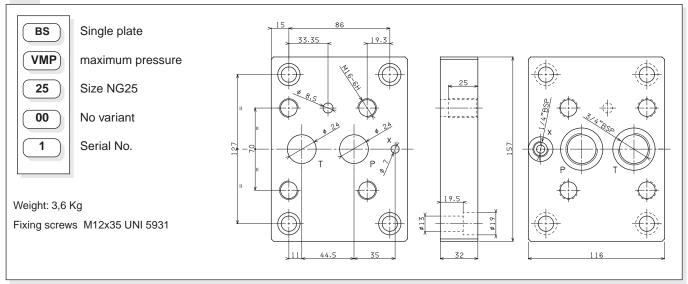
II • 10



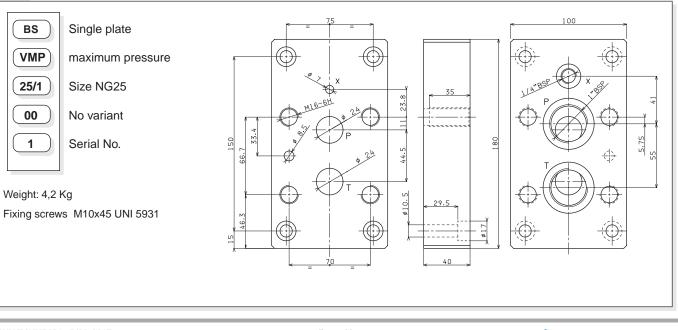
BSVMP16... CONNECTORS: P = 1/2" BSP - T = 3/4" BSP - X = 1/4" BSP



BSVMP25... CONNECTORS: P AND T = 3/4" BSP - X = 1/4" BSP









2



FLOW CONTROL

COMPENSATED FLOW REGULATORS



ABBREVIATIONS

AP	HIGH PRESSURE CONNECTION
AS	Phase lag (degrees)
BP	LOW PRESSURE CONNECTION
С	Stroke (MM)
СН	ACROSS FLATS
Сн	INTERNAL ACROSS FLATS
DA	Amplitude decay (dB)
Dp	DIFFERENTIAL PRESSURE (BAR)
F	Force (N)
1%	INPUT CURRENT (A)
М	MANOMETER CONNECTION
NG	KNOB TURNS
OR	SEAL RING
Ρ	LOAD PRESSURE (BAR)
PARBA	
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	
Y	Drainage



AM3ABU...

Cap. III • 4





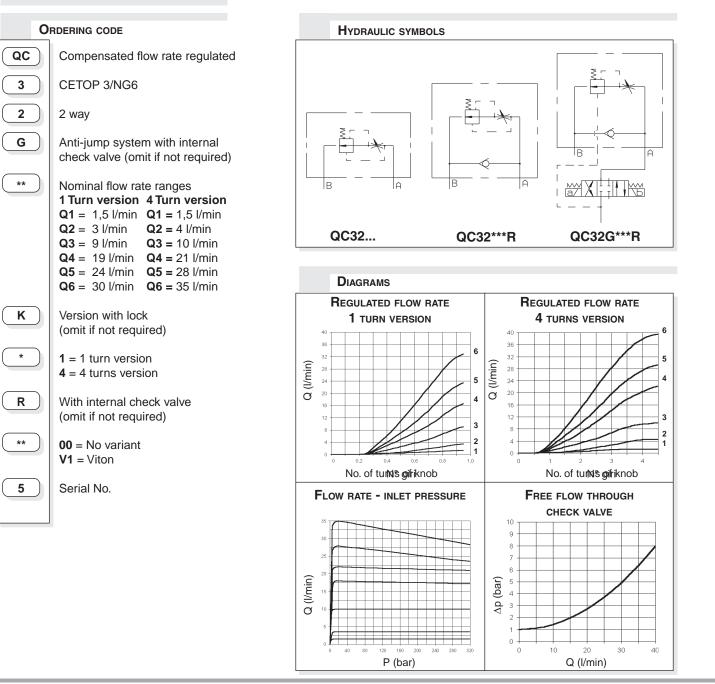
QC32... 2 WAY COMPENSATED

FLOW RATE REGULATORS

These QC32... compensated flow rate regulators are designed to control and maintain a constant irrespective of the pressure variations upstream and downstream of the regulation section. Their new cast construction has made it possible to obtain a wider flow rate range, taking the upper limit to 35 l/min (4 turns version) while maintaining unchanged the pressure differential required to obtain good pressure compensation.

All models are available with and without reverse flow check valve, complete with an "anti-jump" device on request. This accessory has been designed to eliminate the problem which manifests itself as a "anti-jump" in the controlled actuator due to the instantaneous flow rate variation that takes place under the form of a transient every time the flow is made to pass through the regulator.

Max. operating pressure	320 bar		
Opening pressure (with bypass)	1 bar		
Min. regulated flow rate (Q1 version) 0.03 ÷ 0.05 l/min		
Nominal regulated flow rate			
(1 turn version)	1,5 ÷ 30 l/min		
Nominal regulated flow rate			
(4 turns version)	1,5 ÷ 35 l/min		
Difference in pressure (Δp) for ver	rs.Q1 3 bar		
Difference in pressure (∆p) Q2-Q3			
Hydraulic fluids Mine	ral oils DIN 51524		
Fluid viscosity	10 ÷ 500 mm²/s		
Fluid temperature	-25°C ÷ 75°C		
Ambient temperature	-25°C ÷ 60°C		
Max. contamination level(*) class 10 in accordance			
with NAS 1638 with filter B ₂₅ ≥75			
Dependency on temperature (Q1	,		
Dependency on temperature (Q2	,		
Dependency on temperature (Q3-	,		
Weight	1,5 Kg		
(*) Max contamination level must b the right function of the valve	e respect to obtain		







CAP. III • 4 CAP. III • 4

QC33	3	WAY	COMPENSATED
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FLOW RATE REGULATORS

This regulator type can be used whenever it is necessary to obtain a constant fluid flow irrespective of the pressure variations present upstream or downstream. It is fitted with a third T line for discharging any excessive flow rate.

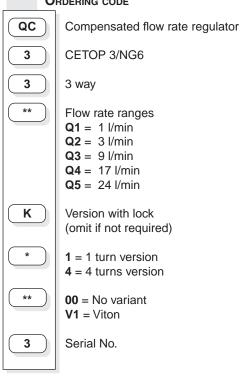
When the reverse flow check valve is needed, the check valve holder type "AM3ABU3..." can be fitted underneath the valve. (The check valve holder must be ordered separately see next page).

Max. operating pressure	320 bar
Opening pressure (with bypas	s) 1 bar
Min. regulated	
flow rate (Q1 version)	0.03 ÷ 0.05 l/min
Nominal regulated	
flow rate	1 ÷ 22 l/min
Difference in pressure (Δp) for	vers. Q1 3 bar
Difference in pressure (Ap) Q2	2-Q3-Q4-Q5-Q6 8 bar
Hydraulic fluids N	lineral oils DIN 51524
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level(*) cl	ass 10 in accordance
with NAS	1638 with filter ß ₂₅ ≥75
Dependency on temperature (Q1 vers.) 5%
Dependency on temperature (Q2 vers.) 3%
Dependency on temperature (Q3-Q4-Q5) 2%
Weight	1,5 Kg
(*) Max contamination level mu	st be respect to obtain
the right function of the valve	

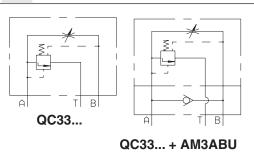


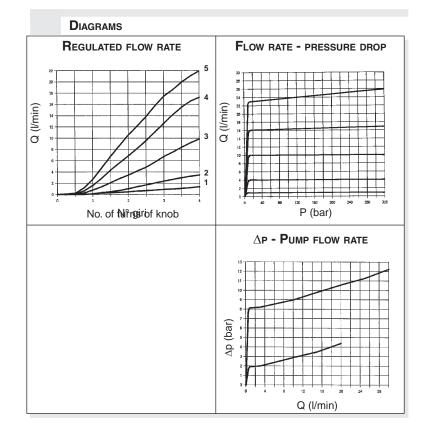
OVERALL DIMENSIONS

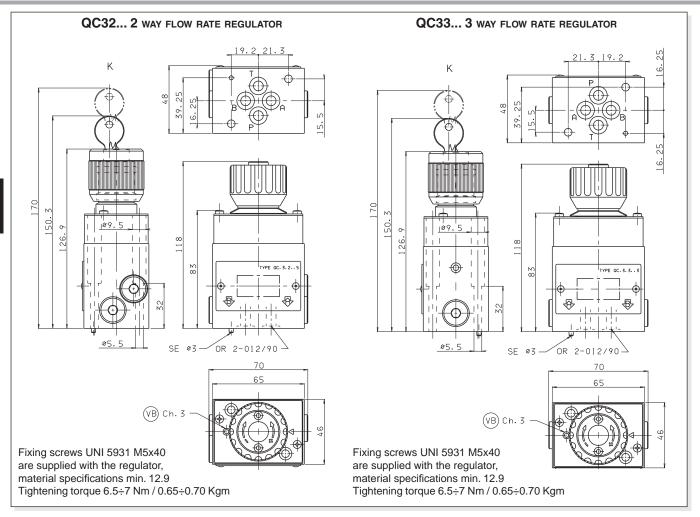
AM3ABU...



HYDRAULIC SYMBOLS

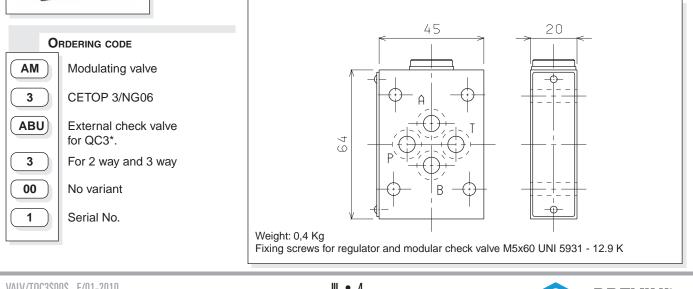




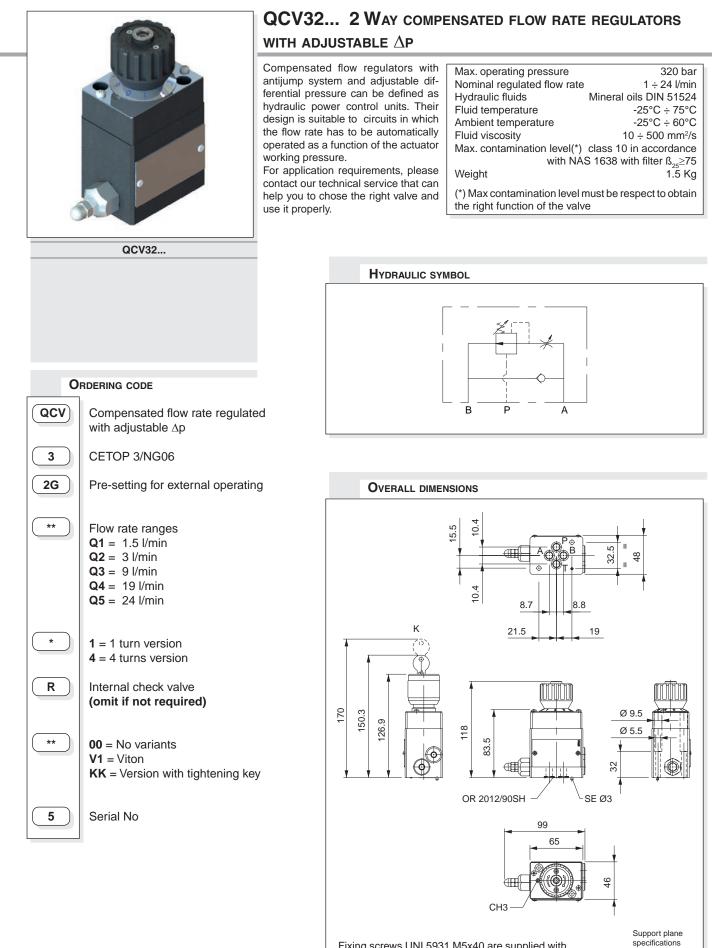


AM3ABU... CHECK VALVE HOLDER FOR REGULATORS TYPE QC3...

This check valve holder must be fitted underneath the QC valve when he reverse flow function is needed.







Fixing screws UNI 5931 M5x40 are supplied with the regulator, material specifications min. 12.9 Tightening torque 6.5÷7 Nm / 0.65÷0.70 Kgm



III • 5

3



MODULAR VALVES

MODULAR VALVES CETOP 5



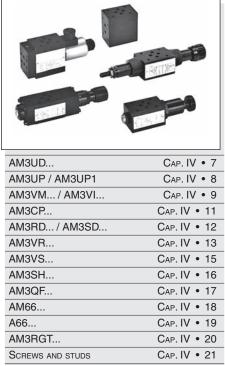
AM5UD	Cap. IV • 22
AM5UP	Cap. IV • 23
AM5VM / AM5VI	Cap. IV • 24
AM5CP	Cap. IV • 26
AM5VR	Cap. IV • 27
AM5VS	Cap. IV • 29
AM5SH	Cap. IV • 30
AM5QF	Cap. IV • 31
AM88	Cap. IV • 33
A88	Cap. IV • 34
AM5RGT	Cap. IV • 36
SCREWS AND STUDS	Cap. IV • 36

MODULAR VALVES CETOP 2



Cap. IV • 2
Cap. IV • 3
Cap. IV • 4
Cap. IV • 5
Cap. IV • 6

MODULAR VALVES CETOP 3



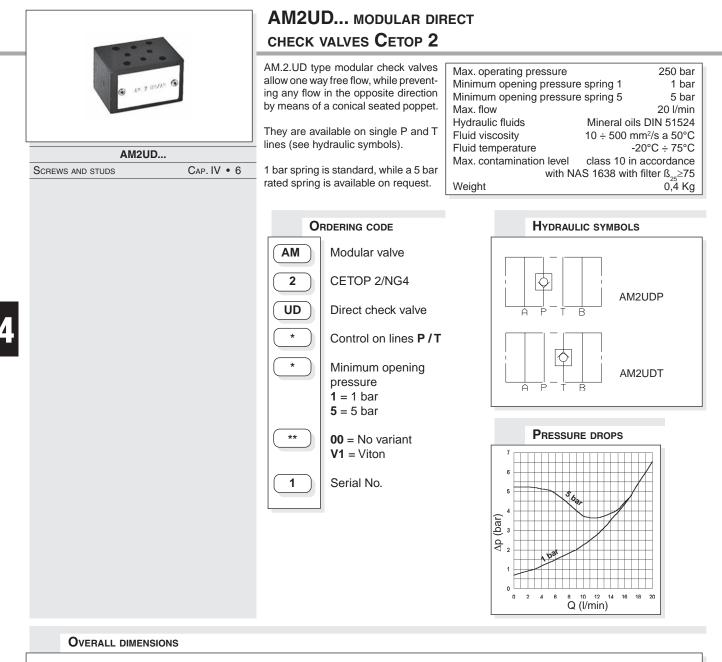
MODULAR VALVES CETOP 7

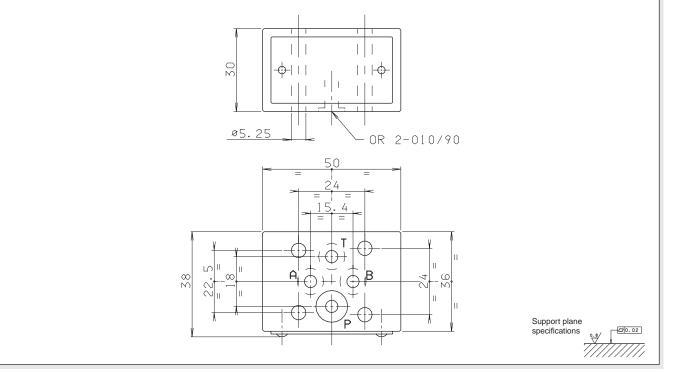




ABBREVIATIONS

AP	HIGH PRESSURE CONNECTION
AS	Phase lag (degrees)
BP	LOW PRESSURE CONNECTION
С	Stroke (MM)
СН	ACROSS FLATS
Сн	INTERNAL ACROSS FLATS
DA	Amplitude decay (dB)
Dp	DIFFERENTIAL PRESSURE (BAR)
F	Force (N)
1%	INPUT CURRENT (A)
М	MANOMETER CONNECTION
NG	KNOB TURNS
OR	SEAL RING
Ρ	LOAD PRESSURE (BAR)
PARBA	
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









AM2UP...

SCREWS AND STUDS

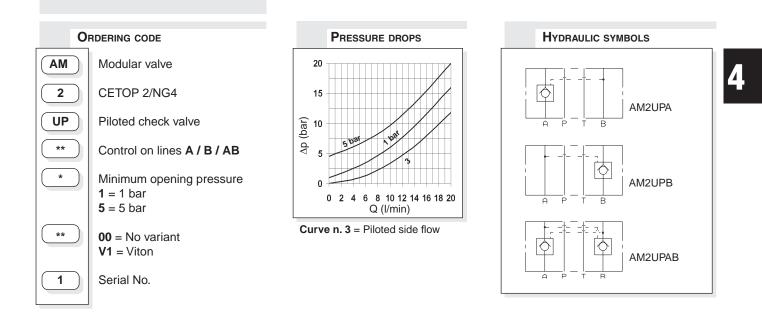
CAP. IV • 6

AM2UP MODULAR PILOT				
OPERATED CHECK VALVES CETOP 2	2			

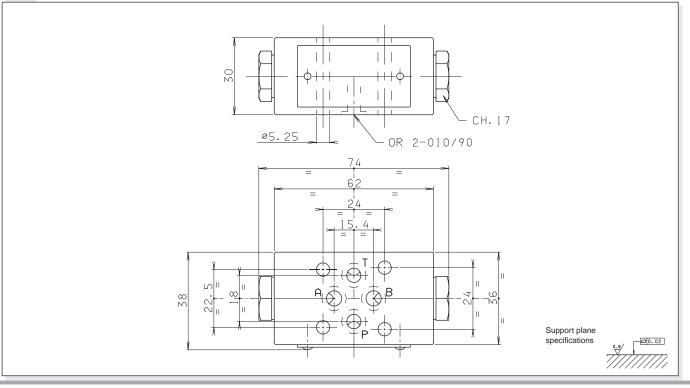
AM.2.UP type modular check valves allow one way free flow by raising a conical shutter, while in the opposite direction the fluid can return by means of a small piston piloted by the pressure in the other line.

They are available on single A or B lines, and on double A and B lines (see hydraulic symbols).

Max. operating pressure		250 bar
Minimum opening pressure spring 1		1 bar
Minimum opening pressure spring 5		5 bar
Piloting ratio:		1:4
Max. flow		20 l/min
Hydraulic fluids Mineral		ls DIN 51524
Fluid viscosity 10 ÷ 500		nm²/s a 50°C
Fluid temperature		-20°C ÷ 75°C
Max. contamination level	class 10 ii	n accordance
with NAS 1638 with filter B ₂₅ ≥75		
Weight		0,5 Kg











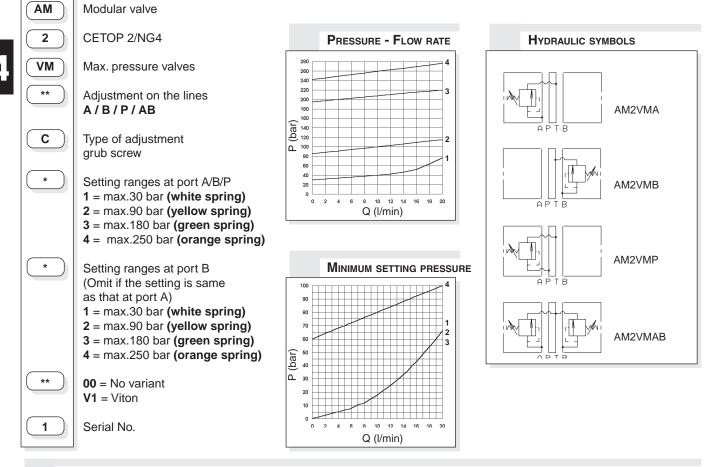
AM2VM					
CMP02 CARTRIDGE CATALOG					
SCREWS AND STUDS	Cap. IV • 6				

ORDERING CODE

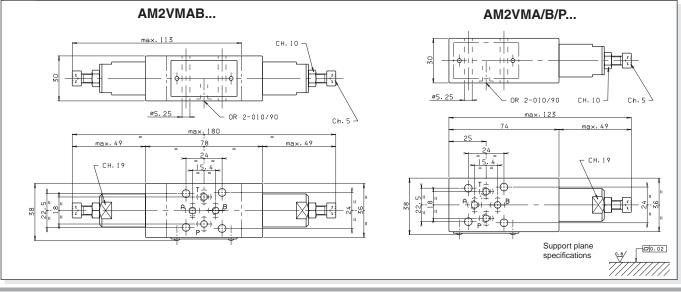
AM2VM... MODULAR MAXIMUM PRESSURE VALVES CETOP 2

AM.2.VM type pressure regulating valves are available with an operating pressure range of 4 to 250 bar. Adjustment is via a grub screw. Two base versions are available: **AM2VM.**. single on A or B, and double on A and B lines, with drainage on T; **AM2VMP.** single on P line, with drainage on T. 4 different types of springs can be mounted on all versions, with the adjustment range specified in the specifications. The cartridge used is the CMP02 type.

Max. operating pressure		250 bar		
Setting ranges:				
spri	ng 1	30 bar		
spring 2		90 bar		
spring 3		180 bar		
spri	spring 4			
Max. flow		20 l/min		
Hydraulic fluids	Mineral oils DIN 51524			
Fluid viscosity	10 ÷ 500 mm²/s a 50°C			
Fluid temperature	-20°C ÷ 75°C			
Max. contamination level	class 10 in accordance			
with NAS 1638 with filter B ₂₅ ≥75				
Weight AM2VMA/B/P		0,53 Kg		
Weight AM2VMAB		0,7 Kg		

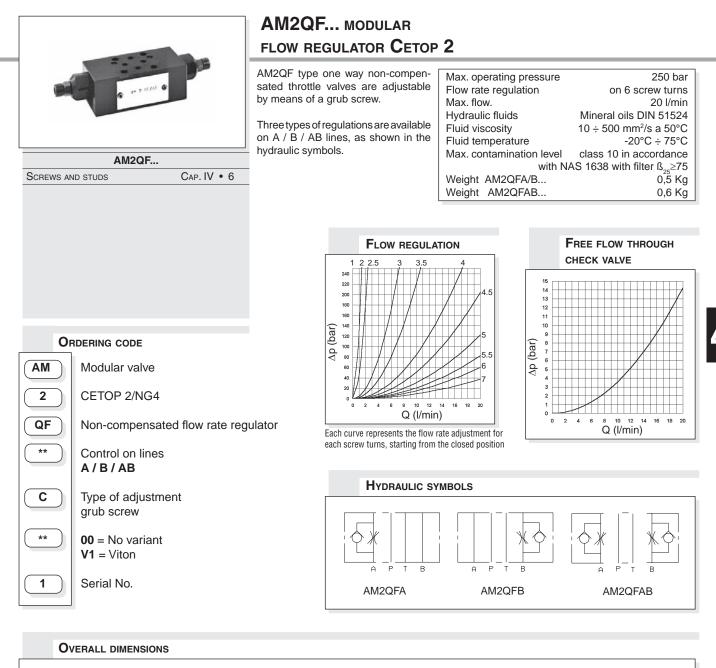


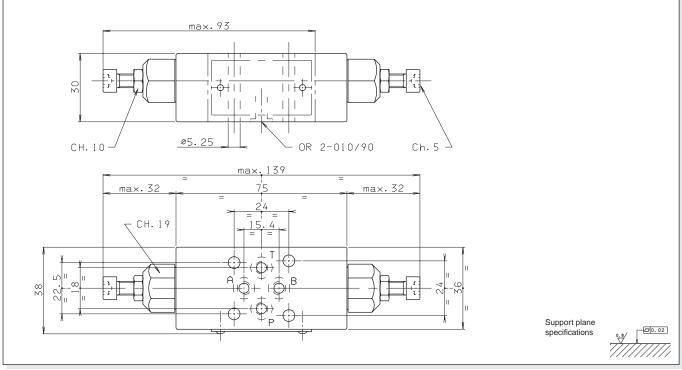
OVERALL DIMENSIONS



IV • 4

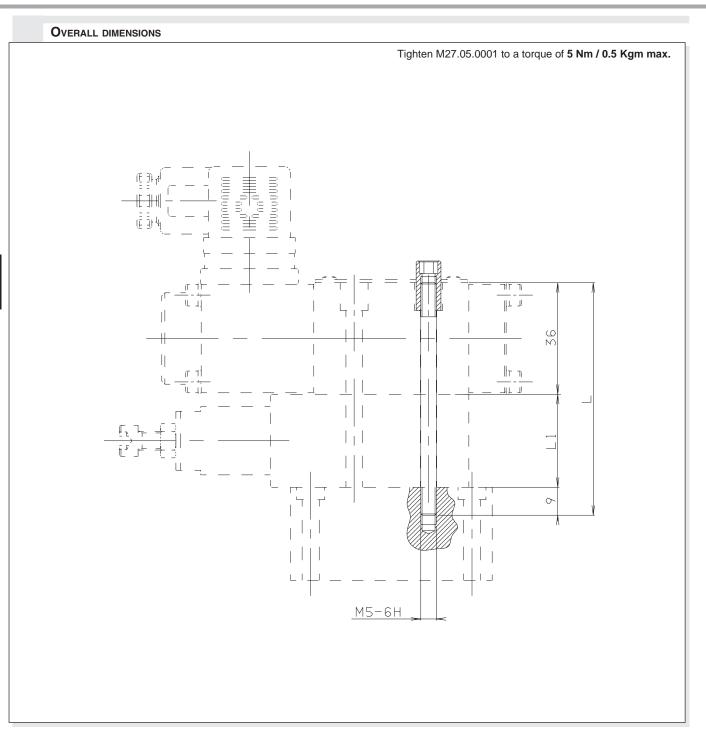










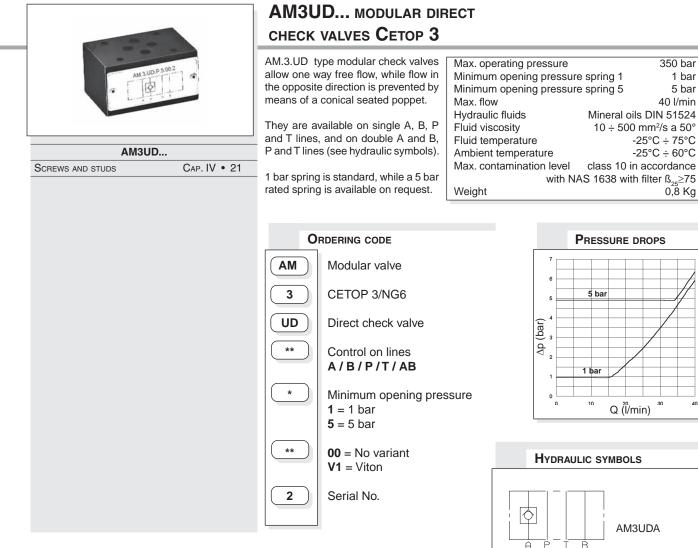


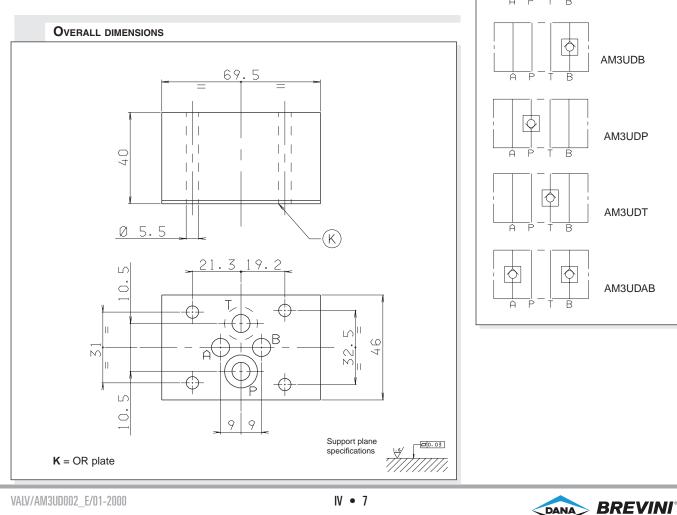
SCREWS T.C.E.I CODE	L mm	L1 * mm	COMPOSITION	Q.TY	SPECIAL NUTS CODE
Q26074069	35	—	AD2	4	
Q26074243	65	30	AD2 + 1 AM2 (ISO)	4	—
Q26074252	95	60	AD2 + 2 AM2 (ISO)	4	
M80100008	135	90	AD2 + 3 AM2	4	V89240000
M80100020	165	120	AD2 + 4 AM2	4	(No. 20 nuts kit)

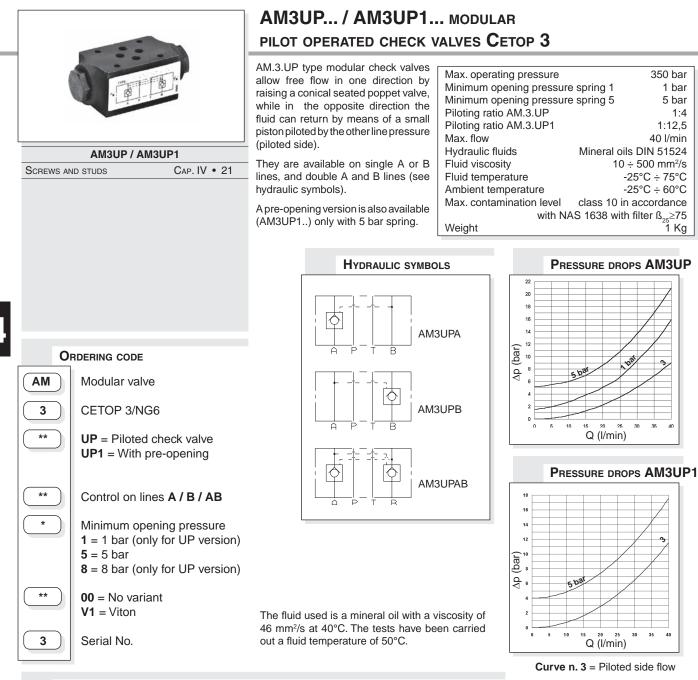
* Indicative overall dimensions valves composition



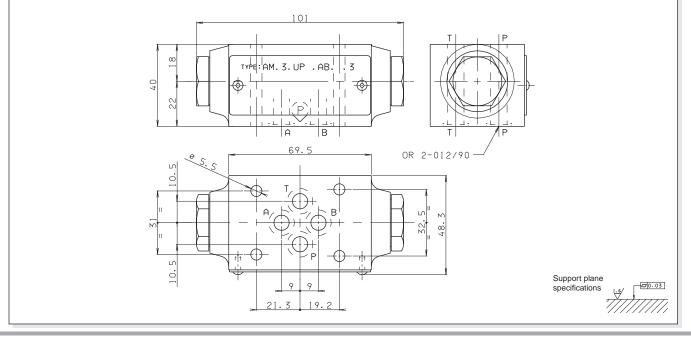








OVERALL DIMENSIONS







AM3VM.	
CMP10	Cap. VII • 30
SCREWS AND STUDS	Cap. IV • 21

AM3VM... / AM3VI... modular max pressure valves Cetop 3

AM.3.VM type pressure regulating valves are available with a pressure range of 2 \div 320 bar.

Adjustment is by means of a grub screw or a plastic knob.

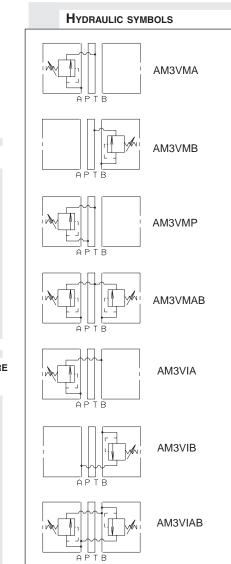
Three basic versions are available: - AM3VM on single A or B lines, and on A and B lines, with drainage to T; - AM3VMP on single P line, with drainage to T;

- AM3VI on single A or B lines, and on A and B lines, with crossed drainage on A or B (see hydraulic symbols). All versions can accept three types of springs with calibrated ranges as shown in the specifications.

The cartridge, which is the same for all versions, is the direct acting type CMP10.

For the minimum permissible setting pressure depending on the spring, see minimum pressure setting curve.

Max. operating pressure		320 bar
Setting ranges:	spring 1	max. 50 bar
	spring 2	max. 150 bar
	spring 3	max. 320 bar
Max. flow		40 l/min
Hydraulic fluids	Miner	al oils DIN 51524
Fluid viscosity		10 ÷ 500 mm²/s
Fluid temperature		-25°C ÷ 75°C
Ambient temperature	9	-25°C ÷ 60°C
Max. contamination I	evel class	10 in accordance
W	ith NAS 1638	b with filter B ₂₅ ≥75
Weight AM3VMA/B/F	P	1,Ž Kg
Weight AM3VMAB		1,3 Kg
Weight AM3VIA/B		2 Kg
Weight AM3VIAB		2,2 Kg



Curves n° 1 - 2 - 3 = setting ranges

20 Q (l/min) 30

40

10

100

80

60

20

0

0

P (bar) ⁶

ORDERING CODE

Modular valve

CETOP 3/NG6

AM

3

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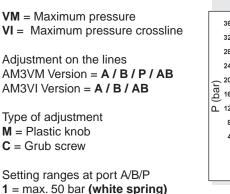
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2 = max. 150 bar (yellow spring)

3 = max. 320 bar (green spring)

1 = max. 50 bar (white spring)

2 = max. 150 bar (yellow spring)

3 = max. 320 bar (green spring)

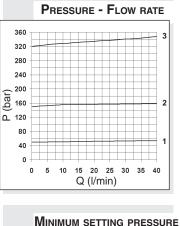
Setting ranges at port B (Omit if the setting is same

as that at port A)

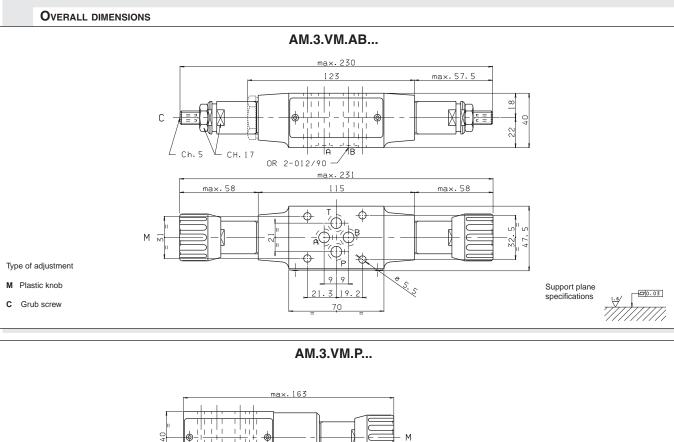
00 = No variant

V1 = Viton

Serial No.

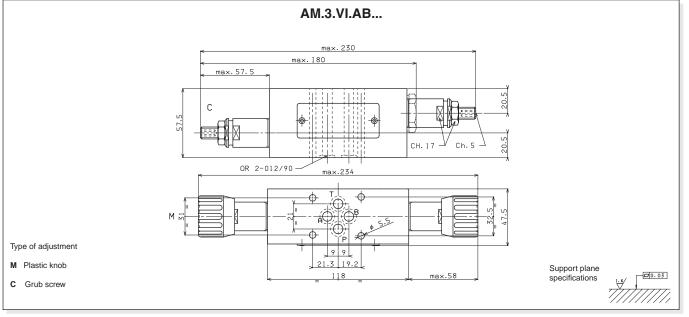








OR 2-012/90 10.5 СН. 17 -Ch.5 0-0-Æ Ь B 32. 47. С 10.5 ΓP 5.5 99 max.58 max.57.5 21.3 19.2 Type of adjustment 69.5 M Plastic knob Support plane specifications 0.03 C Grub screw







MP.10 CAP. VII •	30
CREWS AND STUDS CAP. IV •	21
CREWS AND STUDS CAP.	IV •

AM

3

СР

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AM3CP... MODULAR BACK PRESSURE VALVE CETOP 3

AM3CP type back pressure valves are damped in-line direct acting pressure relief valves fitted with bypass nonreturn valves.

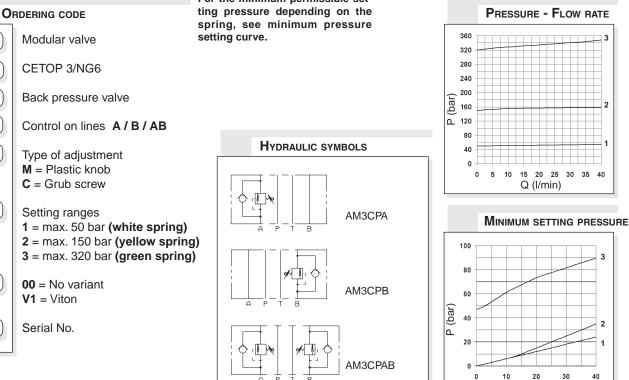
Adjustment within the range 2 ÷ 320 bar is by means of a grub screw or a plastic knob, on ports A or B (single) or AB (double).

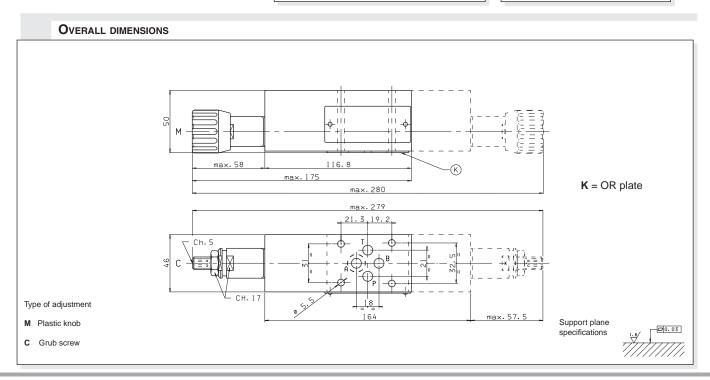
The cartridge is the direct acting type CMP10.

These valves are especially used on vertically working cylinders with dragging loads.

For the minimum permissible set-

Max. operating pressure		350 bar
Setting ranges:	spring 1	max. 50 bar
	spring 2	max. 150 bar
	spring 3	max. 320 bar
Max. flow		40 l/min
Hydraulic fluids	Mine	al oils DIN 51524
Fluid viscosity		10 ÷ 500 mm²/s
Fluid temperature		-25°C ÷ 75°C
Ambient temperatu	re	-25°C ÷ 60°C
Max. contamination	level class	10 in accordance
	with NAS 1638	B with filter B ₂₅ ≥75
Weight AM3CPA/B.		Ž Kg
Weight AM3CPAB		2,7 Kg





2

3

35 40

3

2

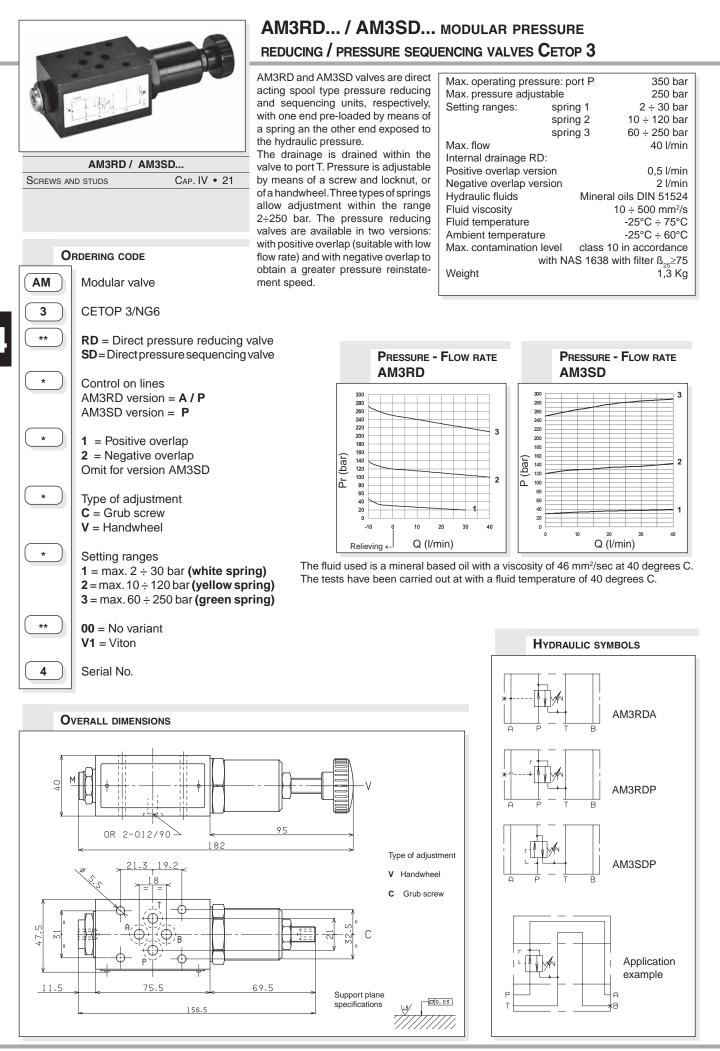
1

40

Q (I/min)

VALV/AM3CP003 E/04-2015





IV • 12





AM3VR	
CVR.20	CATALOGO CARTUCCE
SCREWS AND STUDS	Cap. IV • 21

AM3VR... MODULAR REDUCING VALVES WITH RELIEVING - PILOT OPERATED CETOP 3

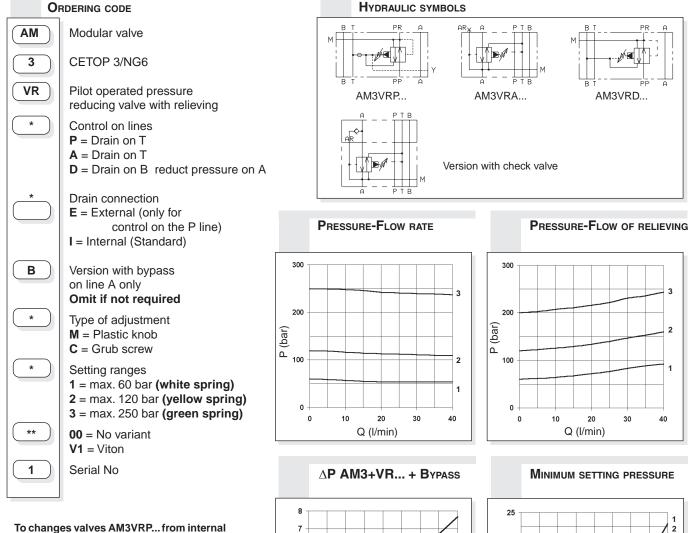
These pressure reducing valves ensure a minimum pressure variation on the P or A port with changing flow rate up to 90 l/min.

Three spring types allow adjustment within the range 7 ÷ 250 bar. Manual adjustment is available by a grub screw or plastic knob.

The RELIEVING SYSTEM inside the valve AM3VR allows the passage from the setting pressure line to T line of the flow through the valve to avoid the increasing of pressure in the reducedpressure line by diverting exceeding flow to reservoir. A bypass module with check valve for free flow from A to AR port (see hydraulic symbol) is available..

Max. operating pre	ssure		350 bar
Setting ranges:	spring 1	ma	ax. 60 bar
	spring 2	2 max	k. 120 bar
	spring 3	s max	k. 250 bar
Maximum allowed	d ∆p pre	ssure	
between the inlet	an outle	et pressure	150 bar
Max. flow			40 l/min
Draining on port T		0,5 ÷	0,7 l/min
Hydraulic fluids		Mineral oils D	IN 51524
Fluid viscosity		10 ÷ 5	00 mm²/s
Fluid temperature		-25°	C ÷ 75°C
Ambient temperatu	ire	-25°	C ÷ 60°C
Max. contamination	n level	class 10 in ac	cordance
	with NA	S 1638 with filt	ter ß₂₅≥75
Weight			1,36 Kg
Weight bypass ver	sion		2 Kg

ORDERING CODE

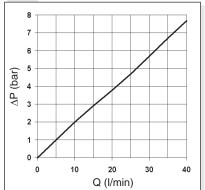


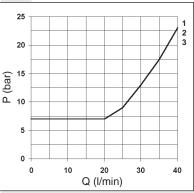
to external drainage it is necessary: - screw out the plug on the "Y" port

screw out the plug T.C.E.I. M8x1 from the body

- screw in a screw S.T.E.I. M6
- rescrew the T.C.E.I. M8x1 plug on the body

NOTE: the external draining can be used as a piloting line (please, contact our technical department for other informations)



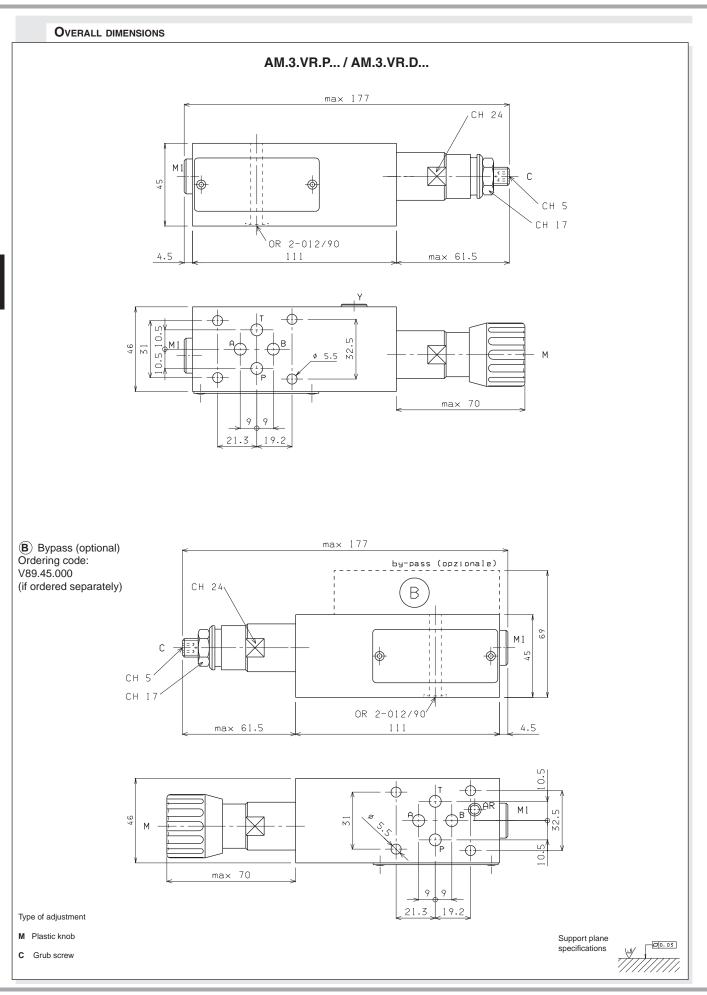


Curves n° 1 - 2 - 3 = setting ranges

The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C. The tests have been carried out a fluid temperature of 50°C.







4

BREVINI

Motion Systems

DANA



AM3VS	
CVS.20	CARTRIDGE CATALOGUE
SCREWS AND STUDS	Cap. IV • 21

AM3VS... MODULAR SEQUENCING VALVES CETOP 3

The sequence valve are used to assure that a secondary circuit is pressurized when the setting pressure is reached.

These valves grant a minimum variation of the setting pressure with a changing flow up to 40 l/min (see diagram).

Three spring types allow adjustment within the range $7 \div 250$ bar. Manual adjustment is available by a grub screw or plastic knob.

The cartridge used is the "CVS" type.

300

200

0

0

10

20 Q (l/min) 30

(bar)

____ 100

Max. operating pressure		350 bar
Setting ranges:	Spring 1	max. 60 bar
	Spring 2	max. 120 bar
	Spring 3	max. 250 bar
Max. flow		40 l/min
Draining on port T		0,5 ÷ 0,7 l/min
Hydraulic fluids		Mineral oils DIN 51524
Fluid viscosity		10 ÷ 500 mm²/s
Fluid temperature		-25°C ÷ 75°C
Ambient temperat	ure	-25°C ÷ 60°C
Max. contaminatio	n level	class 10 in accordance
	with NA	S 1638 with filter ß₂₅≥75
Weight		1,36 Kg

ORDERING CODE

CETOP 3/NG6

Sequencing valve

Drain connection **E** = External

I = Internal (Standard)

1 = max. 60 bar (white spring)

2 = max. 120 bar (yellow spring)

3 = max. 250 bar (green spring)

Type of adjustment \mathbf{M} = Plastic knob

C = Grub screw

Setting ranges

00 = No variant

V1 = Viton

Serial No

3

vs

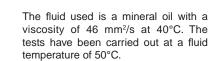
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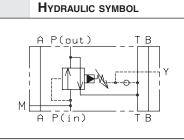
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1

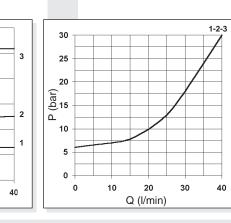


Curves n° 1 - 2 - 3 = setting ranges

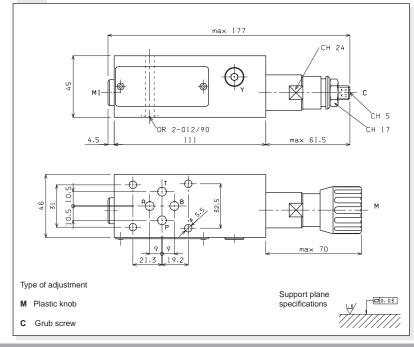
PRESSURE-FLOW RATE



MINIMUM SETTING PRESSURE



OVERALL DIMENSIONS



To changes valves AM.3.VS... from internal to external drainage it is necessary:

- screw out the plug on the Y port
- screw out the plug T.C.E.I. M8x1 from the body
- screw in a screw S.T.E.I. M6
- rescrew the T.C.E.I. M8x1 plug on the body

NOTE: the external draining can be used as a piloting line (please, contact our technical department for other informations)





AM3SH	
SH.03	CARTRIDGE CATALOGUE
SCREWS AND STUDS	Cap. IV • 21

AM3SH... MODULAR SHUTTLE VALVES CETOP 3

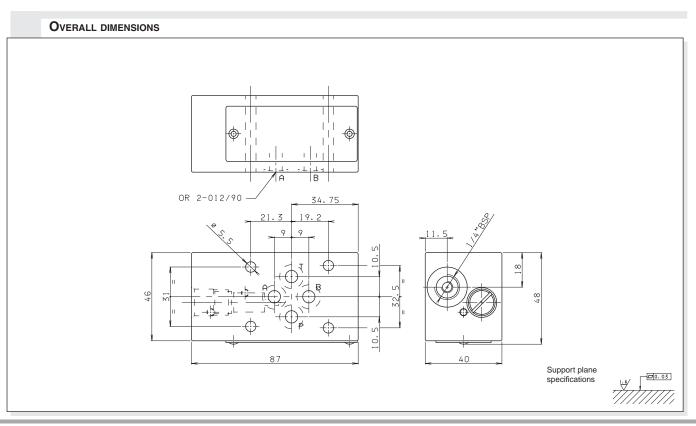
Modular valves type AM.3.SH are actuator load pressure selecting units, as they are fitted with an integral shuttle valve cartridge which allows taking of the highest pressure signal to the external port via displacement of a ball. They are usually employed to signal the actuator load to the pressure compensator of load sensing pump, or for the command of fail-safe brakes.

For seat overall dimensions see cartridge shuttle SH03 type.

Max. operating pressure	350 bar
Max. flow at the cartridge	3 l/min
Max. flow at ports A/B/P/T	40 l/min
Hydraulic fluids	Mineral oils DIN 51524
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in accordance
with NA	S 1638 with filter B ₂₅ ≥75
Weight	Ĩ Kg
Cartridge tightening torque	20÷30 Nm/2÷3 Kgm

4

ORDERING CODE HYDRAULIC SYMBOL **P**RESSURE DROPS ON THE SHUTTLE VALVE AM Modular valve 4 3,5 3 CETOP 3/NG6 3 SH Cartridge shuttle 2.5 ∆p (bar) 2 ** 00 = No variant 1.4 V1 = Viton R Â 0.5 1 Serial No. 0.8 1.2 1,6 2,0 2,4 2,8 3,2 n 0.4 Q (I/min)





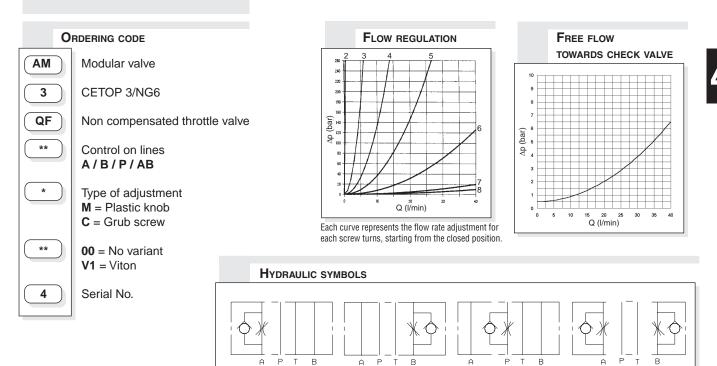


AM3QF... MODULAR FLOW REGULATOR CETOP 3

AM.3.QF type one way non-compensated throttle valve are fitted with an O-Ring mounting plate which allows its assembly for either input or output regulation. Adjustment is obtained by means of a grub screw or a plastic knob. They are available in the four regulating configurations shown in the hydraulic diagrams.

The standard valve configuration allows "meter in" regulation, while it is possible to obtain "meter out" regulation by turning the valve by 180° along its longitudinal axis.

Max. operating pressure	350 bar
Max. pressure adjustable	250 bar
Flow rate regulation	on 8 screw turns
Max. flow	40 l/min
Hydraulic fluids	Mineral oils DIN 51524
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in accordance
with NA	S 1638 with filter ß ₂₅ ≥75
Weight	1,5 Kg

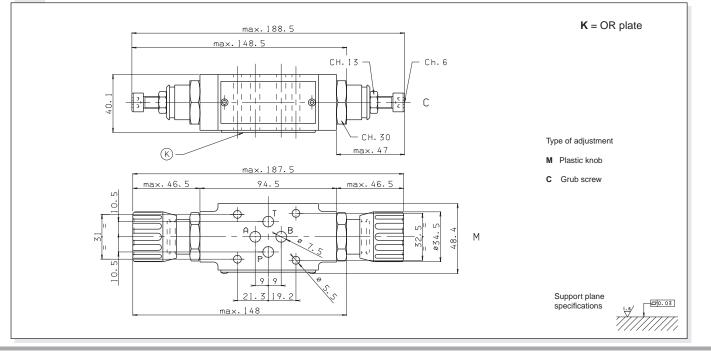


AM3QFB

AM3QFP

AM3QFA

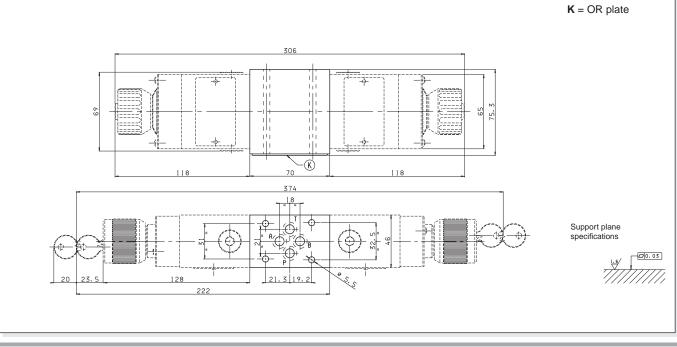
OVERALL DIMENSIONS





AM3QFAB

		AM66 MODULAR COMPENSATED FLOW CONTROL ASSEMBLY CETOP 3
		This is an intermediate block for modular mounting of one or two flow rate regulators type QC3Max. operating pressure320 bar Hydraulic fluidsThe flow regulator type QC3* must be
	AM066	Hydraulic symbols
QC32	Cap. III • 2	For regulators two-way QC32
QC33 Screws an	CAP. III • 3 ND STUDS CAP. IV • 21	
Or	RDERING CODE Modular valve	AM66P AM66PT* AM66T
66 **	Size Control on lines A / B / P / PT* / AB For T / A1 / B1 / A1B1 versions see table "Hydraulic symbols"	$ \begin{array}{c c} \hline \\ \hline \\ AP \\ \hline \\ AM66A1 \\ \hline \\ AM66B1 \\ \hline \\ \hline \\ AM66A1B1 \\ \hline \\ \hline \\ AM66A1B1 \\ \hline \\ \hline \\ \hline \\ AM66A1B1 \\ \hline \\ \hline$
**	 00 = No variant V3 = regulators for three-way Q(only with adjustment of P) V1 = Viton Serial No. 	 For regulators for three-way QC33 C33 PT * = From line towards exhaust (P→ T drain) In order to obtain versions with regulation on T, the AM66P regulator carrying block should be turned by 180°. In order to obtain versions A1, B1 and A1B1 the AM66A, AM66B or AM66AB regulators carrying block should be turned by 180°.



IV • 18





A66		
STANDARD CONNECTORS	Cap. I • 20	
DC COILS	Cap. I • 72	
QC32	Cap. III • 2	
SCREWS AND STUDS	Cap. IV • 21	

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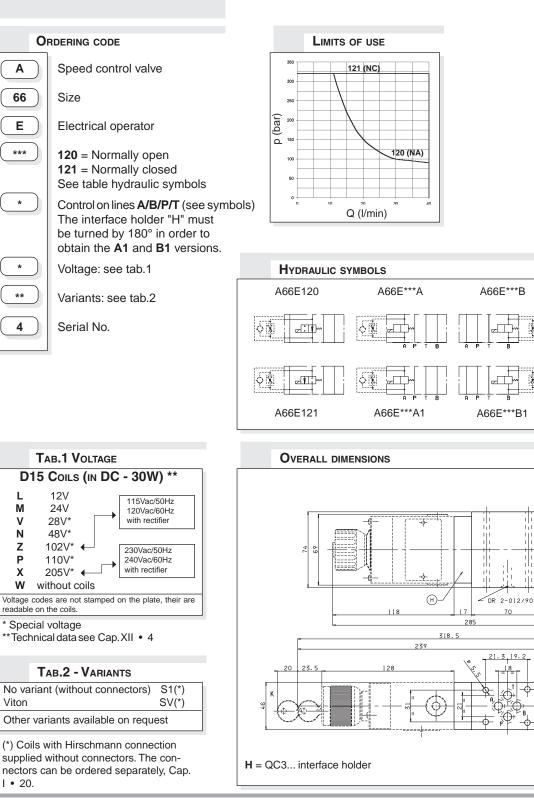
A66... MODULAR FLOW CONTROL VALVES FAST / SLOW ASSEMBLY CETOP 3

This is modular assembly ON/OFF solenoid valve which, by fitting suitable 2 way regulator, allows two speed operation in the same system via an electrical changeover command.

The flow rate regulator type QC32... must be ordered separately. The operational limit curves have been obtained with the regulator fully closed, and those same limits improve gradually with the opening of the regulator.

Max. operating pressure	320 bar
Hydraulic fluids	Mineral oils DIN 51524
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in accordance
with NA	AS 1638 with filter B ₂₅ ≥75
Weight	2,4 Kg

The test have been carried out at operating temperature, with a voltage 10% lower than rated voltage and with a fluid temperature of 50 degrees C. The fluid used was a mineral based oil with a viscosity of 46 mm²/s at 40 degrees C.





0.03

80

Support plane specifications

A66E***T

A66E***P



SCREWS AND STUDS

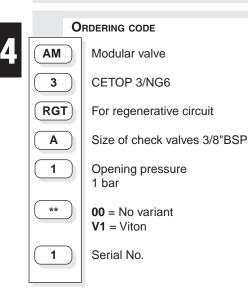
CAP. IV • 21

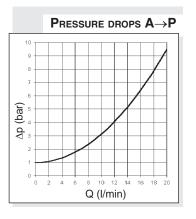
AM3RGT... MODULAR VALVES FOR REGENERATIVE CIRCUIT CETOP 3

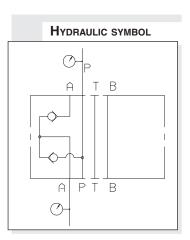
This modular valve produces a regenerative system to increase the actuator (differential cylinder) exit speed as shown in the diagram.

In particular, if a cylinder is used with a 2:1 ratio for the operating surfaces, the exit and re-entry speeds are the same.

Max. operating pressure	350 bar
Max. flow at port A/B/P/T	20 l/min
Hydraulic fluids	Mineral oils DIN 51524
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in accordance
with N/	AS 1638 with filter B ₂₅ ≥75
Weight	1,ੈ7 Kg







OVERALL DIMENSIONS

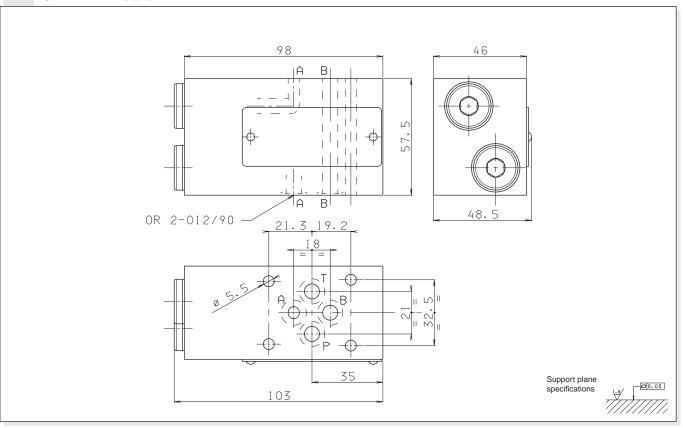
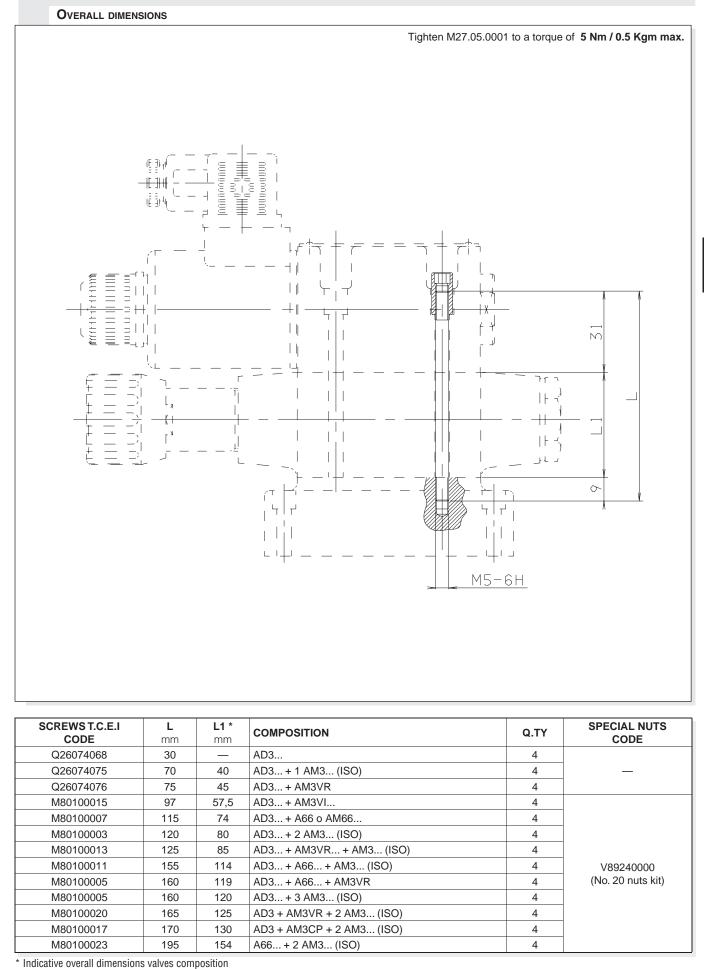






TABLE OF SCREWS AND STUDS FOR MOUNTING MODULES CETOP 3







CAP. IV • 36

SCREWS AND STUDS

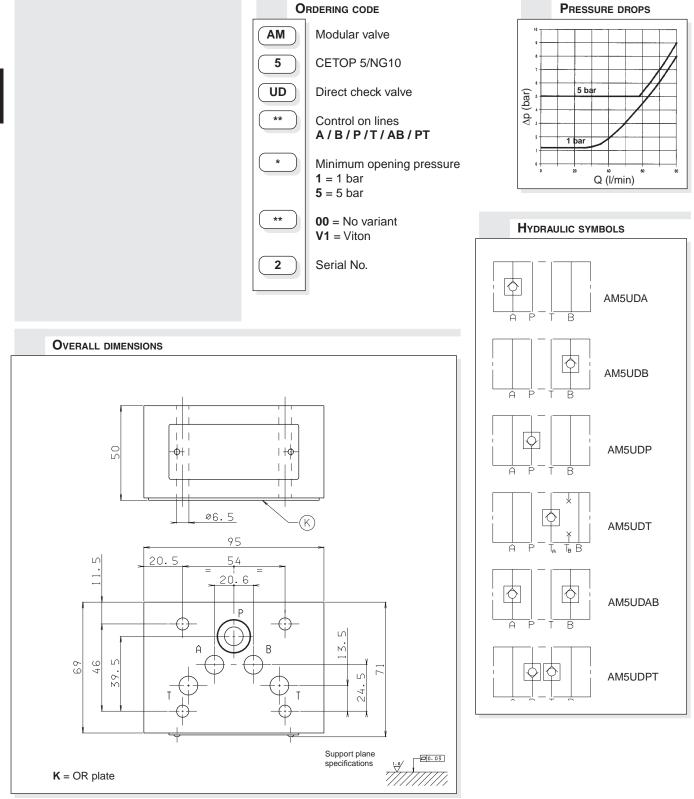
AM5UD MODULAR D	IRECT
CHECK VALVES CETOP	5

AM5UD type modular check valves allow free flow in one direction, while a conical seated poppet prevents flow in the opposite direction.

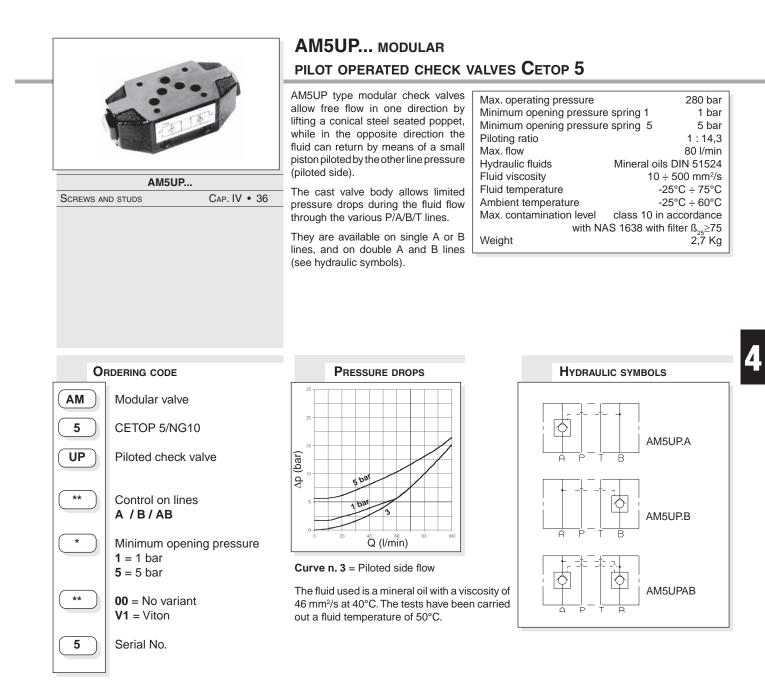
They are available on single A, B, P and T lines, and on double A and B, P and T lines (see hydraulic symbols).

1 bar springs are standard, while 5 bar rated springs are available on request.

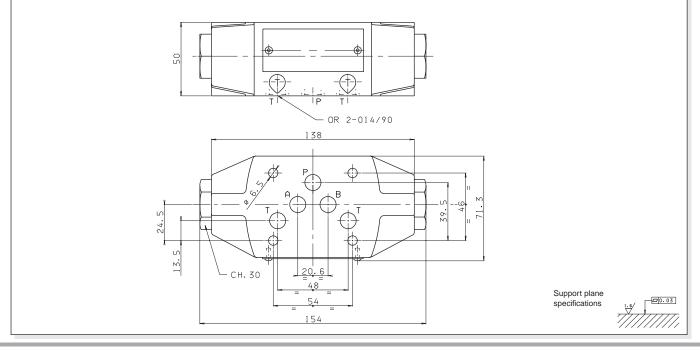
Max. operating pressure		350 bar
Minimum opening pressure	e spring 1	1 bar
Minimum opening pressure	e spring 5	5 bar
Max. flow		80 l/min
Hydraulic fluids	Mineral oi	ls DIN 51524
Fluid viscosity	10	÷ 500 mm²/s
Fluid temperature	-	25°C ÷ 75°C
Ambient temperature		25°C ÷ 60°C
Max. contamination level	class 10 ir	n accordance
with NAS 1638 with filter ß₂₅≥75		
Weight		2,1 Kg







OVERALL DIMENSIONS







AM5VM / AM5VI		
CMP20	CARTRIDGE CATALOGUE	
CMP30	CARTRIDGE CATALOGUE	
SCREWS AND STUDS	Cap. IV • 36	

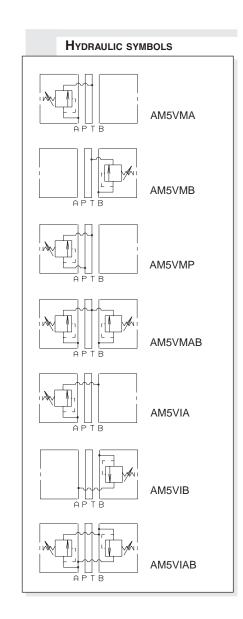
AM5VM... / AM5VI... MODULAR MAX. PRESSURE VALVES CETOP 5

AM5VM type pressure regulating valves are available within operating range 7 ÷ 350 bar. Adjustment is by means of a grub screw or a plastic knob. They are three basic versions: AM5VM, on single A or B lines, and on double A and B lines, with drainage on T; AM5VMP, on single P line, with drainage on T; AM5VI, on single A or B lines, and on double A and B lines, with crossed drainage on either A or B (see hydraulic symbols). Three spring types can be fitted on all versions, with calibrated ranges as shown in the unit specifications.

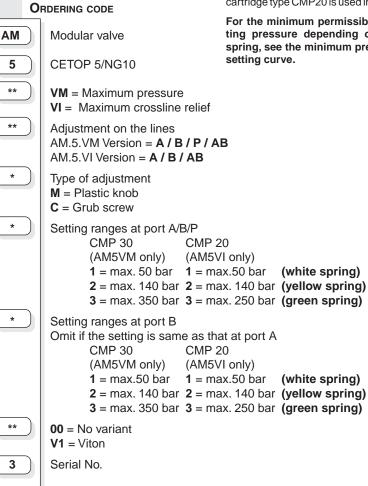
Piloted operation cartridge type CMP30 is used on versions AM5VM and AM5VM.P (see ordering code), while on version AM5VI direct acting cartridge type CMP20 is used instead.

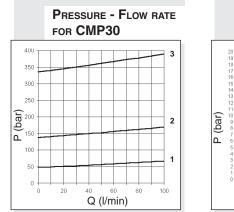
For the minimum permissible setting pressure depending on the spring, see the minimum pressure setting curve.

Max. operating pressure		350 bar
Setting ranges:	spring 1	50 bar
	spring 2	140 bar
	spring 3	350 bar
Max. flow		80 l/min
Hydraulic fluids	Mineral o	ils DIN 51524
Fluid viscosity	sity 10 ÷ 500 mm ² /s	
Fluid temperature		-25°C ÷ 75°C
Ambient temperatur	re	-25°C ÷ 60°C
Max. contamination	level class 10 i	n accordance
with NAS 1638 with filter ß ₂₅ ≥75		
Weight AM5VMA/B	/P	2,5 Kg
Weight AM5VMAB.		2,7 Kg
Weight AM5VIA/B		5,7 Kg
Weight AM5VIAB		5,9 Kg

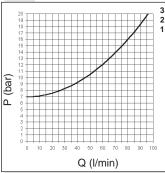




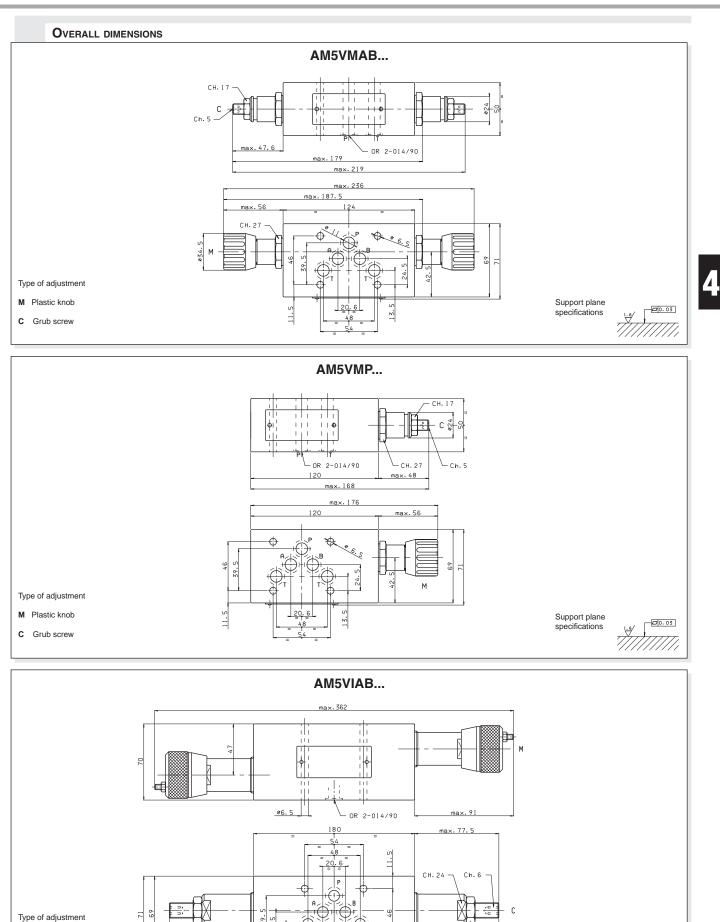




MINIMUM SETTING PRESSURE FOR CMP30 3







VALV/AM5V\$003_E/02-2014

M Plastic knob

C Grub screw

max. 335

СН.22



7

0.03

Support plane specifications



CMP20	CARTRIDGE CATALOGUE
SCREWS AND STUDS	Cap. IV • 36

AM5CP... MODULAR BACK PRESSURE VALVES CETOP 5

Back pressure valves type AM.5.CP are direct acting damped maximum pressure in-line valves fitted with bypass non-return valves. They are obtainable within the adjustable range 2 ÷ 250 bar.

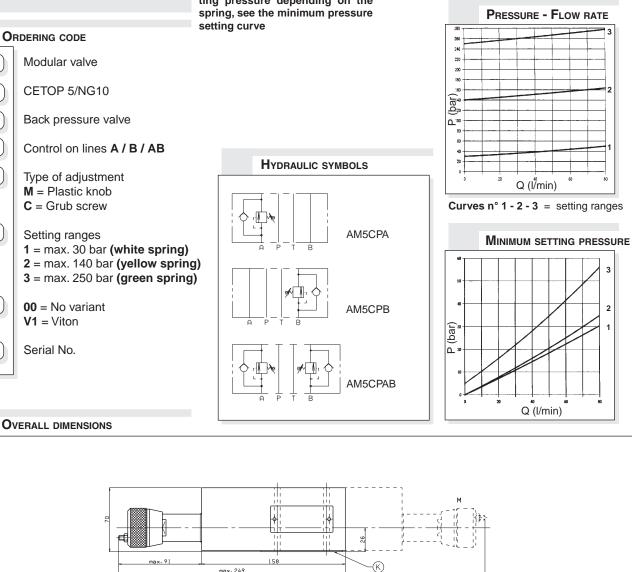
Adjustment is by means of a grub screw or a plastic knob, on ports A or B (single), or on AB double.

The cartridge is direct acting type CMP.20.

These valves are especially used on vertical working cylinders with dragging loads.

For the minimum permissible setting pressure depending on the

Max. operating pressure		350 bar
Setting ranges:	spring 1	30 bar
	spring 2	140 bar
	spring 3	250 bar
Max. flow		80 l/min
Hydraulic fluids	Mineral	oils DIN 51524
Fluid viscosity		10 ÷ 500 mm²/s
Fluid temperature		-25°C ÷ 75°C
Ambient temperatu	re	-25°C ÷ 60°C
Max. contamination	level class 10) in accordance
with NAS 1638 with filter ß₂₅≥75		
Weight AM5CPA/B		5,3 Kg
Weight AM5CPAB.		7,2 Kg



AM

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3

Control on lines A / B / AB

M = Plastic knob



Ch. 6 max.77

00 = No variant

Serial No.

max.249 max. 402 max.235 K = OR plate CH. 22 _ СН. 24

Support plane specifications



Type of adjustment

M Plastic knob

C Grub screw

IV • 26

220

max. 374



0.03



AM5VR	
CVR20	CARTRIDGE CATALOGUE
SCREWS AND STUDS	Cap. IV • 36

ORDERING CODE

AM5VR... MODULAR PRESSURE REDUCING VALVES WITH RELIEVING - PILOT OPERATED CETOP 5

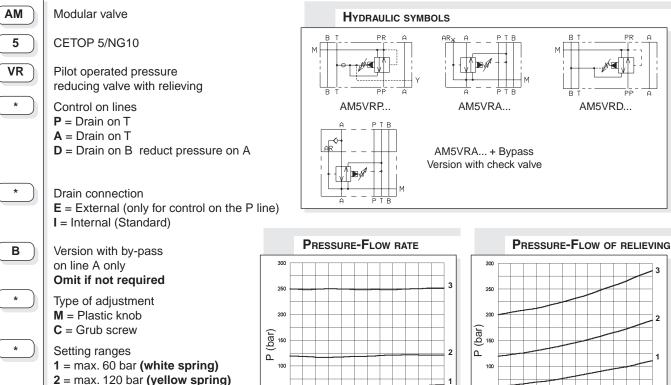
These pressure reducing valves ensure a minimum pressure variation on the P or A port with changing flow rate up 90 l/min.

Three spring types allow adjustment with the range $7 \div 250$ bar. Manual adjustment is available by a grub screw or plastic knob.

The RELIEVING SYSTEM inside the valve AM5VR allows the passage from the setting pressure line to T line of the flow through the valve to avoid the increasing of pressure in the reduced-pressure line by diverting exceeding flow to reservoir.

A by pass module with check valve for free flow from A to AR port (see hydraulic symbol) is available.

Max. operating pressure		350 bar
Setting ranges:	spring 1	60 bar
	spring 2	120 bar
	spring 3	250 bar
Maximum allowed 2	p pressure	
between the inlet a	nd outlet pressure	150 bar
Max. flow		90 l/min
Draining on port T	0,5	÷ 0,7 l/min
Hydraulic fluids	Mineral oils	DIN 51524
Fluid viscosity	10 ÷	500 mm ² /s
Fluid temperature	-2	5°C ÷ 75°C
Ambient temperature	-2	5°C ÷ 60°C
Max. contamination I	evel class 10 in a	accordance
V	vith NAS 1638 with	filter ß₂₅≥75
Weight		3,73 Kg
Weight by-pass version	ion	6,56 Kg
-		-



15

3 = max. 250 bar (green spring) 00 = No variant V1 = Viton

Serial No.

**

1

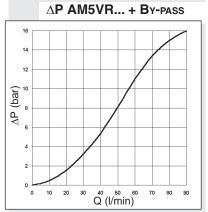
To change valves AM5VRP... from internal to external drainage it is necessary:

- screw out the plug on the Y port
- screw out the plug T.C.E.I. M8x1 from the body
- screw in a screw S.T.E.I. M6
- rescrew the T.C.E.I. M8x1 plug on the body

NOTE: the external draining can be used as a piloting line (please, concta our technical department for other informations)

Curves n° 1 - 2 - 3 = setting ranges

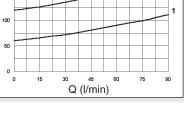
The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C. The tests have been carried out at a fluid temperature of 50°C.

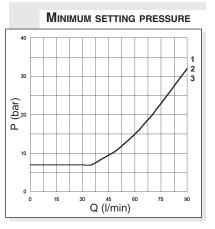


Q (I/min)

90

76



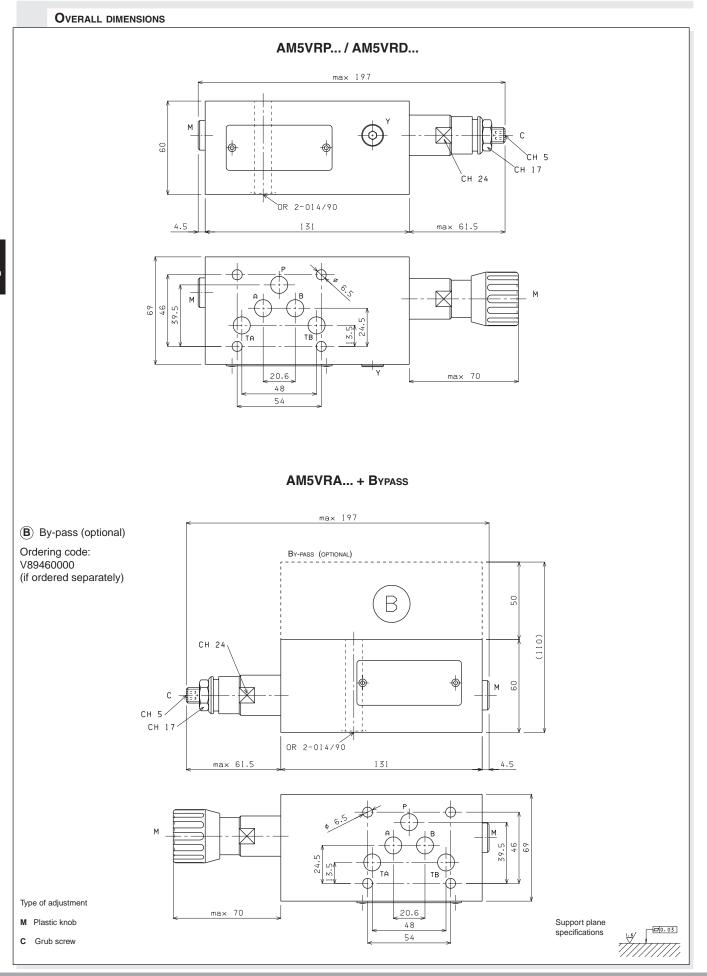




3

2

AM5VR... MODULAR PRESSURE REDUCING VALVES WITH RELIEVING - PILOT OPERATED CETOP 5







AM5VS	
CVS20	CARTRIDGE CATALOGUE
SCREWS AND STUDS	Cap. IV • 36

AM5VS... MODULAR PRESSURE SEQUENCING VALVES CETOP 5

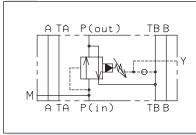
The sequence valve are used to assure that a secondary circuit is pressurized when the setting pressure with a changing flow to up 90 l/min (see diagram).

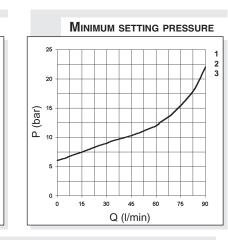
Three spring types allow adjustment within the range 7 ÷ 250 bar. Manual adjustment is available by a grub screw or plastic knob.

The cartridge used is the "CVS" type.

Max. operating pressure		350 bar
Setting ranges:	spring 1	60 bar
	spring 2	120 bar
	spring 3	250 bar
Max. flow		90 l/min
Draining on port T		0,5 ÷ 0,7 l/min
Hydraulic fluids	Minera	l oils DIN 51524
Fluid viscosity		10 ÷ 500 mm²/s
Fluid temperature		-25°C ÷ 75°C
Ambient temperatur	re	-25°C ÷ 60°C
Max. contamination	level class 1	0 in accordance
	with NAS 1638	with filter B ₂₅ ≥75
Weight		3,73 Kg

HYDRAULIC SYMBOL





3

2

1

90

45 60 75

Q (l/min)

30

To change valves AM.5.VS... from internal to external drainage it is necessary:

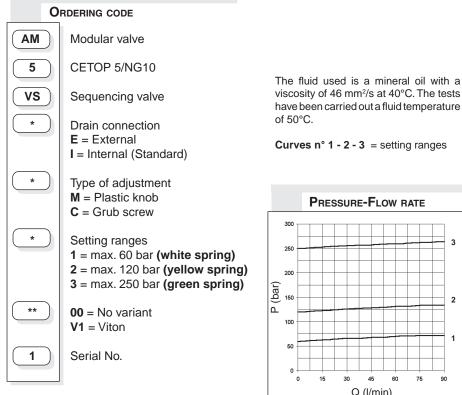
- screw out the plug on the Y port

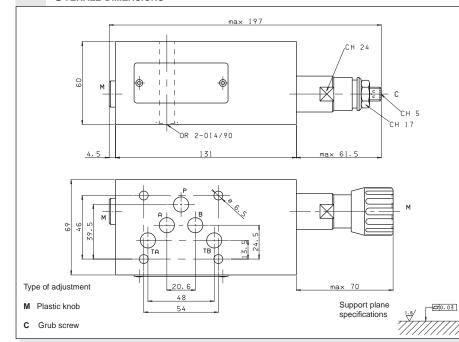
- screw out the plug T.C.E.I. M8x1 from the body

- screw in a screw S.T.E.I. M6

- rescrew the T.C.E.I. M8x1 plug on the body

NOTE: the external draining can be used as a piloting line (please, contact our technical department for other informations)





OVERALL DIMENSIONS





AM5SH			
SH03	CARTRIDGE CATALOGUE		
SCREWS AND STUDS	Cap. IV • 36		

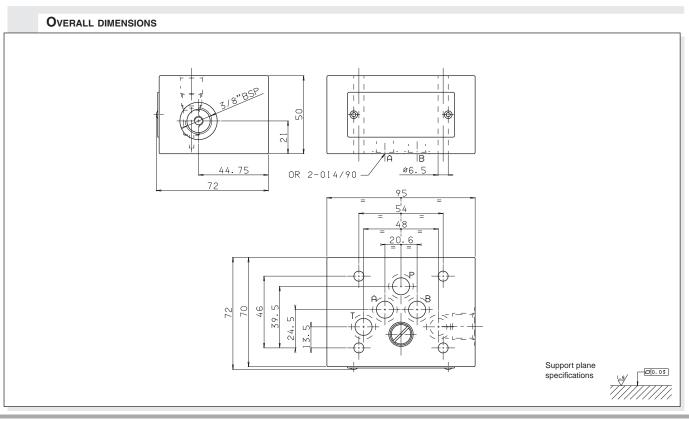
AM5SH... MODULAR SHUTTLE VALVES CETOP 5

Modular valves type AM5SH are actuator load pressure selecting units, as they are fitted with an integral shuttle valve cartridge which allows taking of the highest pressure signal to the external port via displacement of a ball. They are usually employed to signal the actuator load to the pressure compensator of a load sensing pump, or for the command of fail-safe brakes. For seat overall dimensions see cartridge shuttle type SH03.

Max. operating pressure	350 bar		
Max. flow at the cartridge	3 l/min		
Max. flow at ports A/B/P/T	80 l/min		
Hydraulic fluids	Mineral oils DIN 51524		
Fluid viscosity	10 ÷ 500 mm²/s		
Fluid temperature	-25°C ÷ 75°C		
Ambient temperature	-25°C ÷ 60°C		
Max. contamination level	class 10 in accordance		
with NAS 1638 with filter ß₂₅≥75			
Weight	2,Ĩ Kg		
Cartridge tightening torque	20÷30 Nm/2÷3 Kgm		

4

PRESSURE DROPS (ΔP) HYDRAULIC SYMBOL **O**RDERING CODE ON THE SHUTTLE VALVE AM Modular valve 35 CETOP 5/NG10 5 SH Cartridge shuttle 2.5 ∆p (bar) ** 00 = No variant 1.5 V1 = Viton Â R 0,5 1 Serial No. 0 0 0.4 0.8 1,2 1,6 2,0 2,4 2,8 3,2 Q (I/min)







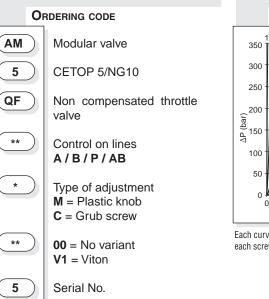
AM5Q	F
SCREWS AND STUDS	Cap. IV • 36

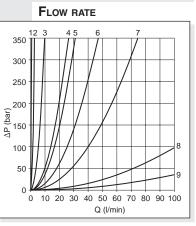
AM5QF... MODULAR FLOW REGULATOR CETOP 5

AM.5.QF type one way non-compensated throttle valve are fitted with an O-Ring mounting plate which allows its assembly for either input or output regulation. Adjustment is obtained by means of a grub screw or a plastic knob. They are available in the four regulating configurations shown in the hydraulic diagrams. These valves are supplied with related

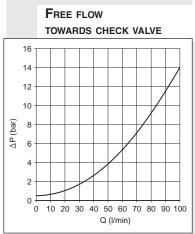
These valves are supplied with related hydraulic scheme. In case of inversion of rated flow direction, turn valve 180° right or left (attention: in this case the label will appear upside down with A and B inverted).

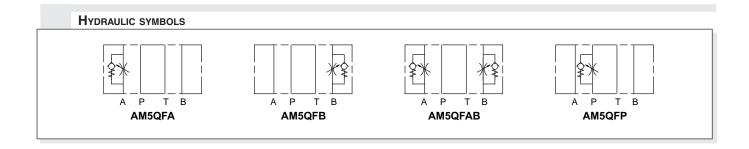
Max. operating pressure	350 bar
Flow rate regulation	on 9 screw turns
Max. flow	100 l/min
Hydraulic fluids	Mineral oils DIN 51524
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in accordance
with NA	AS 1638 with filter ß ₂₅ ≥75
Weight	3,5 Kg



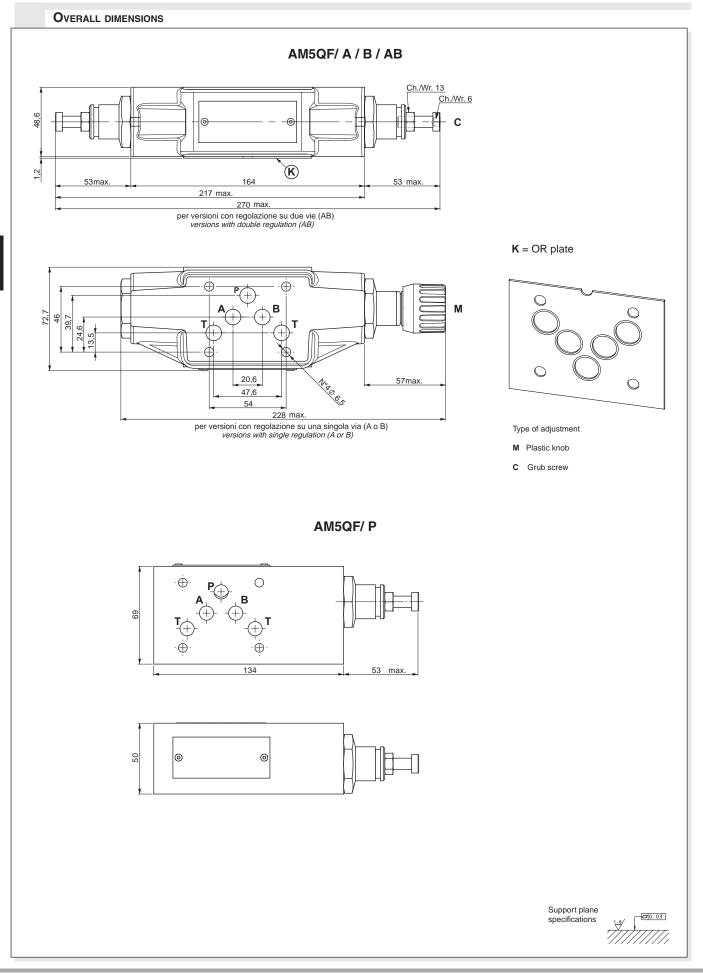


Each curve represents the flow rate adjustment for each screw turns, starting from the closed position.





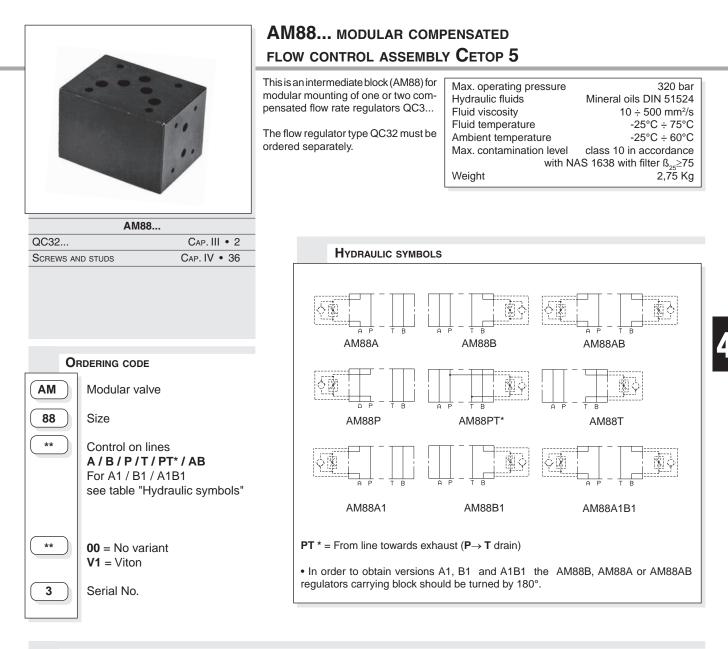


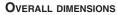


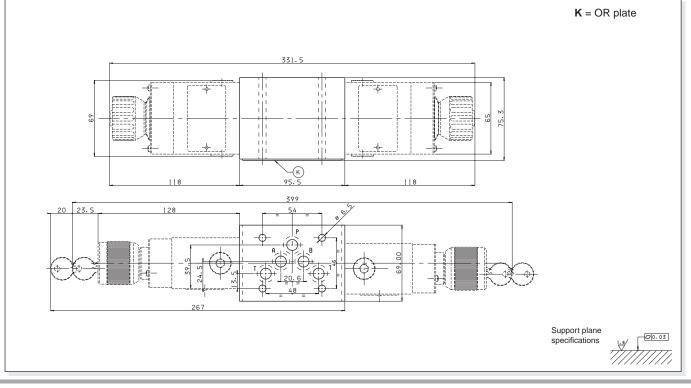
BREVINI

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DANA







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A88				
"A16" DC COILS	Cap. I • 40			
STANDARD CONNECTORS	Cap. I • 20			
QC32	Cap. III • 2			
SCREWS AND STUDS	Cap. IV • 36			

A88... MODULAR FLOW CONTROL VALVES FAST / SLOW ASSEMBLY CETOP 5

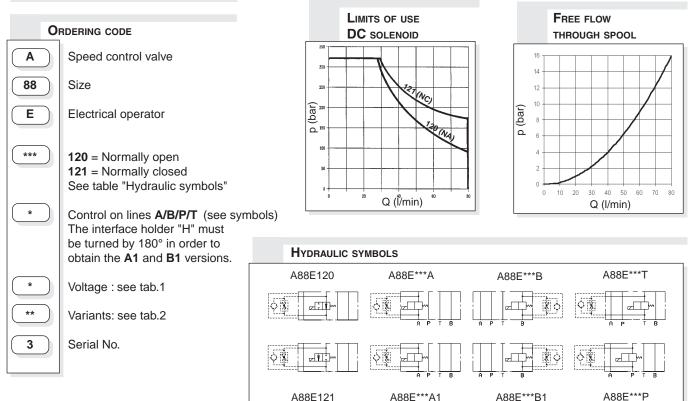
This is a modular assembly ON/OFF solenoid valve which, by fitting a suitable 2 way regulator, allows two speed operation in the same system via an electrical changeover command.

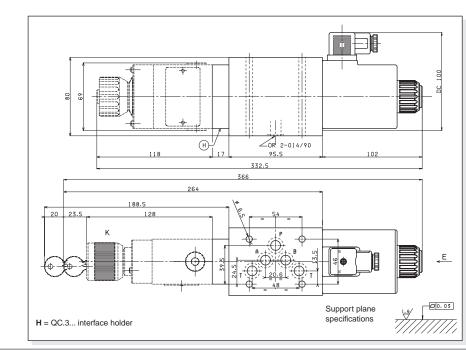
The flow rate regulator type QC32 must be ordered separately. The limit of use curves have been obtained with the regulator fully closed, and those same limits improve gradually with the opening of the regulator.

 Solenoids used are standard type A16 for DC voltage.

Max. operating pressure	320 bar			
Hydraulic fluids	Mineral oils DIN 51524			
Fluid viscosity	10 ÷ 500 mm²/s			
Fluid temperature	-25°C ÷ 75°C			
Ambient temperature	-25°C ÷ 60°C			
Max. contamination level	class 10 in accordance			
with NAS 1638 with filter B₂₅≥75				
Weight with a DC solenoid				

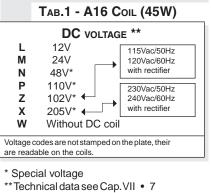
The test have been carried out at operating temperature, with a voltage 10% lower than rated voltage and with a fluid temperature of 50 degrees C. The fluid used was a mineral based oil with a viscosity of 46 mm²/sec at 40 degrees C.

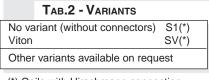




BREVINI

Motion Systems





(*) Coils with Hirschmann connection supplied without connectors. The connectors can be ordered separately, Cap. I • 20.



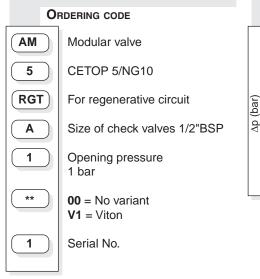
SCREWS AND STUDS

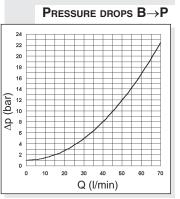
CAP. IV • 36

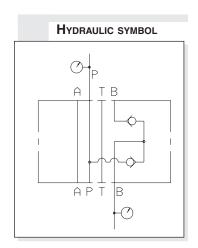
AM5RGT MODULAR VALVES	
FOR REGENERATIVE CIRCUIT CETOP	5

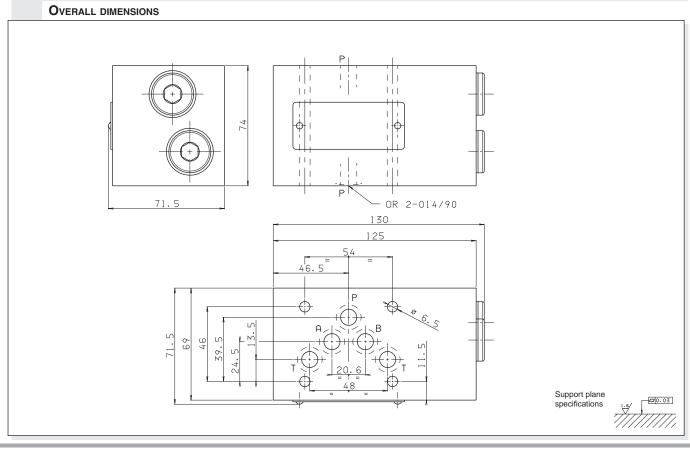
This modular system produces a regenerative circuit to increasing the actuator (differential cylinder) exit speed as shown in the diagram. In particular, if a cylinder is used with a 2:1 ratio for operating surfaces, the exit and re-entry speeds are the same.

350 bar
70 l/min
Mineral oils DIN 51524
10 ÷ 500 mm²/s
-25°C ÷ 75°C
-25°C ÷ 60°C
class 10 in accordance
AS 1638 with filter $\beta_{25} \ge 75$
2,1 Kg



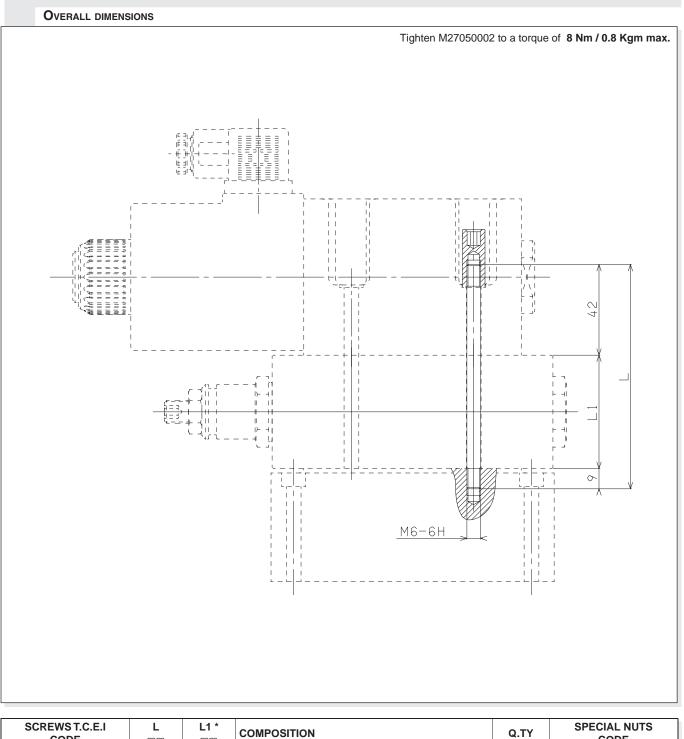












SCREWS T.C.E.I CODE	L mm	L1 * mm	COMPOSITION	Q.TY	SPECIAL NUTS CODE
Q26074090	40	—	AD5	4	
Q26074098	90	50	AD5 + 1 AM5 (ISO)	4	
Q26074301	100	60	AD5 + AM5VR	4	—
Q26074302	110	70	AD5 + AM5VI	4	
Q26074099	120	80	AD5 + A88	4	
M80150004	150	100	AD5 + 2 AM5 (ISO)	4	
M80150012	160	110	AD5 + AM5VR + AM5 (ISO)	4	1/20250000
M80150010	180	130	AD5 + A88 + AM5 (ISO)	4	V89250000 (No. 20 nuts kit)
M80150006	190	140	AD5 + A88 + AM5VR	4	- (NO. 20 HUIS KII)
M80150011	200	150	AD5 + 3 AM5 (ISO)	4	

* Indicative overall dimensions valves composition





AM.7.UP...

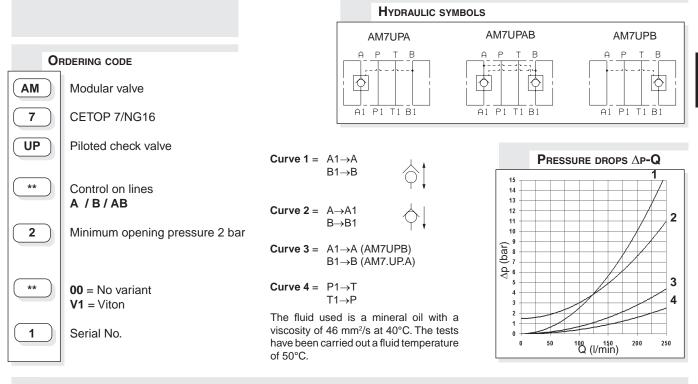
AM7UP... MODULAR PILOT OPERATED CHECK VALVES CETOP 7

AM7UP type modular check valves allow free flow in one direction by lifting a seated poppet, while in the opposite direction the fluid can return by means of a small piston piloted by the other line pressure (piloted side).

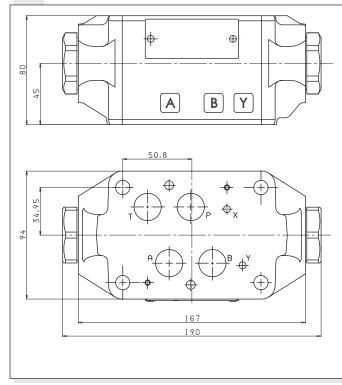
The cast valve body allows limited pressure drops during the fluid flow through the various P/A/B/T lines.

They are available on single A or B lines, and on double A and B lines (see hydraulic symbols).

Max. operating pressure	350 bar
Opening pressure	2 bar
Piloting ratio	1 : 11,7
Max. flow	250 l/min
Hydraulic fluids	Mineral oils DIN 51524
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-20°C ÷ 80°C
Ambient temperature	-20°C ÷ 50°C
Max. contamination level	class 10 in accordance
with NA	S 1638 with filter ß ₂₅ ≥75
Weight	7,2 Kg



OVERALL DIMENSIONS

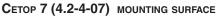


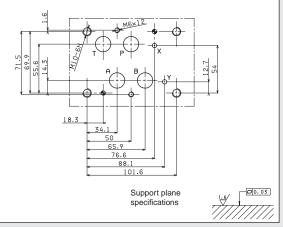
Valve fixing:

n° 4 screws T.C.E.I. M10 - Tightening torque 40 Nm n° 2 screws T.C.E.I. M6 - Tightening torque 8 Nm The longer of the screws depends on the type of assembly used. Fixing screws UNI 5931 with material specifications 12.9

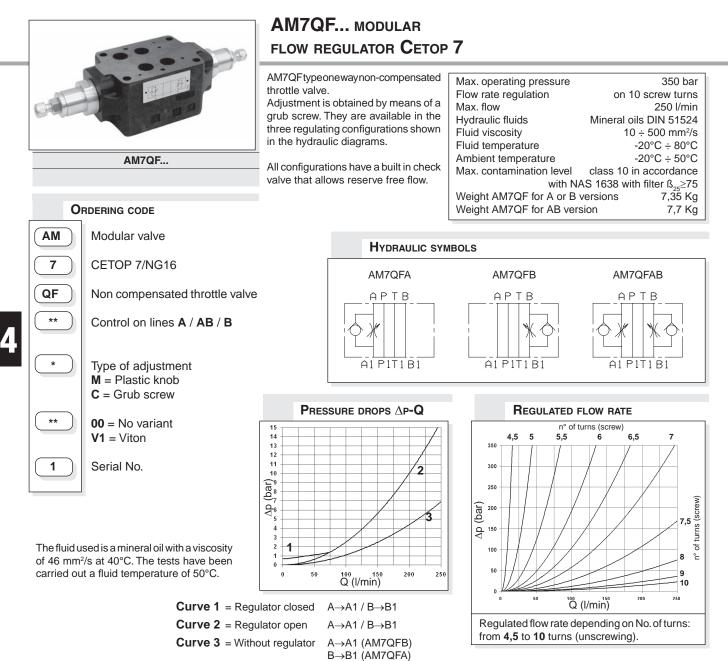
Seals:

n° 4 pieces OR 2-118/90sн PARKER (type 130) n° 2 pieces OR 2-013/90sн PARKER (type 2043)









OVERALL DIMENSIONS • Valve fixing: n° 4 screws T.C.E.I. M10 - Tightening torque 40 Nm n° 2 screws T.C.E.I. M6 - Tightening torque 8 Nm The longer of the screws depends on the type of assembly used. Fixing screws UNI 5931 with material specifications 12.9. 80 · Seals: <u>CH</u> 10 n° 4 pieces OR 2-118/90sH PARKER (type 130) B Y **A** <u>CH</u> 18 n° 2 pieces OR 2-013/90sH PARKER (type 2043) 305 CETOP 7 (4.2-4-07) MOUNTING SURFACE max 339 50.8 ¢ 94 18.3 Type of adjustment 34.1 Support plane м Plastic knob specifications 65 0.03 299 76.6 с Grub screw 88. max





CARTRIDGE VALVES ISO 7368 (DIN 24342)



Overtitie de vieveo	0/4.4 2
KEL 2/2 LOGIC ELEMENTS	Cap. V • 3
KEC COVERS	Cap. V • 5
COVERS WITH CMP	Cap. V • 10
KRA.16/25	Cap. V • 13
Proximity	Cap. V • 16

CARTRIDGE VALVES CARTRIDGE SOLENOID VALVES WITH CHECK VALVE CARTRIDGE SOLENOID VALVES

SEE ALSO CATALOGUE CODE DOC00044

	ABBREVIATIONS
AP	HIGH PRESSURE CONNECTION
AS	PHASE LAG (DEGREES)
BP	LOW PRESSURE CONNECTION
С	STROKE (MM)
СН	ACROSS FLATS
Сн	INTERNAL ACROSS FLATS
DA	AMPLITUDE DECAY (DB)
Dp	DIFFERENTIAL PRESSURE (BAR)
F	Force (N)
1%	INPUT CURRENT (A)
Μ	MANOMETER CONNECTION
NG	KNOB TURNS
OR	SEAL RING
Р	Load pressure (bar)
PARBA	K PARBAK RING
PL	PARALLEL CONNECTION
Pr	Reduced pressure (bar)
Q	FLOW (L/MIN)
Qp	PUMP FLOW (L/MIN)
SE	ELASTIC PIN
SF	Ball
SR	SERIES CONNECTION
Х	PILOTING
Y	Drainage





2/2 LOGIC ELEMENTS AND COVERS						
KEL16/25	Cap. V • 3					
NG16/NG25 KEL SEATS	Cap. V • 4					
KEC16/25	Cap. V • 5					
KEC HYDRAULIC MOUNTING DIAGR.	Cap. V • 6					
KEC16/25 WITH CMP	Cap. V • 10					
C*P16/25	Cap. V • 10					
KRA16/25	Cap. V • 13					
KRA16/25 + AD3V	Cap. V • 15					
PROXIMITY FOR KRA	Cap. V • 16					

2/2 CARTRIDGE VALVES LOGIC ELEMENTS ACCORDING TO ISO 7368 (DIN 24342)

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).

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	B with filter B ₂₅ ≥75

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.

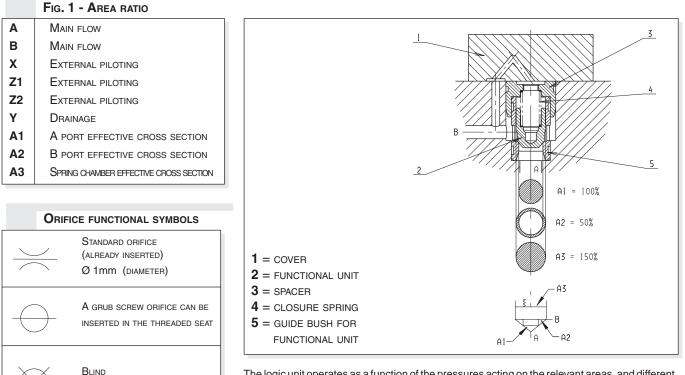
The logic units 2/2 (Fig. 1) are formed by a cover (1), a functional unit (2), a spacer (3), a closure spring (4) and a guide bush (5) for each functional unit. Covers can be changed according to the required application and the functional unit can be combined with different springs in order to obtain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



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;

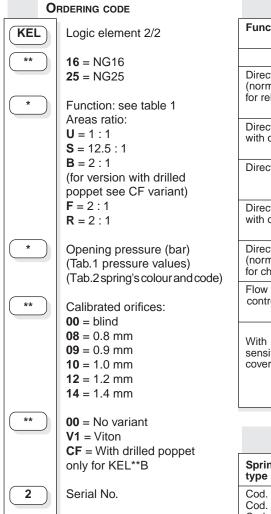
- area A1 is taken to represent 100%, i.e. it is the reference area;

- 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 \to B or from B \to A.



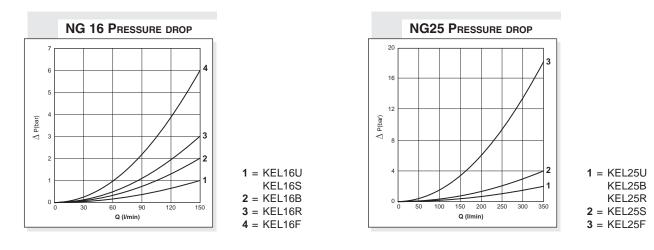
CARTRIDGE VALVES 2/2 LOGIC ELEMENTS ACCORDING TO ISO 7368 (DIN 24342)



TAB. 1 - SYMBOL, FUNCTION, AREA RATIO AND OPENING PRESSURE						
Function	Symbol	Area ratio	Code	Openingpressure (bar)		
				A→B	В→А	
Directional (U) (normally used for relief valve)	A3 A3 A3	A1 : A3 1 : 1	KEL**UL00 KEL**UM00 KEL**UH00 KEL**UJ00	L = 0.3 M = 1.6 H = 4 J = 9		
Directional (U) with orifice	A3 A	A1 : A3 1 : 1	KEL**UL** KEL**UM** KEL**UH**	L = 0.3 M = 1.6 H = 4		
Directional (S)	B A	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	AZ AZ A	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)	B A3 B	A1 : A2 2 : 1	KEL**BL00 KEL**BM00 KEL**BH00	L = 0.5 M = 1 H = 2.5	L = 1 M = 2 H = 5	
Flow (F) control	A A A A A A A A A A A A A A A A A A A	A1 : A2 2 : 1	KEL**FL** KEL**FM** KEL**FH**	L = 0.5 M = 1 H = 2.5	L = 1 M = 2 H = 5	
Mart	AP .			$A \rightarrow B$		
With sensitized (R) cover	B AP	A1 : A2 2 : 1	KEL**RL00 KEL**RM00 KEL**RH00 KEL**RJ00	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

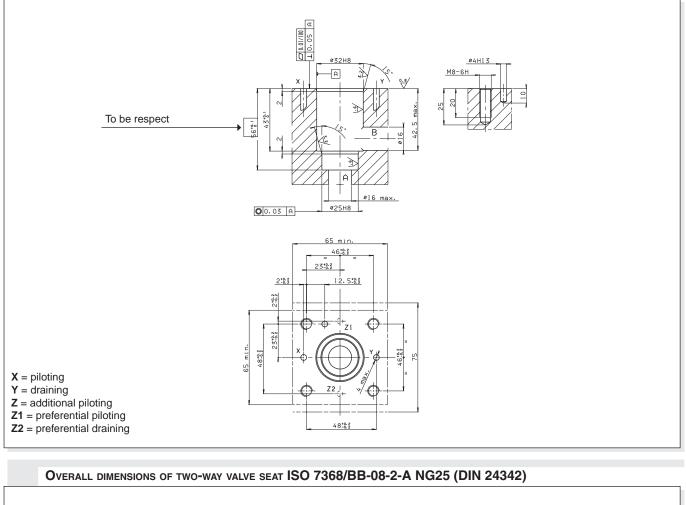
	TAB. 2 - OF HING 3 COLOUR AND CODE							
Spring	U		S		B-F		R	
type	NG16	NG25	NG16	NG25	NG16	NG25	NG16	NG25
Cod. L Cod. M Cod. H Cod. J	without colour green blue without co	red yellow blue ^{blour}	without colour red yellow	red green yellow	without colour red green	red green yellow	without colour red green	red green yellow blue

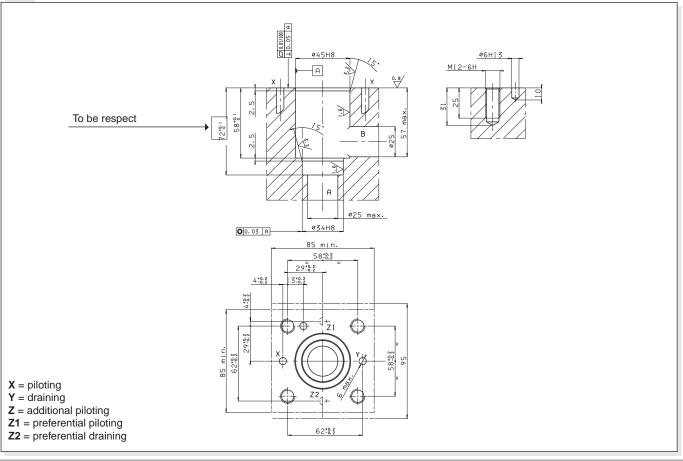


The fluid used is a mineral oil with a viscosity of 46 mm²/s at 40°C. The tests were performed at a fluid temperature of 50°C.

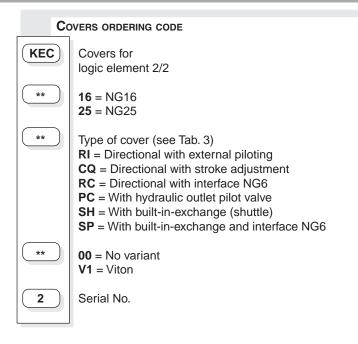






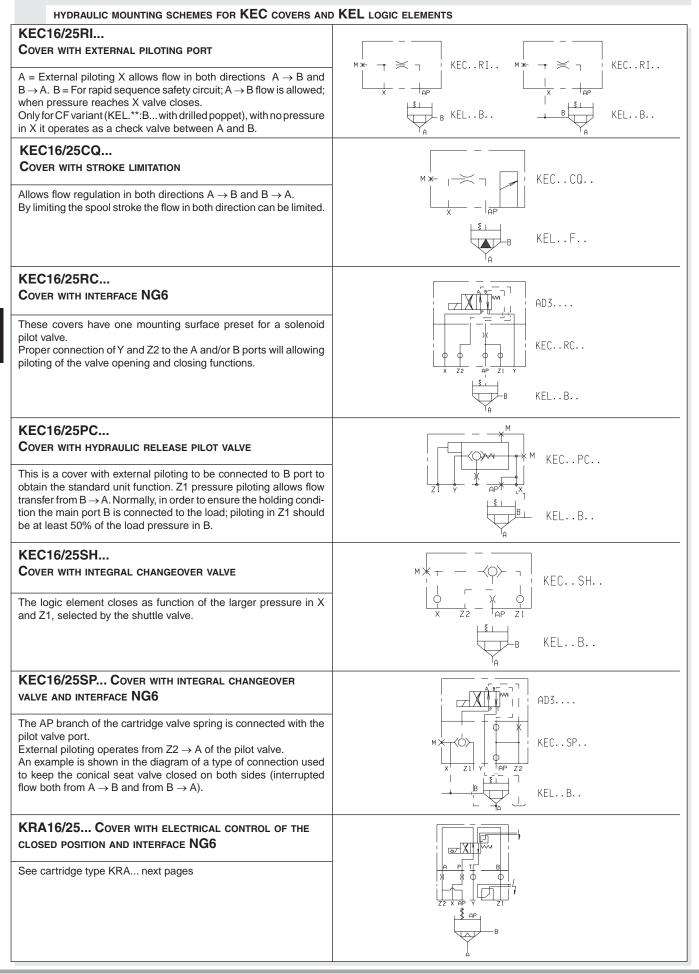






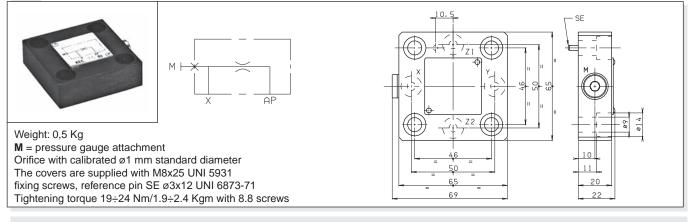
TAB. 1 - COVERS HYDRAULIC SYMBOLS	
Туре	Symbol
KEC**RI**2 Directional with external piloting	
KEC**CQ**2 Directional with stroke adjustment	
KEC**RC**2 Directional with interface NG6	P B A T)()(X Z2 AP Z1 Y
KEC**PC**2 With hydraulic outlet pilot valve	
KEC**SH**2 With built-in-exchange valve (shuttle)	M [*] [†]
KEC**SP**2 With built-in-exchange valve (shuttle) and interface NG6	



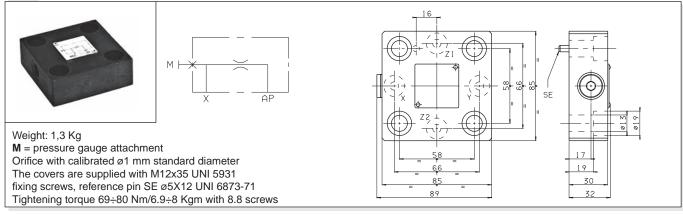




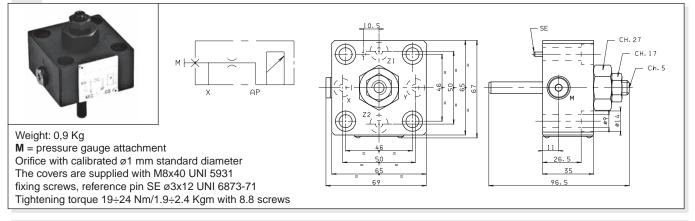
OVERALL DIMENSIONS KEC16RI... CHECK VALVE COVER



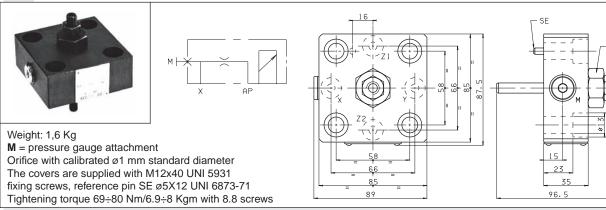
OVERALL DIMENSIONS KEC25RI ... CHECK VALVE COVER



OVERALL DIMENSIONS KEC16CQ.. COVER WITH STROKE ADJUSTMENT



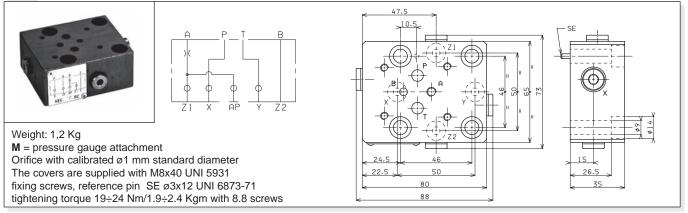
OVERALL DIMENSIONS KEC25CQ.. COVER WITH STROKE ADJUSTMENT



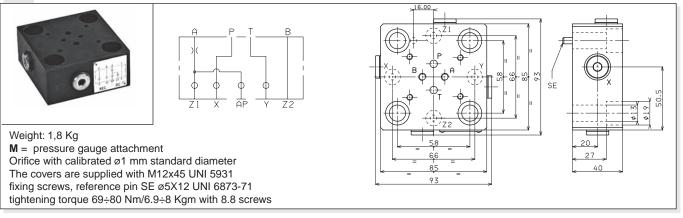


Сн. 27 Г Сн. 17 Г с. С. 5

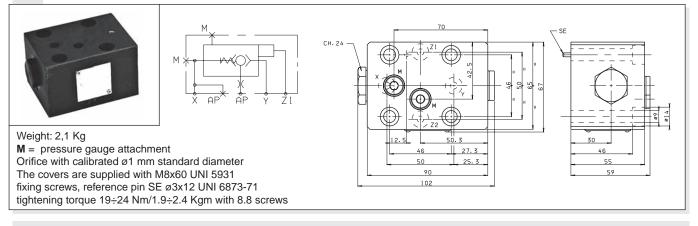
OVERALL DIMENSIONS KEC16RC... COVER WITH INTERFACE CETOP 3/NG6



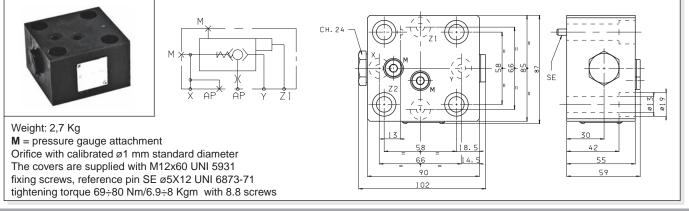
OVERALL DIMENSIONS KEC25RC... COVER WITH INTERFACE CETOP 3/NG6



OVERALL DIMENSIONS KEC16PC... COVER WITH HYDRAULIC OUTLET PILOT VALVE

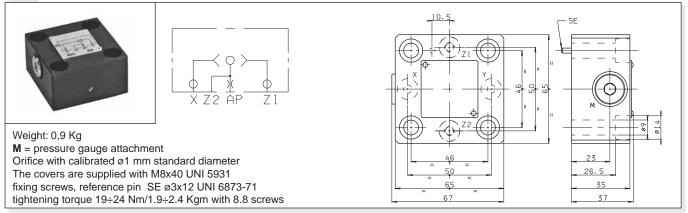


OVERALL DIMENSIONS KEC25PC... COVER WITH HYDRAULIC OUTLET PILOT VALVE

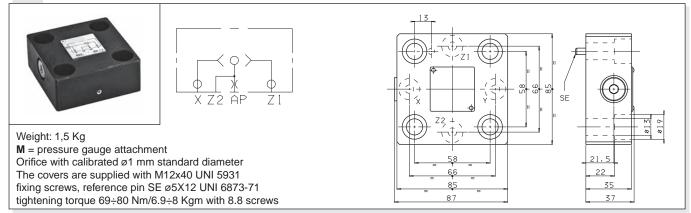




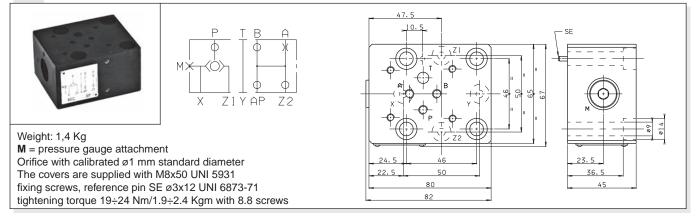
OVERALL DIMENSIONS KEC16SH ... COVER WITH BUILT-IN EXCHANGE VALVE



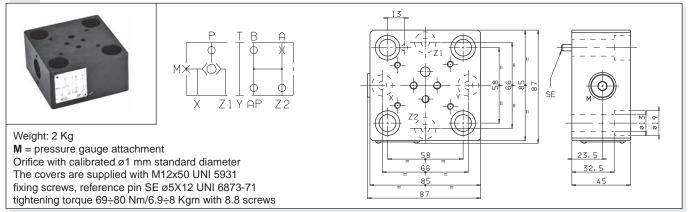
OVERALL DIMENSIONS KEC25SH ... COVER WITH BUILT-IN EXCHANGE VALVE



OVERALL DIMENSIONS KEC16SP COVER WITH BUILT-IN EXCHANGE VALVE AND INTERFACE CETOP 3/NG6



OVERALL DIMENSIONS KEC25SP COVER WITH BUILT-IN EXCHANGE VALVE AND INTERFACE CETOP 3/NG6







MAX. PRESSURE COVERS		
KEC16/25 WITH CMP	Cap. V • 11	
C*P16/25	Cap. V • 12	
CETOP 3/NG06	Cap. I • 8	
AD3E	Cap. I • 11	
AM3VM	Cap. IV • 9	
XP3	Cap. VIII • 20	

MAXIMUM PRESSURE CARTRIDGE VALVES

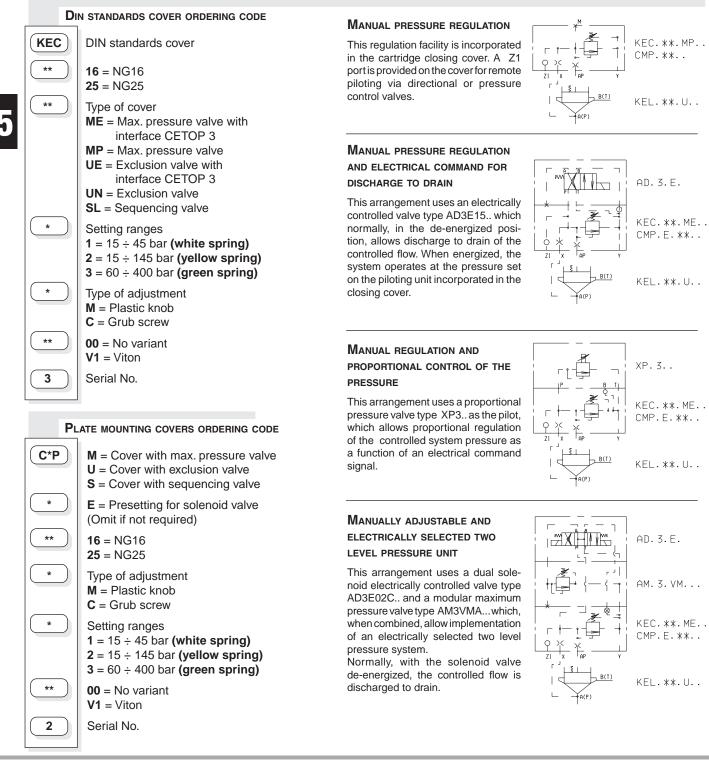
Maximum pressure cartridge valves allow control of hydraulic circuit pressures up 400 bar and 350 l/min maximum flow rate (NG25). Besides the normal manual pressure regulation mode, function like

Nominal size (max. diameter)	16mm / 25mm
Max. operating pressure	400 bar
Maximum nominal flow rate NG16	150 l/min
Maximum nominal flow rate NG25	350 l/min
Setting ranges	15 ÷ 400 bar

electrical command for discharge to drain, remote control, proportional pressure control or electrically selected dual pressure levels are also available.

The cover interface allows the mounting of a CETOP 3/NG06 valve. A standard cartridge valve DIN 24342 is used. A cover not according to DIN rules is also available.

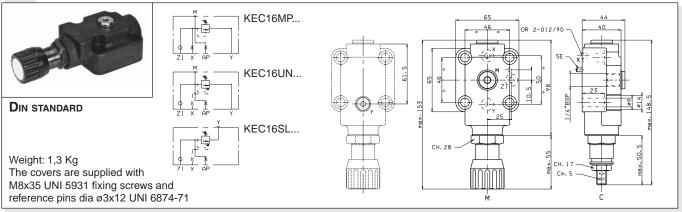
The valve response specification may be modified by selection of different internal orifices according to the required application. The standard version has calibrated orifices of \emptyset 1 mm in X and AP.

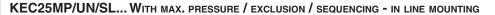


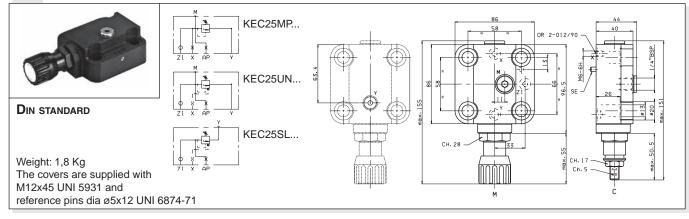


CARTRIDGE VALVES - COVERS

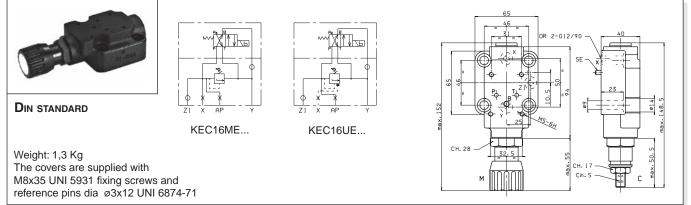




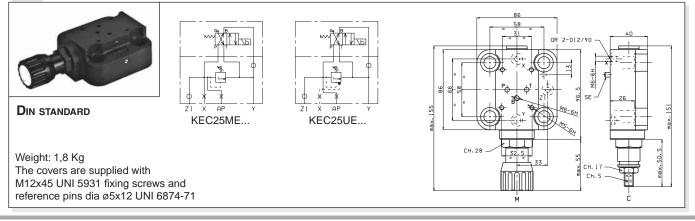








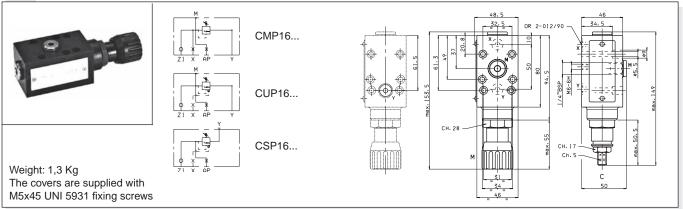
KEC25ME/UE WITH MAX. PRESSURE VALVE / EXCLUSION WITH INTERFACE CETOP 3 - IN LINE MOUNTING



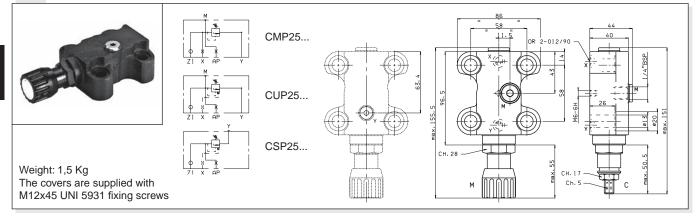


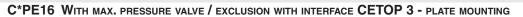
5

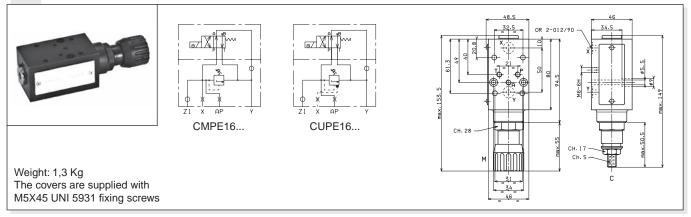




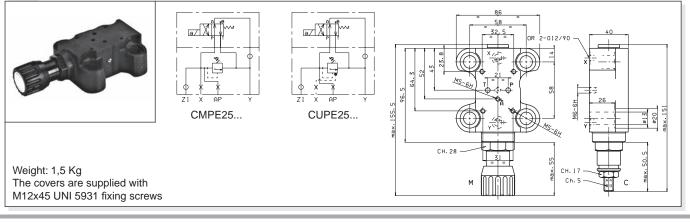








C*PE25 WITH MAX. PRESSURE VALVE / EXCLUSION WITH INTERFACE CETOP 3 - PLATE MOUNTING







KRA16/25			
OVERALL DIMENSIONS	Cap. V • 14		
KRA16/25 + AD3V	Cap. V • 15		
PROXIMITY FOR KRA	Cap. V • 16		
AD3V	Cap. I • 14		
"D15" DC coils	Cap. I • 19		
L.V.D.T. FOR AD3V	Cap. I • 22		
STANDARD CONNECTORS	Cap. I • 20		

Cartridge valve with electrical position control (logic element 2/2 incorporated)

Calibrated orifices at ports A and P:

 $1 = \emptyset$ 1 mm dia opening (NG16 in standard configuration) $2 = \emptyset$ 1.2 mm dia opening (NG25 in standard configuration)

J = 12 (no colour spring) 9 (blue spring)

NG25

3.5 (yellow spring)

ORDERING CODE

16 = NG16

25 = NG25

0 = no orifice

NG16

No variant

Serial No.

Opening pressure (bar):

H = 4 (green spring)

KRA

**

*

*

00

1

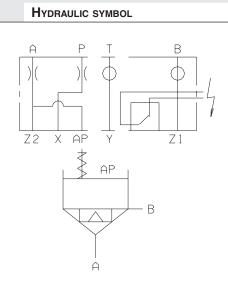
KRA16/25... CARTRIDGE VALVES WITH ELECTRICAL POSITION CONTROL

This valve series is used in those applications where monitoring of the "actual" valve position is required for managing machine safety cycles as required by current accident prevention legislation. Typical examples of applications where this product is used include: hydraulic presses in general, plastic component injection and blow-form presses, die-casting presses.

The valve is composed of a closure cover where the inductive position monitoring proximity sensor is inserted to signal the two possible states of logic element manufactured to DIN 24342 standard.

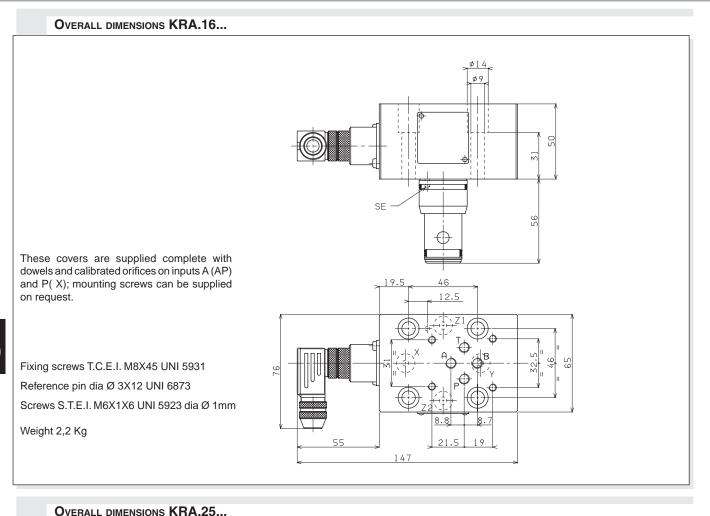
This valve, in view of its being placed inside a safety system loop, can detect movement dangerous both for the safety of the operator and of the machine itself.

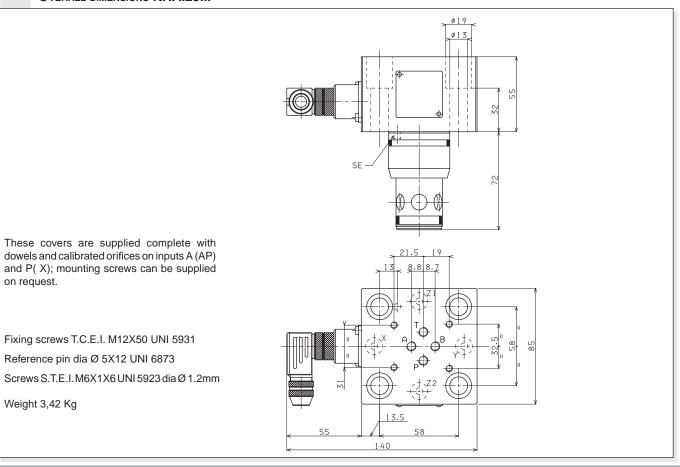
Availability of the CETOP 3 mounting interface on closure cover allows direct insertion of the piloting valves into the main valve, offering in this way to the designer the possibility to produce compact systems which can be easily mounted inside the machine.



VALV/KRA001_E/03-2017

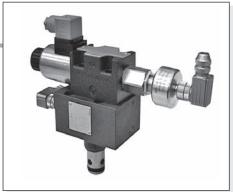












KRA16/25 + AD3V		
PROXIMITY FOR KRA	Cap. V • 16	
AD3V	Cap. V • 14	
D15 DC COIL	Cap. I • 19	
L.V.D.T. FOR AD3V	Cap. I • 22	
STANDARD CONNECTORS	Cap. I • 20	

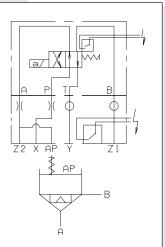
KRA16/25... + AD3V... CARTRIDGE VALVES WITH ELECTRICAL POSITION CONTROL VALVE

This valve series is used in those applications where monitoring of the "actual" valve position is required for managing machine safety cycle as required by current accident prevention legislation.

Typical example of application where this product is used include: hydraulic presses in general, plastic components injection and blow-form presses, die-casting presses. The valve is composed of closure cover where the inductive position monitoring proximity sensor is inserted to signal the two possible states of logic element manufactured to DIN 24342 standard.

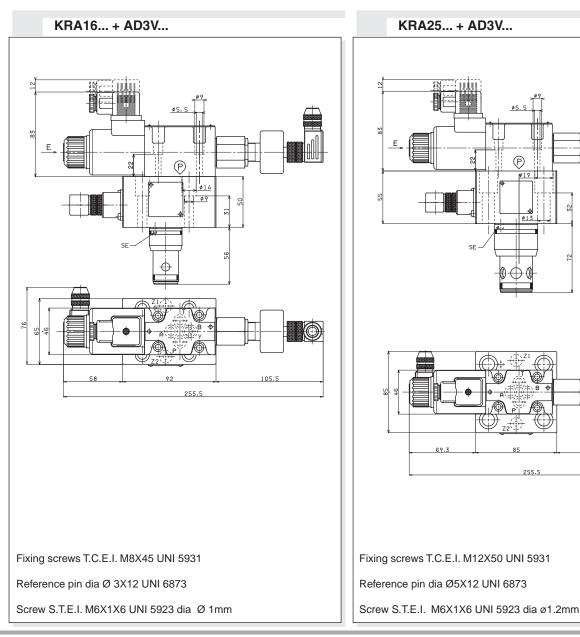
This valve, in view of its being placed inside a safety system loop, can detect movements dangerous both for the safety of the operator and of the machine itself. Use a single solenoid directional valve AD.3.V... as piloting unit allows increase in the safety system control level, since even the piloting unit is equipped with a position monitoring proximity sensor capable of signalling the two possible valve states.

HYDRAULIC SYMBOL



By combining these two monitoring systems it becomes possible to evaluate the hydraulic system response speed to prevent any possible malfunctioning or dangerous situations

These covers are supplied complete with dowel and calibrated orifices on inputs A (AP) /P(X); mounting screws can be supplied on request







101.2

255.5

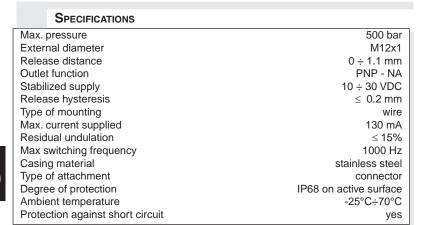
TECHNICAL SPECIFICATIONS PROXIMITY SENSORS AND CONNECTORS

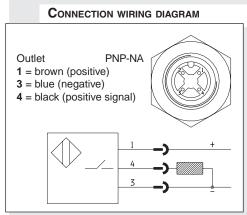


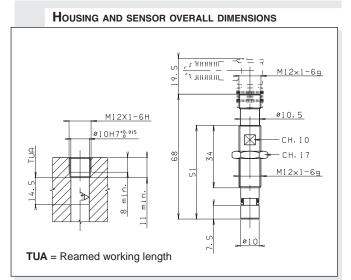
The inductive proximity sensors make it possible to detect metal objects; the operating principle is based on a high frequency oscillator which produces an electromagnetic field in the immediate vicinity of the sensor.

The presence of a metal object (activator) inside the field dampness the amplitude of the oscillation because parte of electromagnetic energy is transferred from the sensor to the activator and from there it is dissipated through the effect of the induced currents.

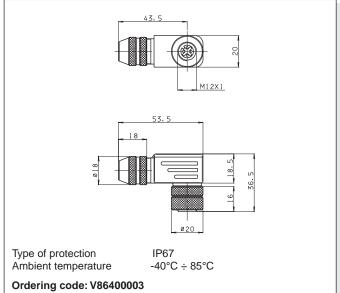
In addition to the shape and the dimensions of the sensor, its sensitivity also depends on the type of metal from which the activator is made.







OVERALL DIMENSIONS CONNECTOR





ABBREVIATIONS

AP	HIGH PRESSURE CONNECTION
AS	Phase lag (degrees)
BP	LOW PRESSURE CONNECTION
С	Stroke (MM)
СН	ACROSS FLATS
Сн	INTERNAL ACROSS FLATS
DA	Amplitude decay (dB)
DP	DIFFERENTIAL PRESSURE (BAR)
F	Force (N)
1%	Input current (A)
Μ	MANOMETER CONNECTION
NG	KNOB TURNS
OR	SEAL RING
Р	LOAD PRESSURE (BAR)
PARBAK	PARBAK RING
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

IN LINE VALVES CARTRIDGE VALVES

SEE CATALOGUE CODE DOC00044



6



			UMINIUM (*) SUBPLATES
	ABBREVIATIONS		
AP AS BP	High pressure connection Phase lag (degrees) Low pressure connection	SUBPLATES CETOP 2	
C CH DA DP F I% M NG OR P	Stroke (MM) Across flats Internal across flats Amplitude decay (dB) Differential pressure (bar) Force (N) Input current (A) Manometer connection Knob turns Seal ring Load pressure (bar)		
PARBA		BS2 CAP. VII • 2	BS5
PL P-	PARALLEL CONNECTION	BC2 CAP. VII • 4	BC5
Pr Q	Reduced pressure (bar) Flow (l/min)	BM2 CAP. VII • 5	BM5
Q₽ SE SF SR	PUMP FLOW (L/MIN) ELASTIC PIN BALL SERIES CONNECTION		
X	PILOTING		

Drainage

SUBPLATES

SUBPLATES CETOP 3

BS3	Cap. VII • 7
BS3W	Cap. VII • 9
BC3	Cap. VII • 10
BC* FOR XQ*3	Cap. VII • 13
BC06	Cap. VII • 14
BM3	Cap. VII • 16



CMP10

For other cartridge valve, see catalogue code DOC00044

Cast iron subplates, recommended pressure max. 320 bar Aluminium subplates, recommended pressure max. 230 bar *



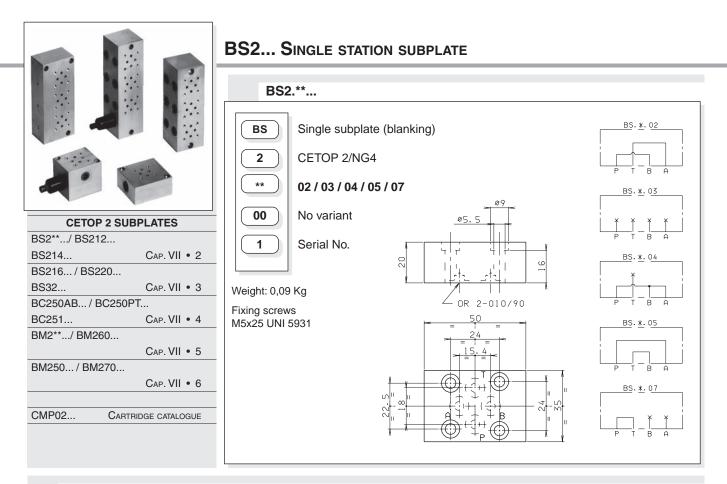
Χ Υ



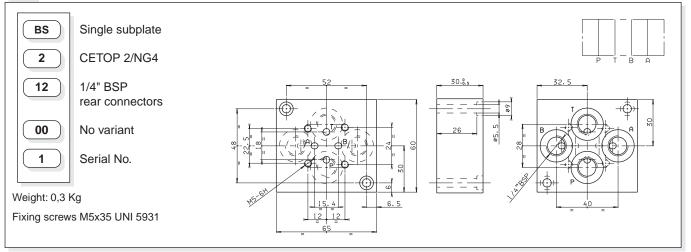
Cap. VII • 19

CAP. VII • 24

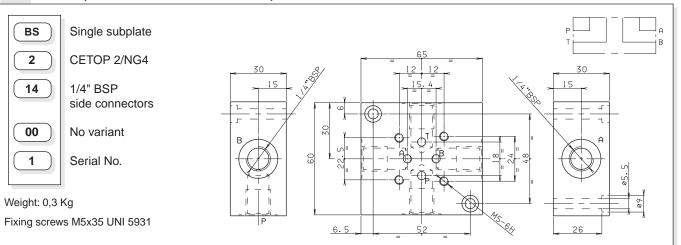
Cap. VII • 28



BS212 (WITH REAR CONNECTION TO 1/4" BSP)



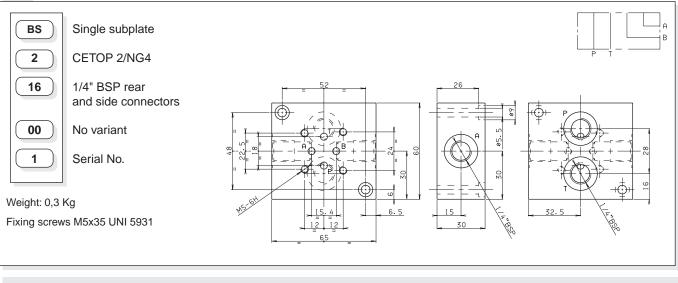
BS214 (WITH SIDE CONNECTION TO 1/4" BSP)



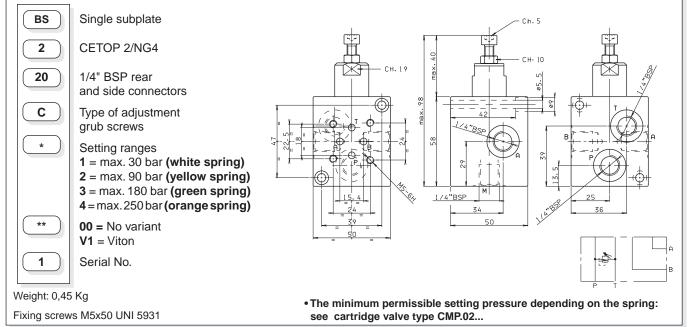
VII • 2

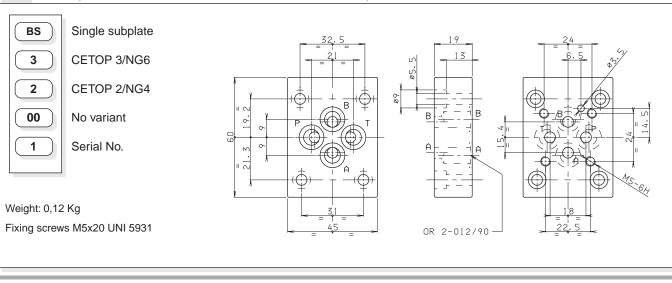








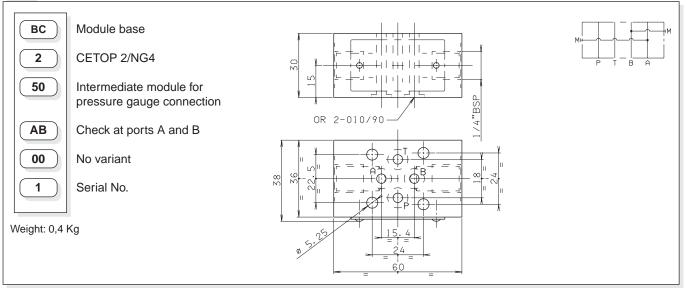




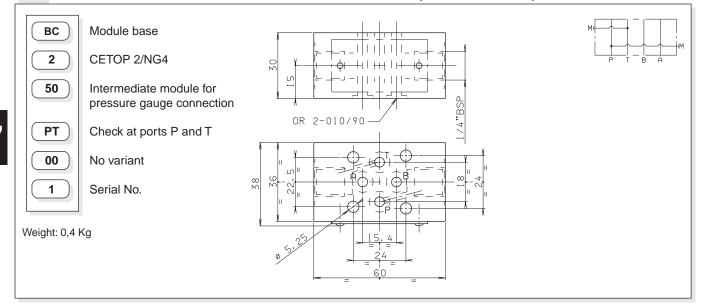
BS32 (REDUCTION PLATE FROM CETOP 3/NG6 TO CETOP 2/NG4)



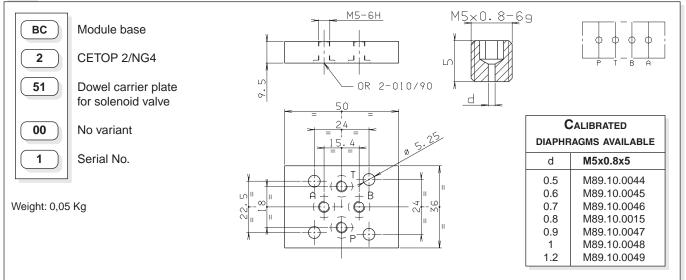




BC250PT INTERMEDIATE MODULE FOR PRESSURE GAUGE CONNECTION (VENTS P AND T LINES)



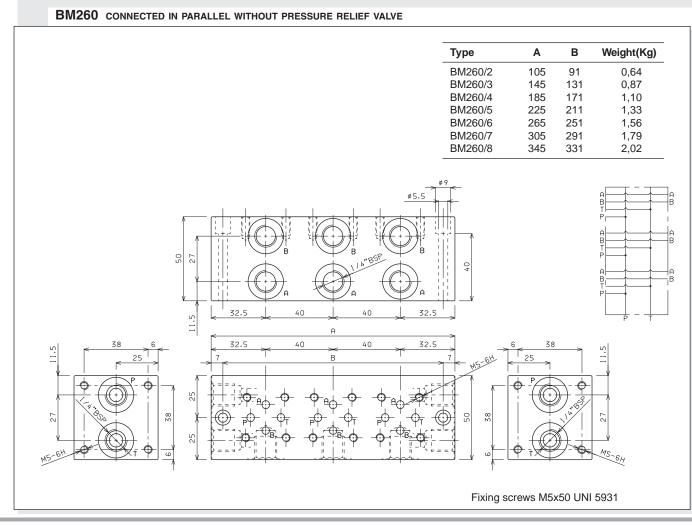
BC251 DOWEL CARRIER PLATE FOR SOLENOID VALVE





BM250/60/70

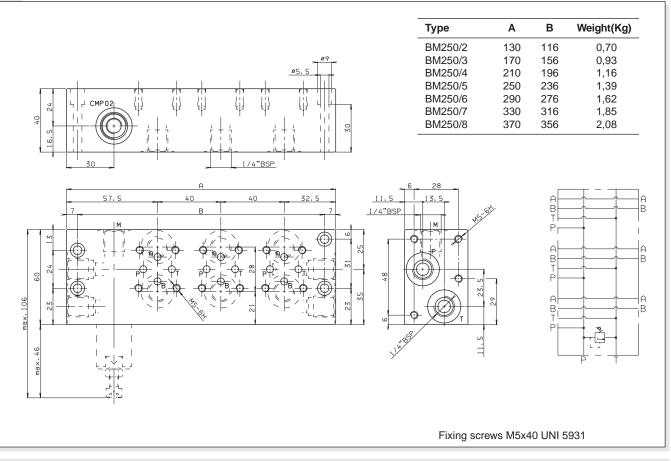
BM	Multi station subplate (supplied in aluminium material)
2	CETOP 2/NG4
**	 50 = Connected in parallel with pressure relief valve and rear connectors 70 = Connected in parallel with pressure relief valve and side connectors 60 = Connected in parallel without pressure relief valve and side connectors
*	No. of valve seats 2/3/4/5/6/7/8
С	Type of adjustment (omit for 60 version) Grub screw
*	Setting range (omit for 60 version) 1 = max. 30 bar (white spring) 2 = max. 90 bar (yellow spring) 3 = max. 180 bar (green spring) 4 = max. 250 bar (orange spring)
**	00 = No variant V1 = Viton
1	Serial No.
	• The minimum permissible setting pressure depending on the spring: see cartridge valve type CMP02



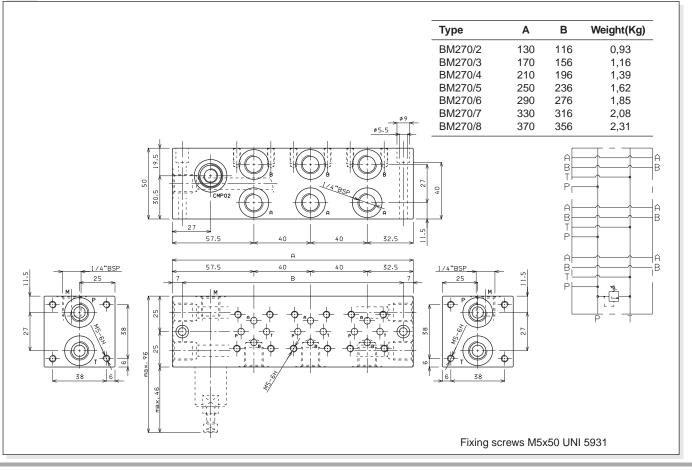




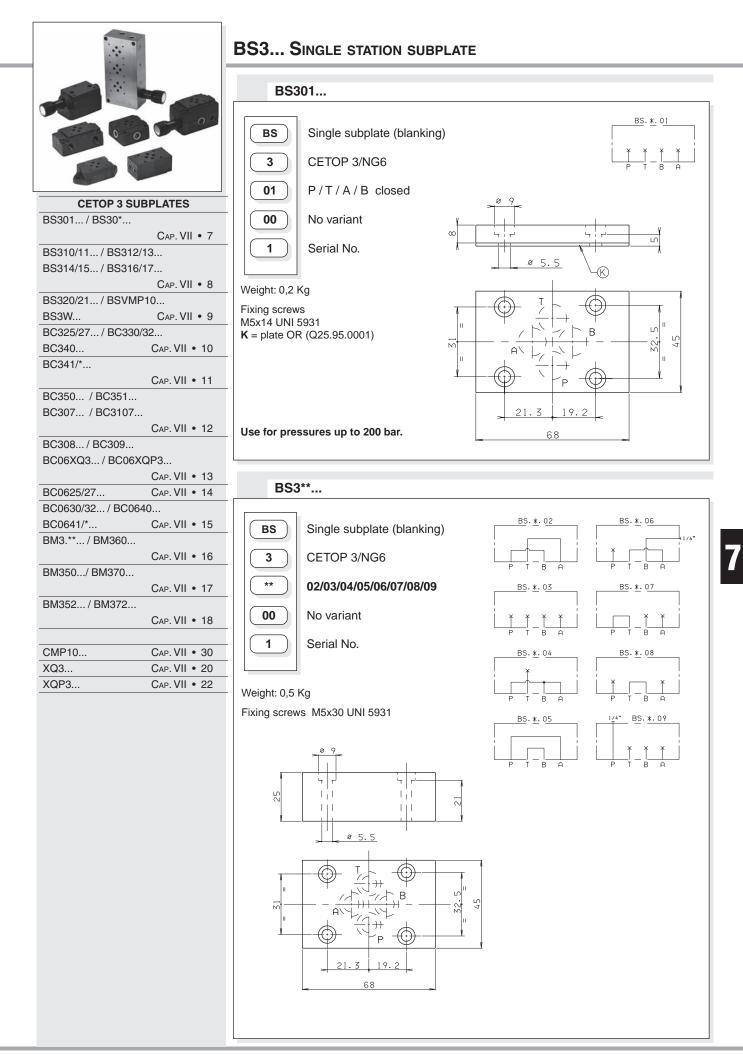




BM270 CONNECTED IN PARALLEL WITH PRESSURE RELIEF VALVE



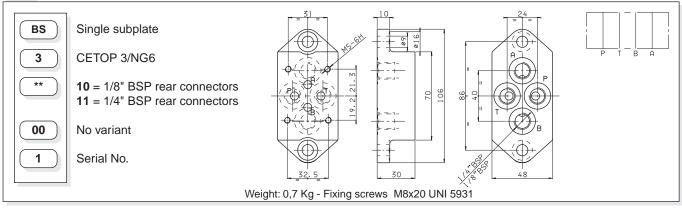




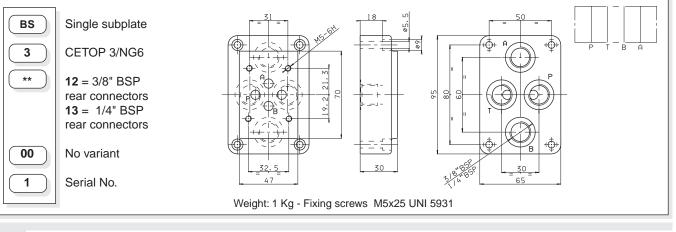
VII • 7



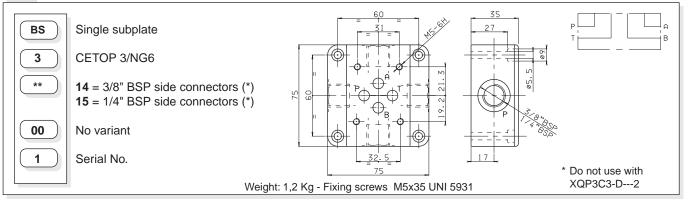




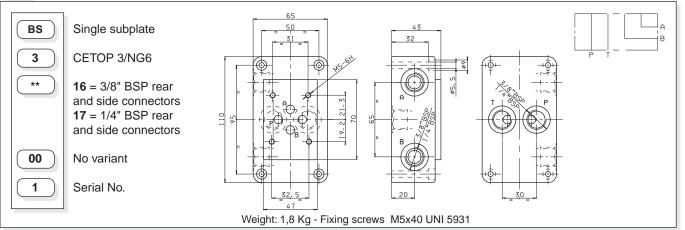
BS312/13 (REAR CONNECTORS)





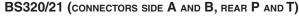


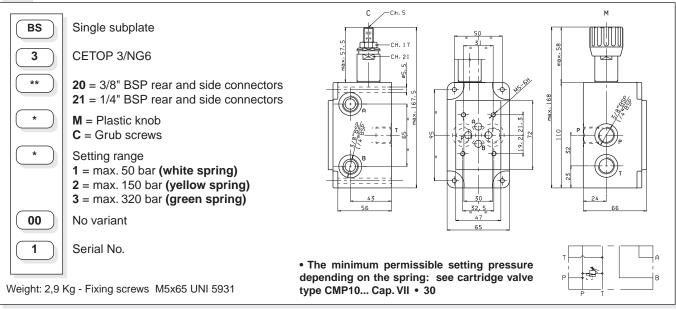
BS316/17 (CONNECTORS SIDE A AND B, REAR P AND T)



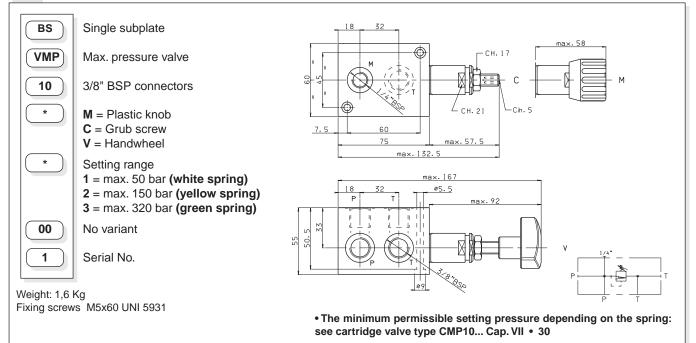


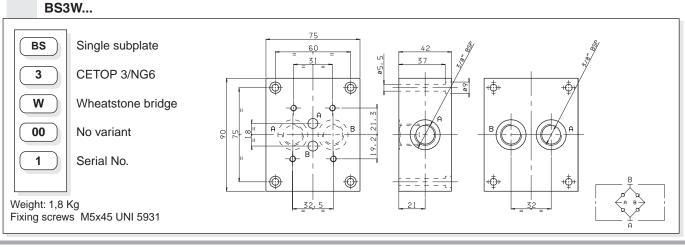




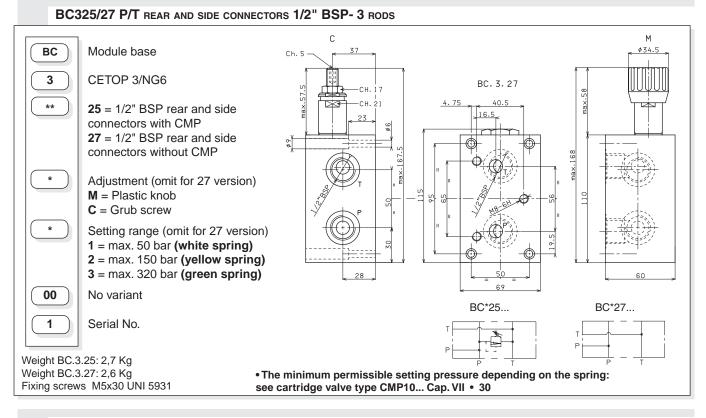


BSVMP10 SINGLE STATION SUBPLATE WITH MAX. PRESSURE VALVE FOR SURFACE MOUNTING (E.G. ON TAKE COVER)

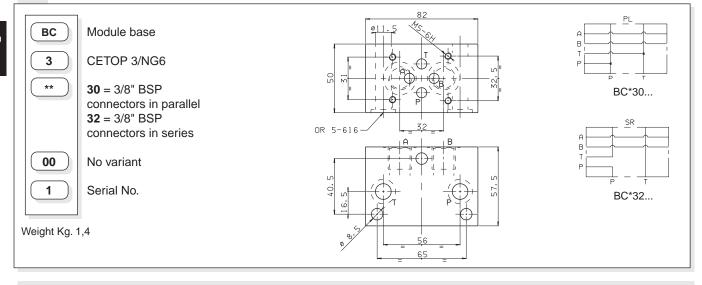




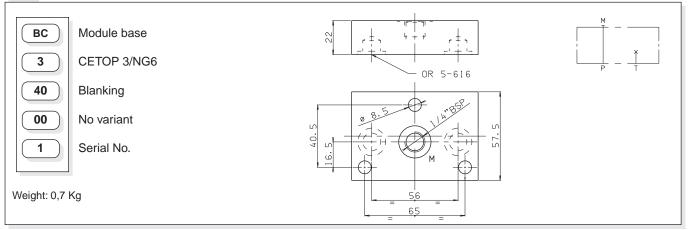




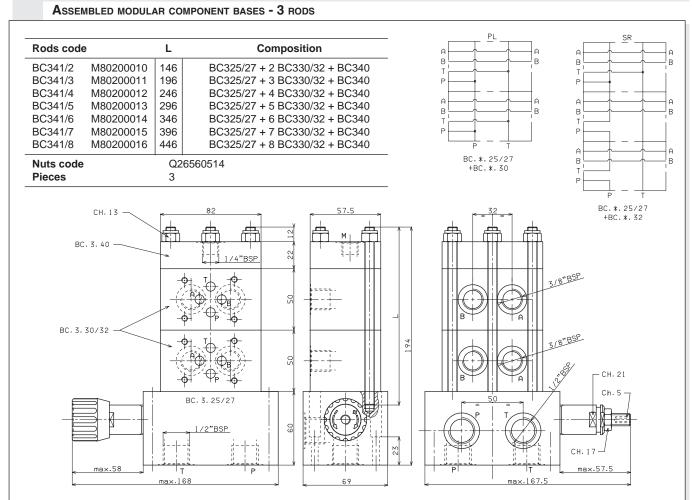
BC330/32 - 3 RODS



BC340 - 3 RODS







• For series connection the last block high up should be connected in parallel (BC330)

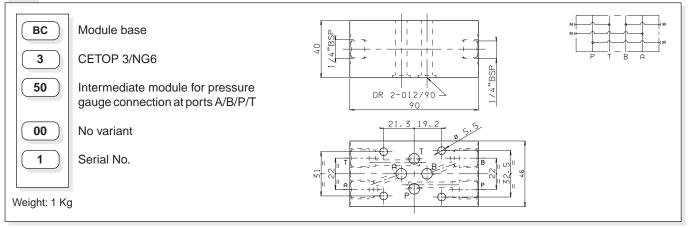
Single components should be ordered separately

• The minimum permissible setting pressure depending on the spring: see cartridge valve type CMP10... Cap. VII • 30

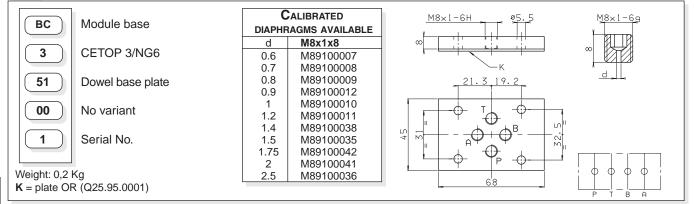
ieces L Composition	Pieces	Rod code
3146for 2 solenoid valves3196for 3 solenoid valves3246for 4 solenoid valves3296for 5 solenoid valves3346for 6 solenoid valves3396for 7 solenoid valves3446for 8 solenoid valves	3 3 3 3 3	3C341/2001 3C341/3001 3C341/4001 3C341/5001 3C341/6001 3C341/7001 3C341/8001



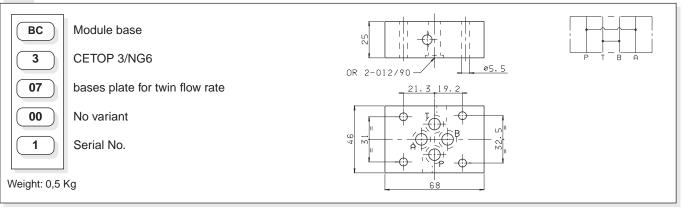
BC350 INTERMEDIATE MODULE FOR PRESSURE GAUGE CONNECTION



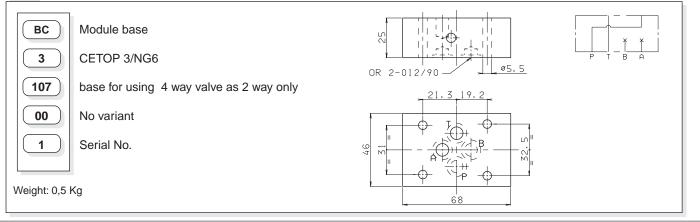
BC351 DOWEL BASE PLATE FOR SOLENOID VALVE



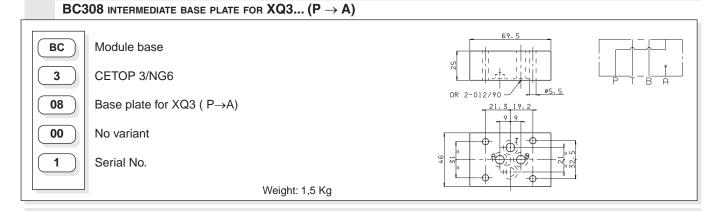
BC307 base plate for double flow rate $P{\rightarrow}A~~\text{and}~~B{\rightarrow}T$



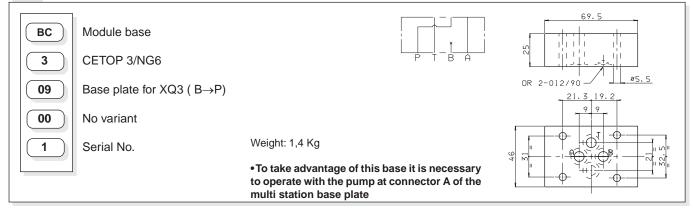
BC3107 base plate for using 4 way value as 2 way only

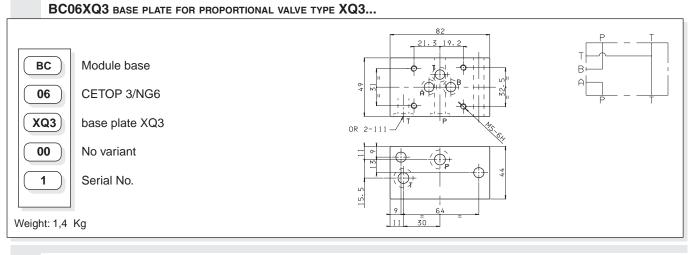




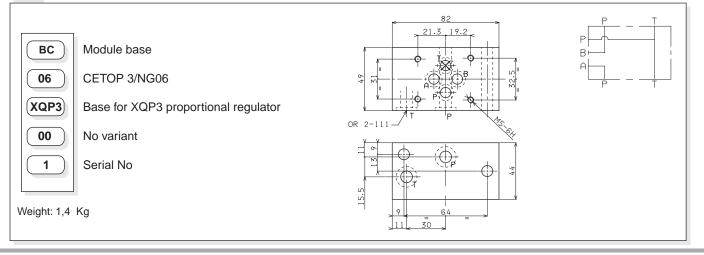


BC309 INTERMEDIATE BASE PLATE FOR XQ3... (B \rightarrow P)



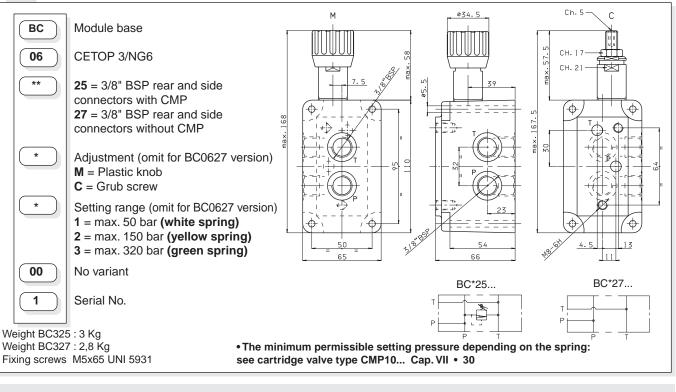


BC06XQP3 BASE PLATE FOR PROPORTIONAL REGULATOR TYPE XQP3...

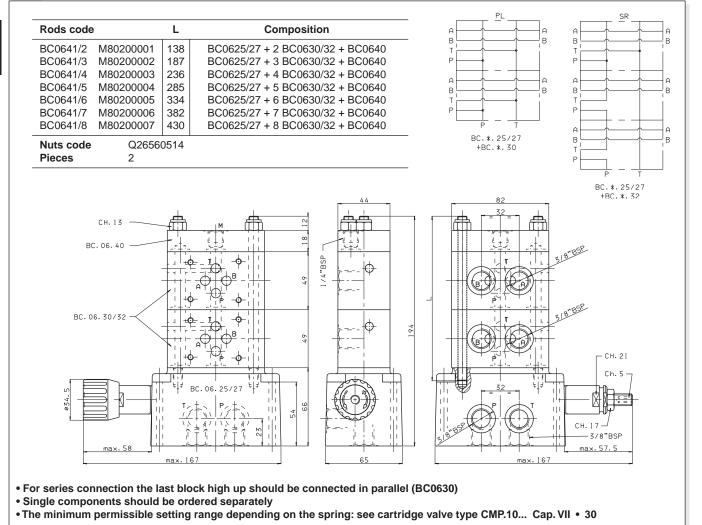








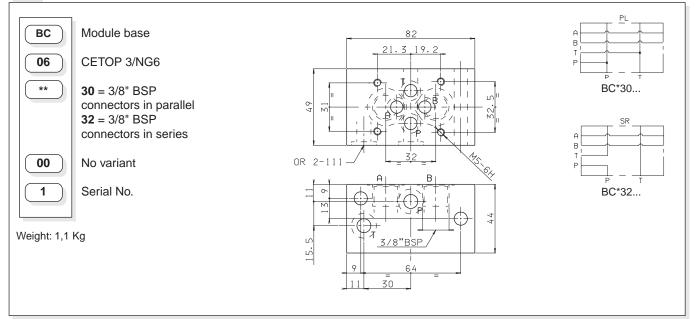
ASSEMBLED MODULAR COMPONENT BASES - 2 RODS



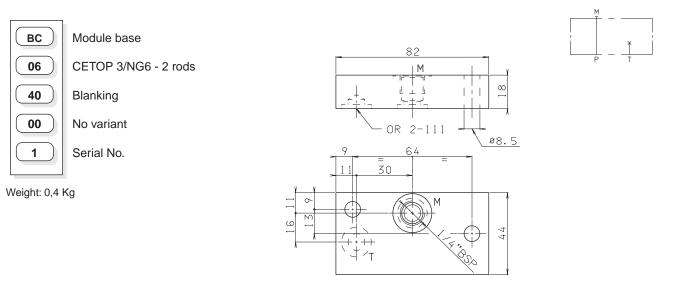
VALV/BC06001_E/03-2015



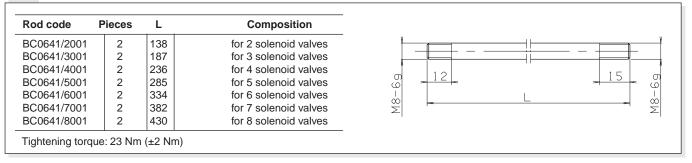
BC0630/32 - 2 RODS



BC0640 - 2 RODS



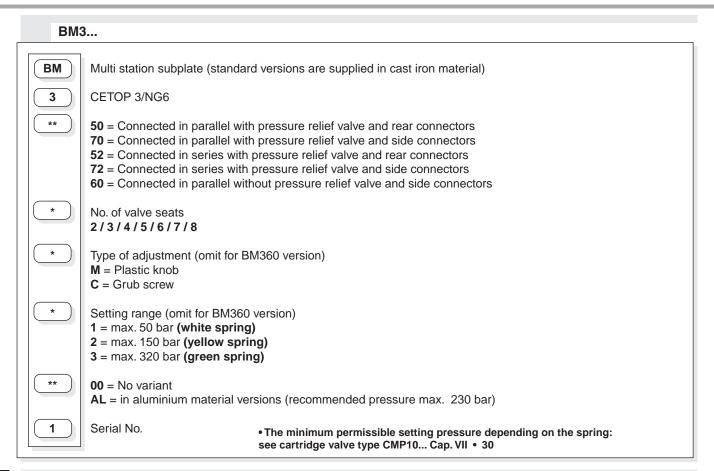
BC0641/* RODS FOR MODULAR ASSEMBLY

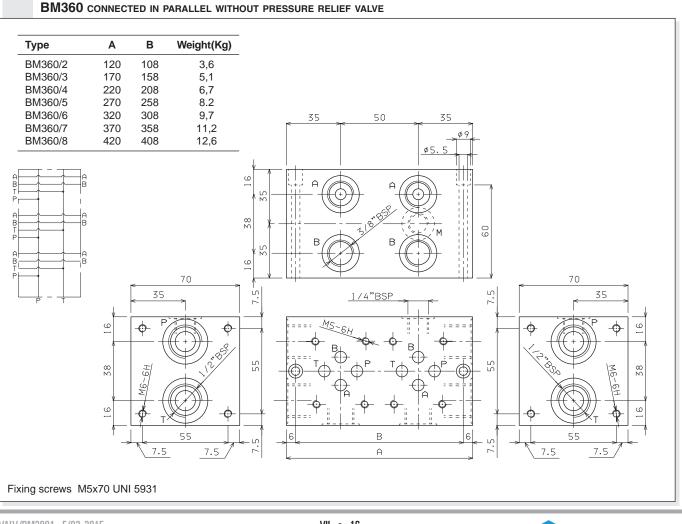




Motion Systems

DANA

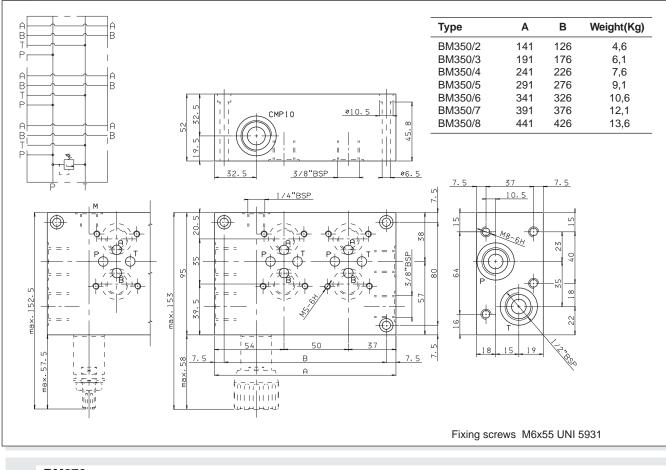




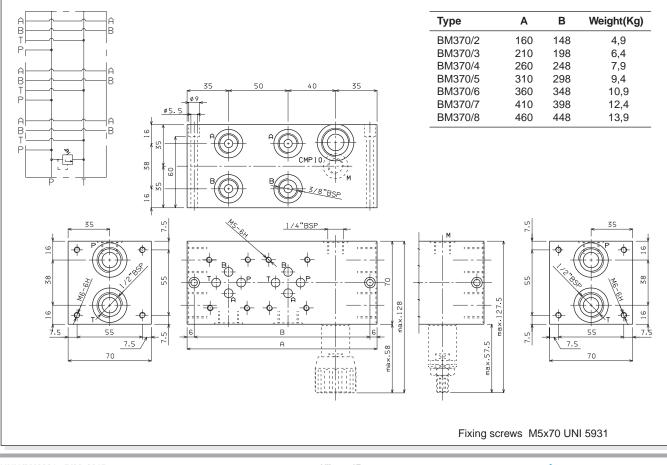
VALV/BM3001_E/02-2015





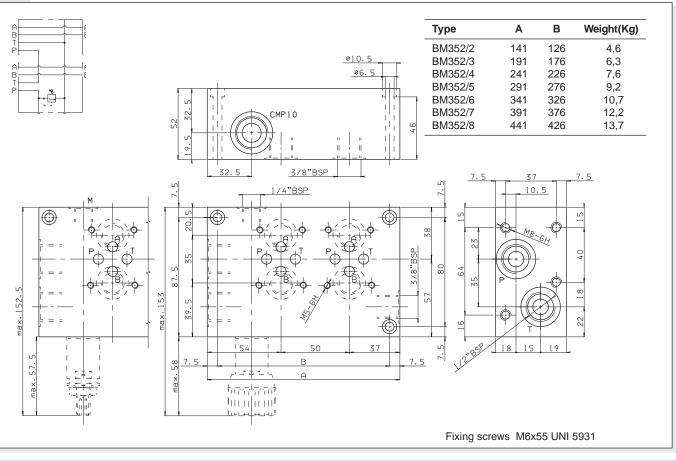




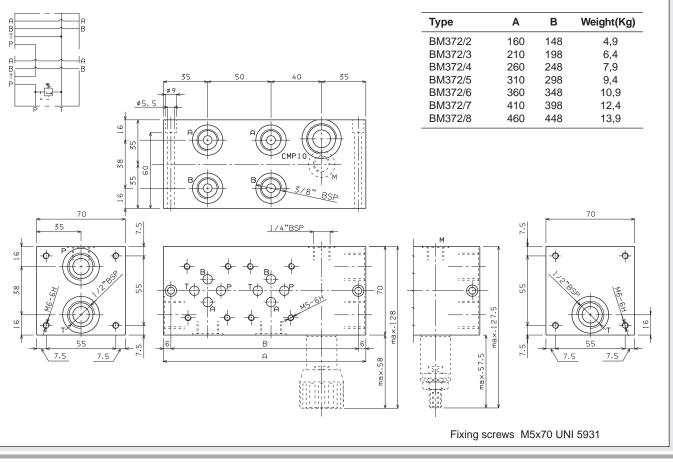








BM372 CONNECTED IN SERIES WITH PRESSURE RELIEF VALVE

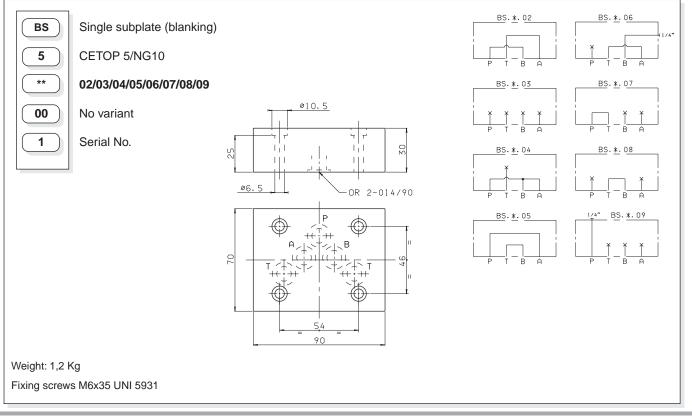


7



0	BS5 SINGLE STATION SUBPLATE	
a	BS501	
	BS Single subplate (blanking) 5 CETOP 5/NG10 P/T/A/B closed	$\begin{bmatrix} BS. \underline{*}. 01 \\ \hline \\ P T \end{bmatrix} = \begin{bmatrix} X & X \\ B & A \end{bmatrix}$
CETOP 5 SUBPLATES		
BS501 / BS50 CAP. VII • 19	00 No variant	
BS512 / BS513 BS514 / BS515	1 Serial No.	
CAP. VII • 20 BS516 / BS517		
BS516 / BS517 BS53 CAP. VII • 21	• Pay attention please, use	0.5
BS530/31 CAP. VII • 22	these subplate in applications	0.3
BSVMP20 / BS529 CAP. VII • 23	− at slow pressure (P max. 150 bar dynamic)	
BC536/28 CAP. VII • 24	<u>,</u> <i>№</i> 6.	<u>5</u> <u>K</u> <u>5</u>
BC541/* / BC540 Cap. VII • 25		
BC530/32 / BC550 BC551 CAP. VII • 26		
BC507 / BC5107		
BC53A / BC1006		
Cap. VII • 27		
BM5** / BM550		
Cap. VII • 28		5.4
BM560 / BM570	Weight: 0,5 Kg	90
BM580 CAP. VII • 29		
CMP20 CARTRIDGE CATALOGUE CMP30 CARTRIDGE CATALOGUE	Fixing screws M6x15 UNI 5931 K = plate OR (Q25950002)	
R\$5		

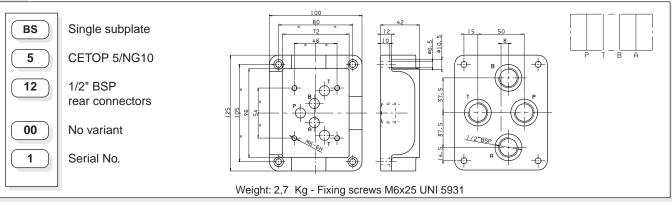
BS5...



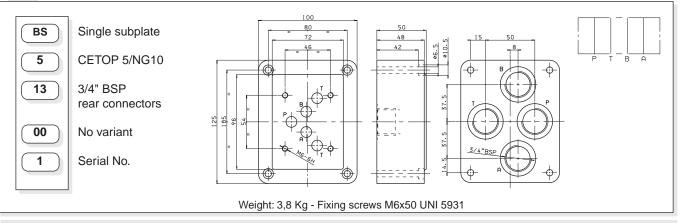


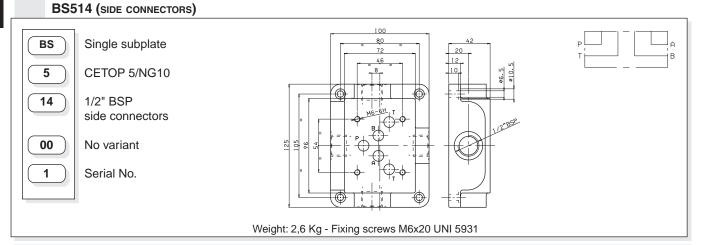




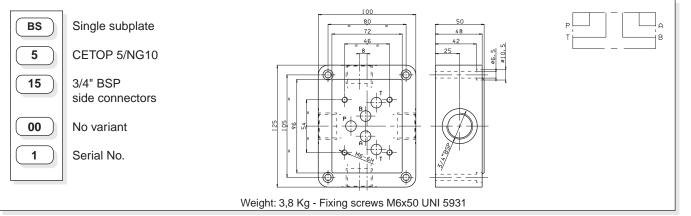




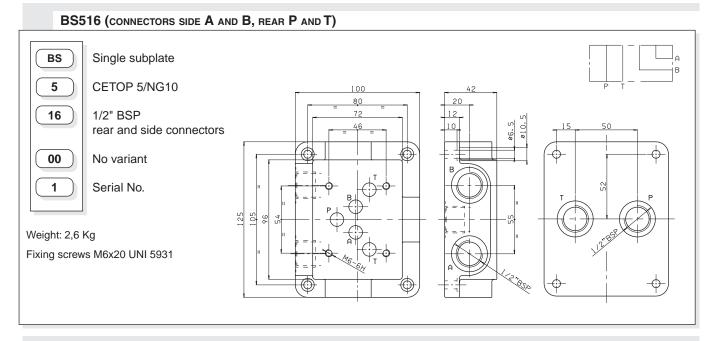




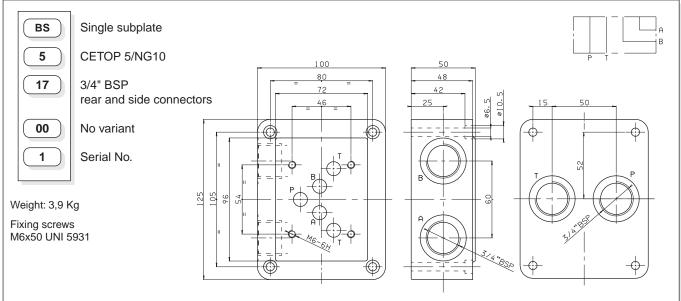




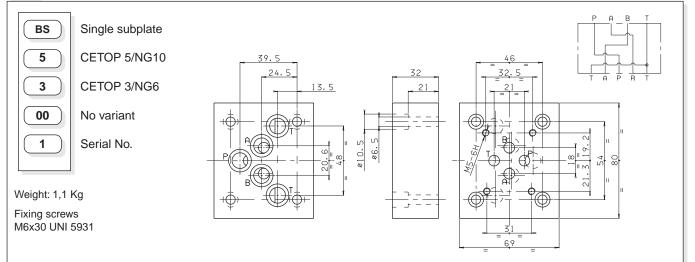




BS517 (connectors side A and B, rear P and T)



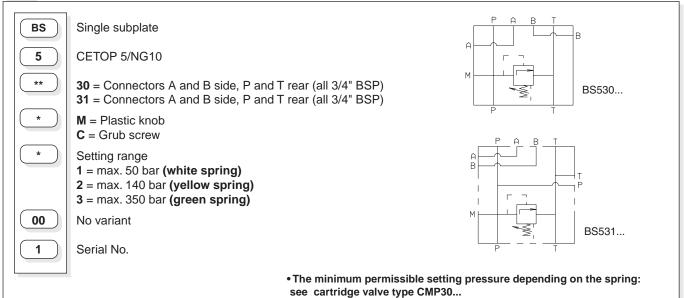
BS53 (REDUCTION PLATE FROM CETOP 5/Ng10 TO CETOP 3/Ng6)

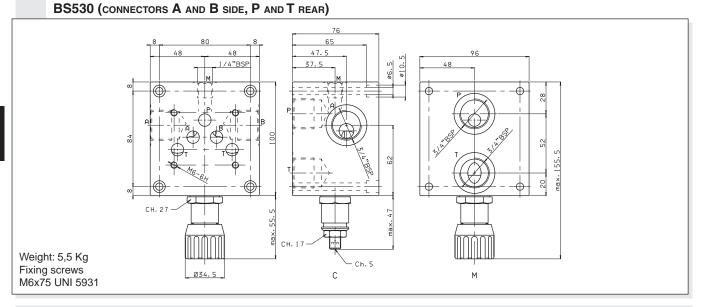




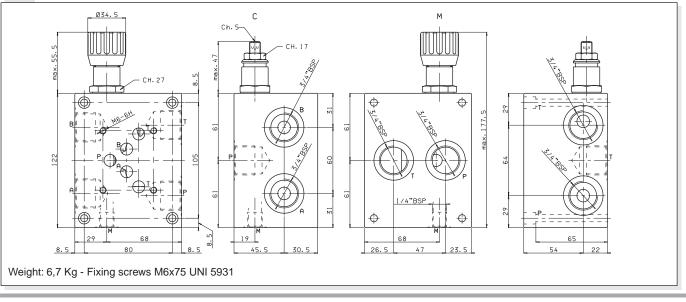


BS530/31



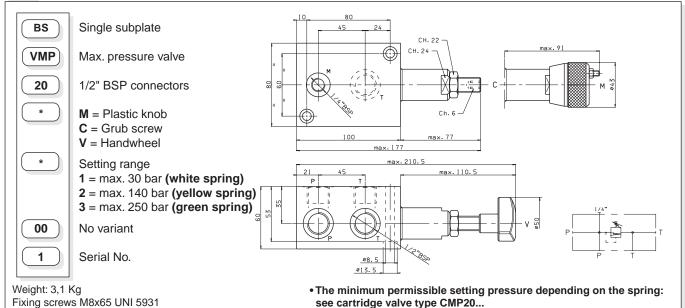


BS5.1 (CONNECTORS A AND B SIDE, P AND T SIDE AND REAR)

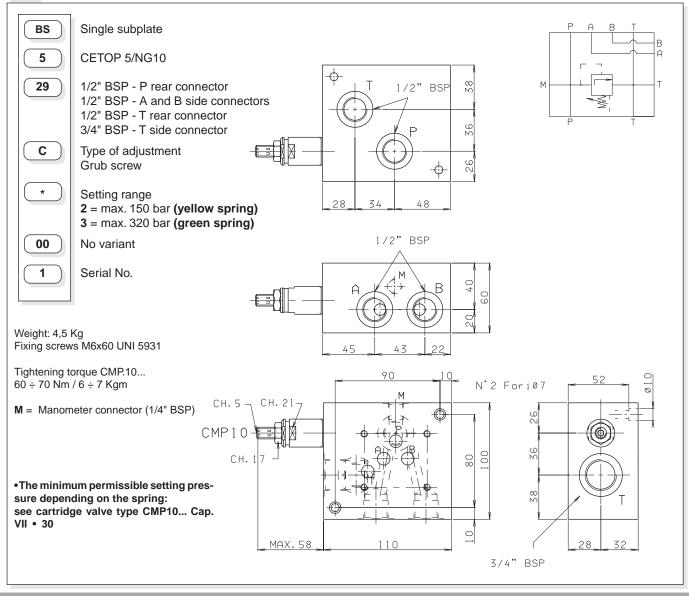






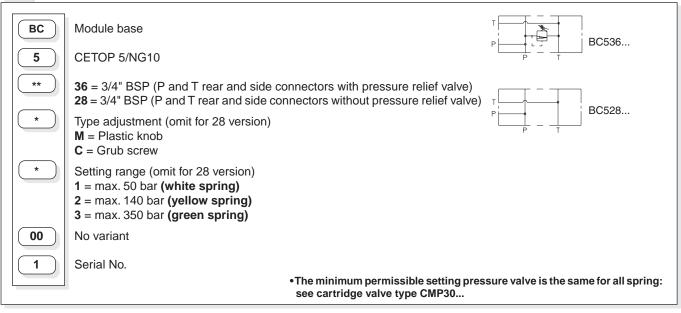


BS529 SINGLE STATION SUBPLATE WITH MAX. PRESSURE VALVE FOR AD51...

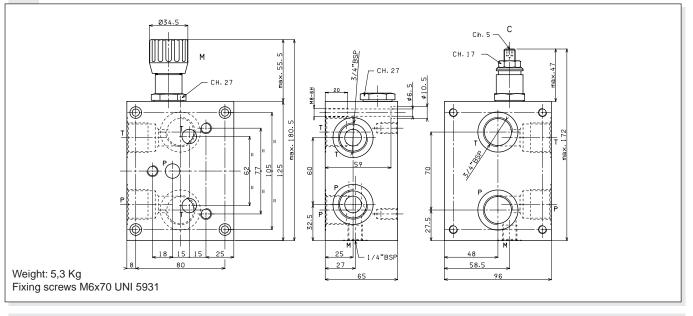


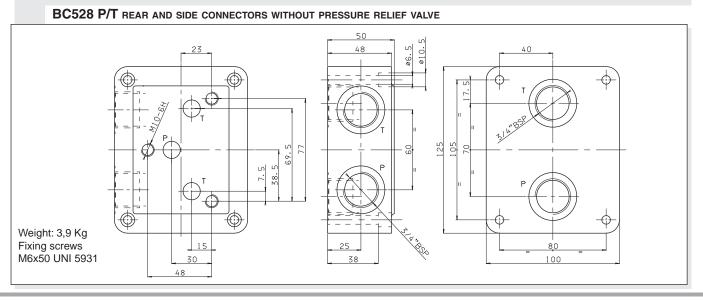


BC536/28 P AND T REAR AND SIDE CONNECTORS 3/4" BSP

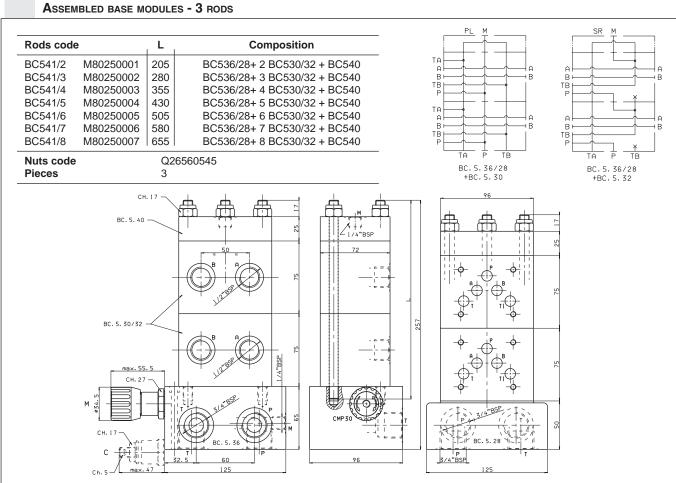


BC536 P/T REAR AND SIDE CONNECTORS WITH PRESSURE RELIEF VALVE





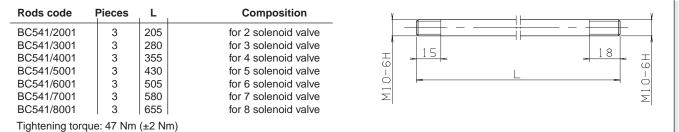




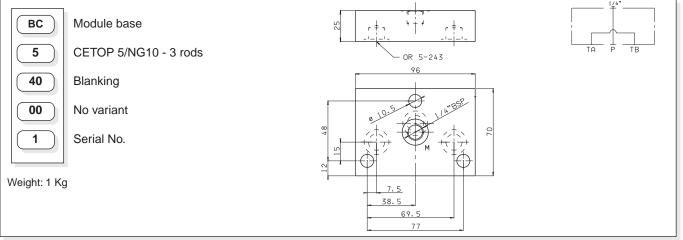
· Single components should be ordered separately

• The minimum permissible setting pressure is the same for all spring: see cartridge valve type CMP30...

BC541/* RODS FOR MODULAR ASSEMBLIES

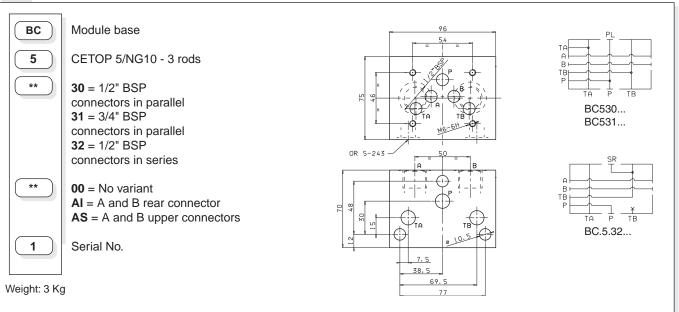




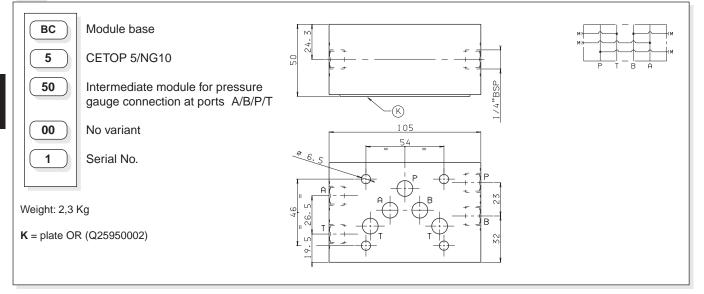




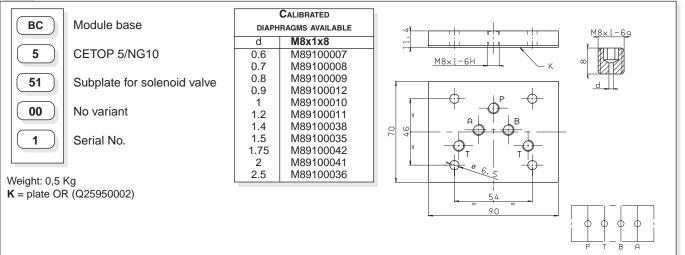
BC530/32



BC550 INTERMEDIATE MODULE FOR PRESSURE GAUGE

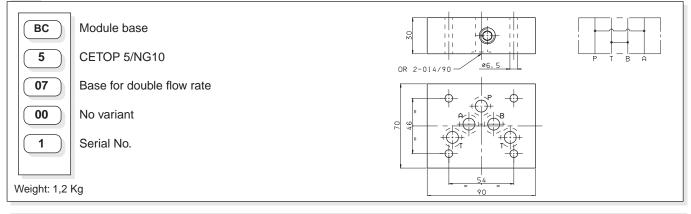


BC551 DOWEL PLATE FOR SOLENOID VALVE





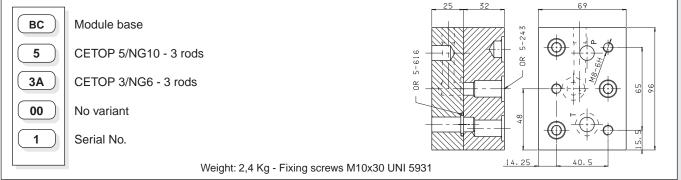
BC507 base for double flow rate $P{\rightarrow}A\ \mbox{e}\ \ B{\rightarrow}T$



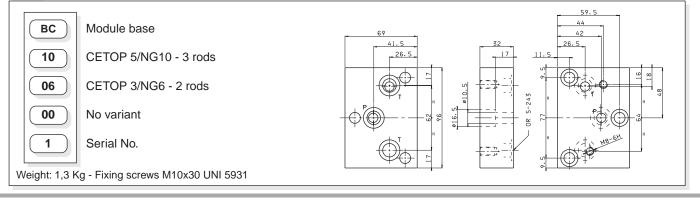
BC Module base 20 5 CETOP 5/NG10 107 Base for use with 2 way valve ø6.5 OR 2-014/90 00 No variant Serial No. 1 70 94 Weight: 1,2 Kg 54 90

BC53A REDUCTION BASE FROM BC5... TO BC3...

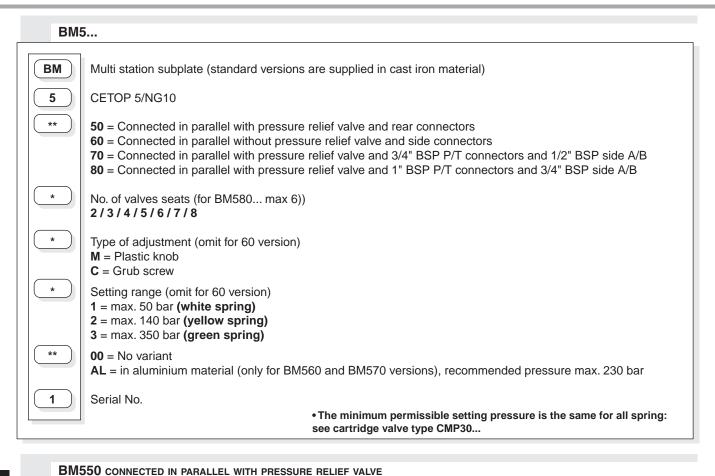
BC5107 BASE FOR USE WITH 2 WAY VALVE

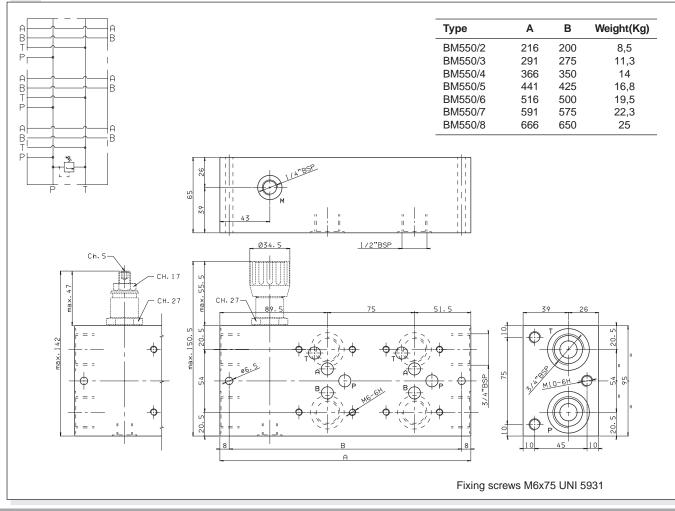


BC1006 REDUCTION BASE FROM BC5... TO BC06...

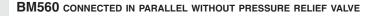


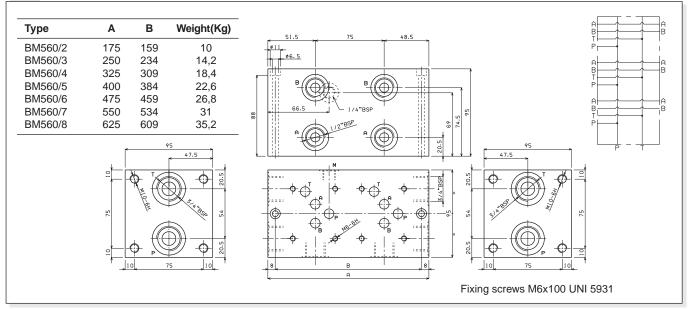




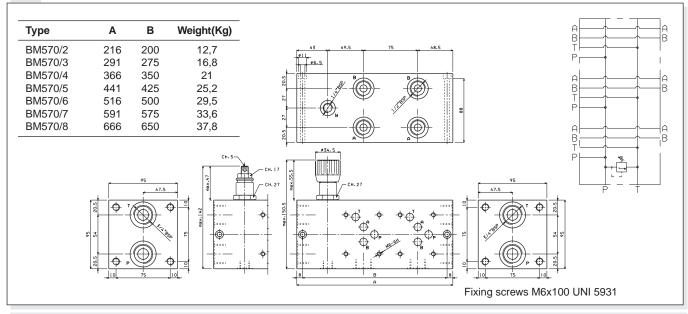




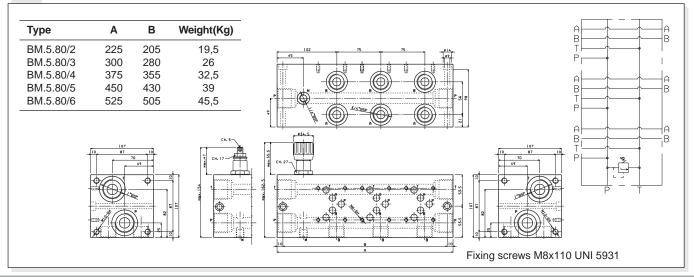




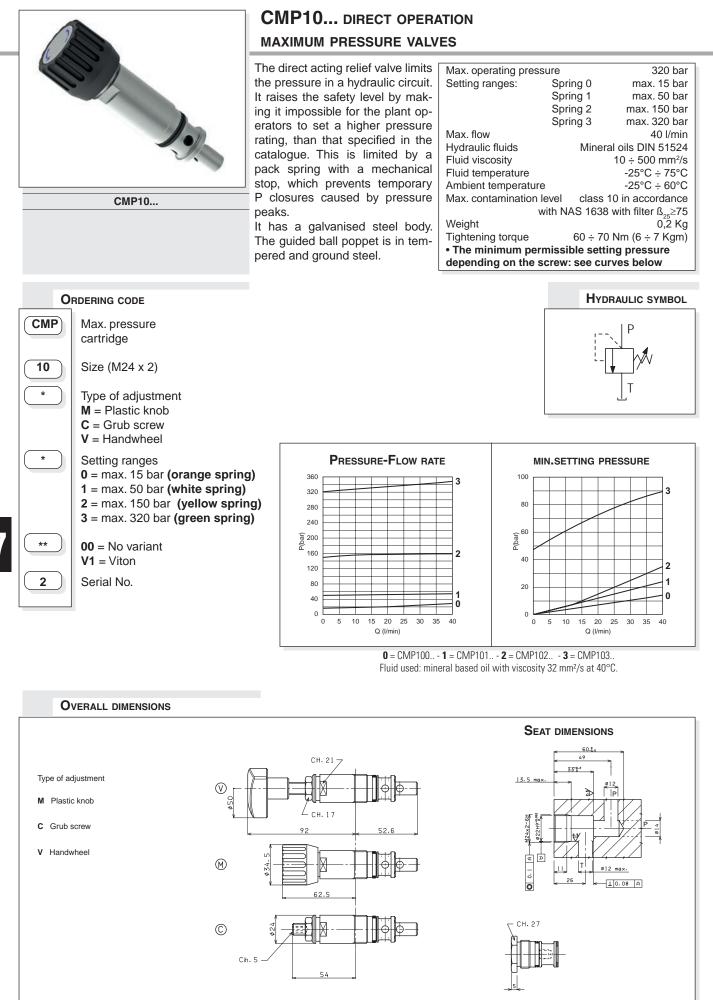
BM570 CONNECTED IN PARALLEL WITH PRESSURE RELIEF VALVE



BM580 CONNECTED IN PARALLEL WITH PRESSURE RELIEF VALVE







00012008 Spare seals kit

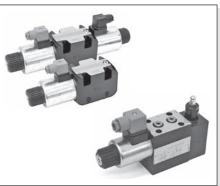
VII • 30



Motion Systems

Valve seat plug code R78300564

PROPORTIONAL VALVES



XD2A / XD2C	Cap. VIII • 2
XD3A / XD3C	Cap. VIII • 4
D15P PROPORTIONAL SOLENOIDS	Cap. VIII • 5
XDP3A / XDP3C	Cap. VIII • 6
D15P PROPORTIONAL SOLENOIDS	Cap. VIII • 7
XDP5A / XDP5C	CAP. VIII • 8
D19P PROPORTIONAL SOLENOIDS	Cap. VIII • 9
XDC3 SERIE 2	Cap. VIII • 10
PROPORTIONAL SOLENOIDS XDC3	CAP. VIII • 11
АМЗН	Cap. VIII • 12
AM5H	Cap. VIII • 13
XQ3	CAP. VIII • 14
D15P PROPORTIONAL SOLENOIDS	Cap. VIII • 15
XQP3.	CAP. VIII • 16
D15P PROPORTIONAL SOLENOIDS	Cap. VIII • 17
XQP5.	CAP. VIII • 18
D15P PROPORTIONAL SOLENOIDS	Cap. VIII • 19
XP3	Cap. VIII • 20
AM3XMP	Cap. VIII • 22

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ABBREVIATIONS

AP	HIGH PRESSURE CONNECTION
AS	Phase lag (degrees)
BP	Low pressure connection
С	Stroke (MM)
СН	ACROSS FLATS
Сн	INTERNAL ACROSS FLATS
DA	Amplitude decay (dB)
DP	DIFFERENTIAL PRESSURE (BAR)
F	Force (N)
1%	Input current (A)
М	MANOMETER CONNECTION
NG	KNOB TURNS
OR	SEAL RING
Р	Load pressure (bar)
PARBA	PARBAK RING
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	
Y	Drainage





XD2A / XD2C SOLENOID OPERATING
PROPORTIONAL VALVES CETOP 2

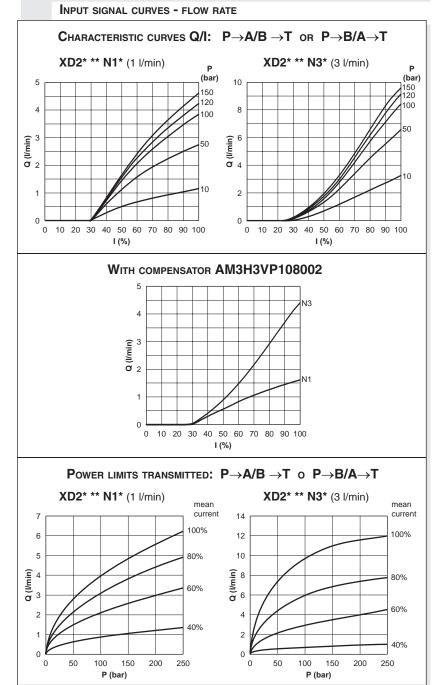
XD2A../XD2C.. series valves are used for controlling fluid direction and flow rate as a function of the supply current to the proportional control solenoid.

Any valve Δp variation causes a change in the set flow rate; however the valve itself ensures a high level internal compensation maintaining constant a regulated flow.

The XD2 cetop valve could be used for accurate proportional controls with compact size, reducing weight.

These valves can be also combined with Mini Powerpacks type MR/MC/FP creating compact solutions. Il can be also used on a Cetop 3 interface using a reduction plate type BS32001.





The fluid used was a mineral oil with a viscosity of 46 mm²/s at 40°C. The tests have been carried out at with a fluid of 40°C.

 XD2...

 STANDARD CONNECTORS
 CAP. I • 20

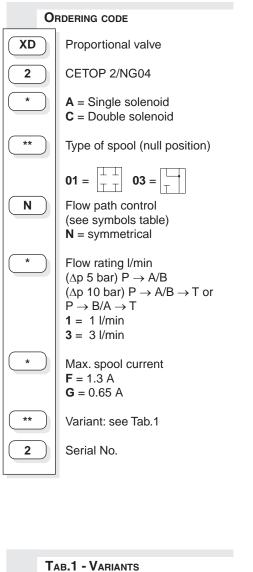
 REMSRA...
 CAP. IX • 4

 REMDRA...
 CAP. IX • 7

 CEPS
 CAP. IX • 2

 AM3H...
 CAP. VIII • 12

 BS32001
 CAP. VIII • 3



IAB.I - VARIANIS	
No variant (without connectors)	S1(*)
Emergency button	ES
Viton	SV

(*) Coils with Hirschmann connection supplied without connectors. The connectors can be ordered separately, Cap. I • 20.



OPERATING SPECIFICATIONS

Max. operating pressure ports P/A/B (1)	250 bar		
Max. operating pressure port T - for dynamic pressure see	250 bar		
Nominal flow rate: (Δp 5 bar: P \rightarrow A/B) (Δp 10 bar: P \rightarrow A/B \rightarrow T or F	Nominal flow rate: $(\Delta p \ 5 \text{ bar}: P \rightarrow A/B)$ $(\Delta p \ 10 \text{ bar}: P \rightarrow A/B \rightarrow T \text{ or } P \rightarrow B/A \rightarrow T)$		
Maximum regulated flow rate: (Δp 150 bar: P \rightarrow A/B \rightarrow T or P \rightarrow B	/A→T)	4.5/9.5 l/min	
Flow rate gain	Flow rate gain		
Hysteresis with connection P/A/B/T $\Delta p = 5$ bar (P/A) $\leq 13\%$		of max. flow rate	
Fluid viscosity		10 ÷ 500 mm²/s	
Fluid temperature		-20°C ÷ 75°C	
Ambient temperature		-25°C ÷ 60°C	
Max. contamination level class 8 in		accordance with	
	NAS 1638	with filter B₁₀≥75	
Weight XD.2.A (single solenoid)		1.0 Kg	
Weight XD.2.C (double solenoid)		1.37 Kg	

• Operating specifications are valid for fluid with 46 mm²/s viscosity at 40°C, using the specified electronic control units.

Supply voltage	12VDC	24VDC	
Supply tolerance	+/- 10%		
Supply voltage type	PWM (pulse width modulation)		
Frequence PWM or Dither	100-150 Hz		
Relative duty cycle Continuous 10		s 100% ED	
Max. current	1.3A 0.65A		
Solenoid coil resistance at 20°C (68°F)	5.5 Ohm	21.8 Ohm	

ELECTRONIC CONTROL UNIT

REMSRA** and **REMDRA**** Card type control for single and double solenoid. Recommended dither frequency 100 Hz.

CEPS

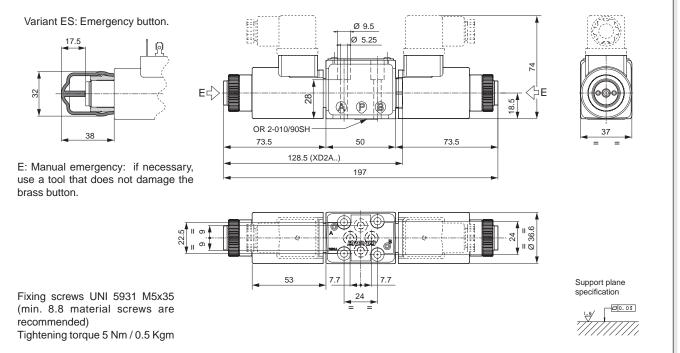
Electronic amplifier plug version for single solenoid proportional valve (150Hz PWM frequency setting)

(1) With AM3H compensator: hysteresist guaranteed up to 150 bar on ports A and B.

Without compensator: use of the valve allowed up to 150 bar.

(2) Dynamic pressure allowed for 500000 cycles.

OVERALL DIMENSIONS

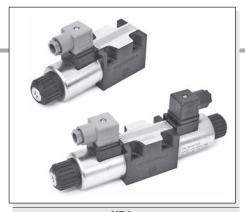




PROPORTIONAL SOLENOID

		_
Type of protection (in relation to connector used)	IP 65	
Insulation class wire	Н	
Weight	0,22 Kg	
Surface treatment	FeZn5 UNI ISO 2081	
		L





XD3	
STANDARD CONNECTORS	Cap. I • 20
"D15P" PROPORT. SOLENOIDS	CAP. VIII • 5
REMSRA	Cap. IX • 4
REMRA	Cap. IX • 7
AM3H	Cap. VIII • 12
BC307	Cap. VII • 12

XD3A... / XD3C... SOLENOID OPERATING PROPORTIONAL VALVES CETOP 3

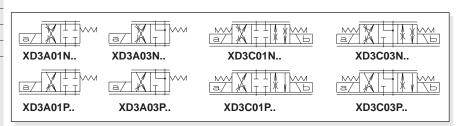
XD3A../XD3C.. series valves are used for controlling fluid direction and flow rate as a function of the supply current to the proportional control solenoid.

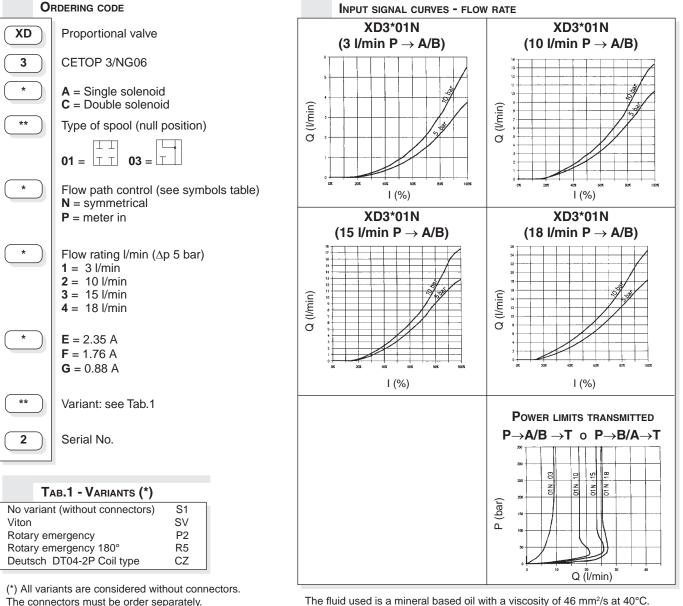
Any valve Δp variation causes a change in the set flow rate; however the valve itself ensure a high level internal compensation by limiting the controlled flow rate.

To ensures a constant flow rate and reduce leakage, we recommend to use AM3H2V or AM3H3V hydrostats.

Performances shown in this catalogue are guaranteed only using 2 or 3 way modular assembly hydrostats type AM3H. ...

The shown flow rates are typical for one line operation (e.g. from P to B), while higher flow rates are obtainable by using the valve with our flow rate doubling sub-base type BC307 (see diagram next page). This type of configuration extends considerably the flow rate limit.



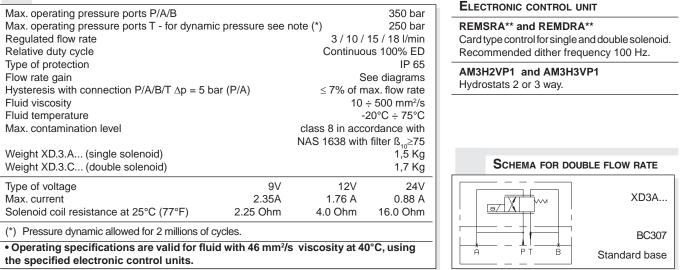


The connectors must be order separately.The fluid used is a mineral based oil with a viscosity of 4See Cap. I • 20.The tests have been carried out at with a fluid of a 40°C.

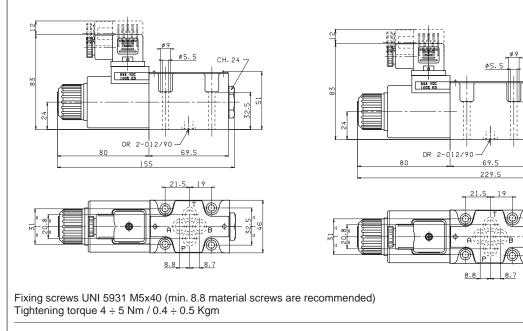
BREVINI

Motion Systems

OPERATING SPECIFICATIONS

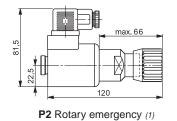


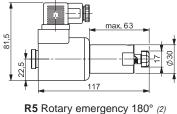




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0.03

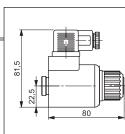




ted can be less than nominal value.

XD3C... OVERALL DIMENSIONS





"D15P" PROPORTIONAL SOLENOIDS

喧し			
	Type of protection (in relation to connector used)	IP 66	
	Duty cycle	100% ED	
	Insulation class wire	н	
	Weight (coil)	0,354 Kg	
×►	Weight (solenoid)	0,608 Kg	





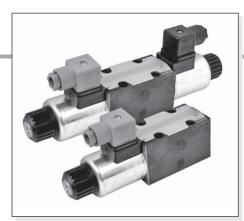
Support plane

regulated flow with emergency actua-

specification

(1) P2 - Adjustable hand emergency.

(2) **R5** - Two positions hand emergency. The

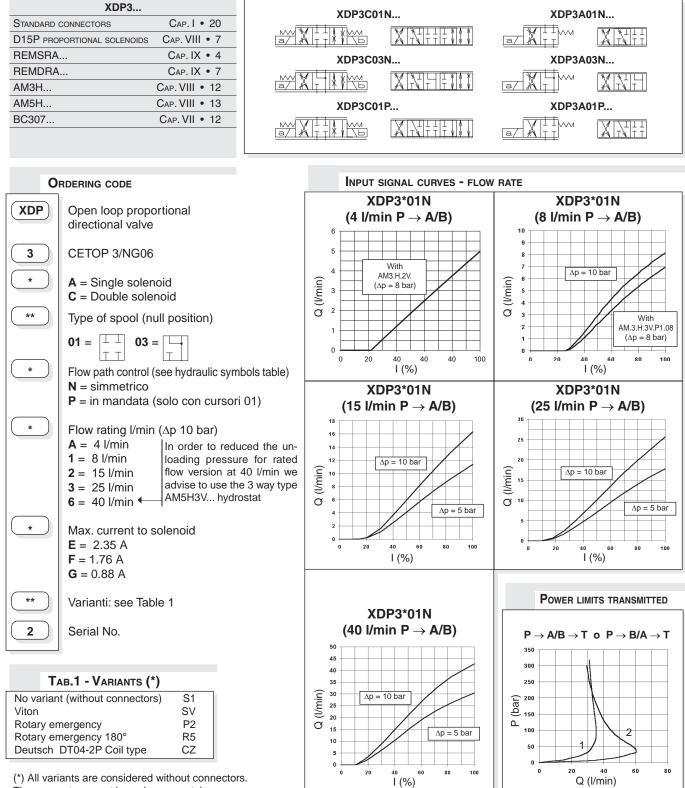


XDP3A... / XDP3C ... PROPORTIONAL DIRECTIONAL VALVES OPEN LOOP

The open loop valves of series XDP... control the direction and the volume of the flow according to the feeding current to the proportional solenoid. By using a valve body equipped with increased passage channels it is possible to reach the highest capacity of its dimensions at a parity of pressure drops, (40 l/min with Δp of 10 bar).

Each Δp variation on the valve leads to the variation of the capacity which has been set, anyway the valve guarantees an high inner compensation grade and limits the adjustment capacity.

Performances shown in this catalogue are guaranteed only using 2 or 3 way modular assembly hydrostats type AM3H. ... By using the valve with the base for capacity doubling type BC307 (see next page) a greater capacity cam be obtained.



The connectors must be order separately. See Cap. I • 20.

8



Curve 2 = 40 l/min

Curve 1= 15 l/min

OPERATING SPECIFICATIONS

OF ERATING OF ECHICATIONS			
Max. operating pressure ports P/A/B			350 bar
Max. pressure port T - for dynamic pressure s	see note (*)		250 bar
Nominal flow		8 / 15 /	25 / 40 l/min
Duty cycle		Continuo	ous 100% ED
Type of protection (depending on the connect	tor used)		IP 65
Flow rate gain			See diagram
Power limits curves transmitted			See diagram
Fluid viscosity		10	÷ 500 mm²/s
Fluid temperature			20°C ÷ 75°C
Ambient temperature			-20°C ÷ 70°C
Max. contamination level		from class 7 at 9 ir	n accordance
	,	with NAS 1638 wit	n filter ß ₁₀ ≥75
Weight XDP3A (single solenoid)			1,7 Kg
Weight XDP3C (double solenoid)			2,9 Kg
Max. current	2.35/	A 1.76 A	0.88 A
Solenoid coil resistance 25°C (77°F)	2.25 Ohr	n 4.0 Ohm	16.0 Ohm
Hysteresis P / A / B / T			
with a pressure compensator AM.3.H.3V	≤5%	6 <5%	<8%
Response to step $\Delta p = 5$ bar (P/A)			
0 ÷ 100%	32 m	s 40 ms	85 ms
100% ÷ 0	33 m	s 33 ms	33 ms
Frequency response -3db (Input signal 50%			
	22H	z 22Hz	12Hz
(*) Pressure dynamic allowed for 2 millions of	of cycles		

Operating specifications are valid for fluids with 46 mm²/s viscosity at 40°C, using the specified electronic control units. Performance data carried out using the specified power amplifier SE3AN... serie 1 - EUROCARD format - powered to 24V.

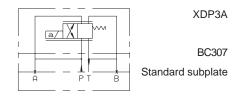
AMPLIFIER UNIT AND CONTROL

REMSRA and REMDRA**** Electronic card control single and double proportional solenoid valve. Recommended dither frequency 100 Hz.

AM3H2VP1 / AM3H3VP1 and AM5H3VP1 (*)

Hydrostats 2 or 3 way (*) for rated flow XDP3 version at 40 l/min only

CONFIGURATION FOR DOUBLE FLOW RATE

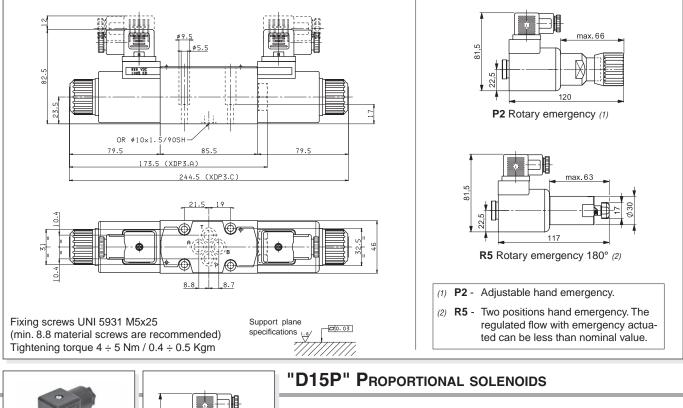


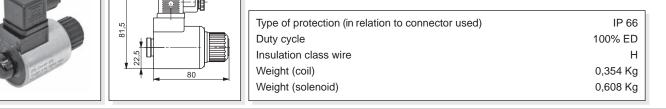
8

BREVINI

Motion Systems

OVERALL DIMENSIONS

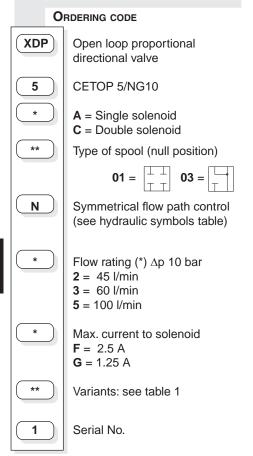








XDP.5				
STANDARD CONNECTORS	Cap. I • 20			
"D19P" PROPORT. SOLENOIDS	Cap. VIII • 9			
REMSRA	Cap. IX • 4			
REMDRA	Cap. IX • 7			
AM5H	Cap. VIII • 13			



(*) Guaranteed with 24Volt, 2.5Amps supply.

TAB.1 - VARIANTS (**)	
No variant (without connectors)	S1
Viton	SV
Rotary emergency	P2
External drainage	S5

(**) All variants are considered without connectors. The connectors must be order separately. See Cap. I • 20.

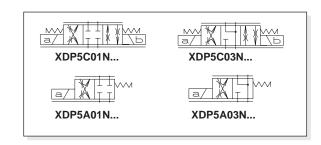
XDP5A... / XDP5C ... PROPORTIONAL DIRECTIONAL VALVES OPEN LOOP

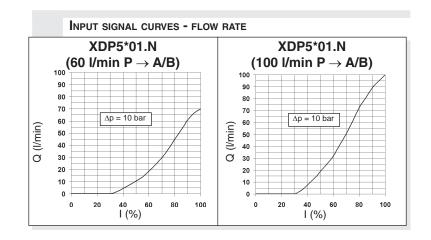
The open loop valves of series XDP control the direction and the volume of the flow according to the feeding current to the proportional solenoid.

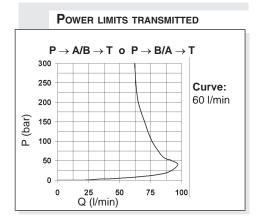
Each Δp variation on the valve leads to the variation of the capacity which has been set, anyway the valve guarantees an high inner compensation grade and limits the adjustment capacity.

Performances shown in this catalogue are guaranteed only using 2 or 3 way modular assembly hydrostats type AM5H.... (see note below in ordering code).

S5 variant - This variant that consists of a solenoid chamber drainage separated from the T line and obtained on CETOP RO5 interface allows operation with up to 320 bar max. back pressure on the T line. To ensure maximum solenoid valve mounting safety and supplementary drainage, only 12.9 material fixing screws must be used with it.









OPERATING SPECIFICATIONS

Max. operating pressure ports P/A/B		320 bar
Max. pressure port T - for dynamic pressure see note (*)		250 bar
Max. pressure port T (with external drainage - S5 variant)		320 bar
Nominal flow	45 / 6	60 / 100 l/min
Duty cycle	Continuc	ous 100% ED
Type of protection (depending on the connector used)		IP 65
Flow rate gain		See diagram
Power limits curves transmitted		See diagram
Fluid viscosity	10	÷ 500 mm²/s
Fluid temperature	-	20°C ÷ 75°C
Ambient temperature	-	20°C ÷ 70°C
Max. contamination level from class 7 at 9 in accordance with	NAS 1638 wit	h filter ß ₁₀ ≥75
Weight XDP5A (single solenoid)		4,97 Kg
Weight XDP5C (double solenoid)		6,55 Kg
Max. current	2.5 A	1.25 A
Solenoid coil resistance 20°C (68°F)	2.85 Ohm	11.4 Ohm
Hysteresis P/A/B/T		
with a pressure compensator AM.5.H.3V	<5%	<8%
Response to step $\Delta p = 10$ bar (P/A)		
0÷100%	56 ms	118 ms
100% ÷ 0	32 ms	32 ms
Frequency response -3db (Input signal 50% ±25% Vmax)		
	10Hz	7Hz
(*) Pressure dynamic allowed for 2 millions of cycles		
On section and sife stimus and selid for finite with 40 mm ³ /s		• • • • • • • • •

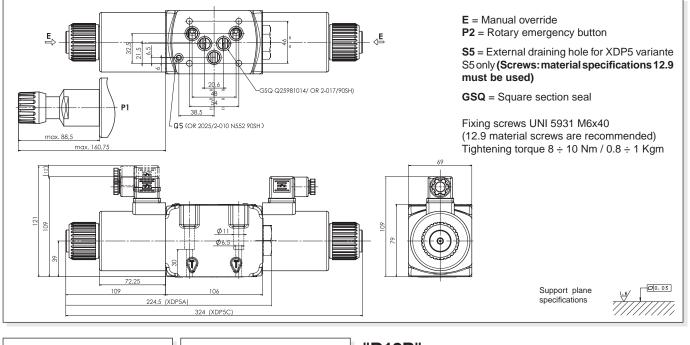
Operating specifications are valid for fluids with 46 mm²/s viscosity at 40°C, using the specified electronic control units. Performance data carried out using the specified power amplifier type REMSRA... power supplied at 24V.

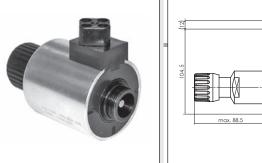
AMPLIFIER UNIT AND CONTROL

REMSRA.*.*. and REMDRA.*.*. Electronic card control single and double proportional solenoid valve. Recommended dither frequency 100 Hz.

AM5H2VP1 / AM5H3VP1(△p=10bar) Hydrostats 2 or 3 way.

OVERALL DIMENSIONS





"D19P"

PROPORTIONAL SOLENOIDS

Type of protection (in relation to connector used)	IP 65
Ambient temperature	-25°C ÷ 60°C
Duty cycle	100% ED
Insulation class wire	Н
Weight	1,58 Kg







XDC32				
STANDARD CONNECTORS	Cap. I • 20			
PROPORTIONAL SOLENOID	CAP. VIII • 11			
SE3AN21RS3	Cap. IX • 11			
AM3H	Cap. VIII • 12			
AM5H	Cap. VIII • 13			
BC307	Cap. VII • 12			

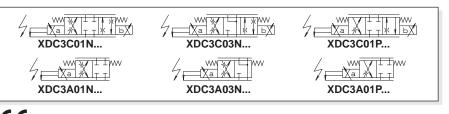
ORDERING CODE

XDC3... PROPORTIONAL DIRECTIONAL VALVES CLOSED LOOP POSITION CONTROL

The valves XDC serie 2 control the direction and the volume of the flow according to the feeding current to the proportional solenoid. The position transducer type LDVT (inductive position transducer) monitors the actual position of the spool.

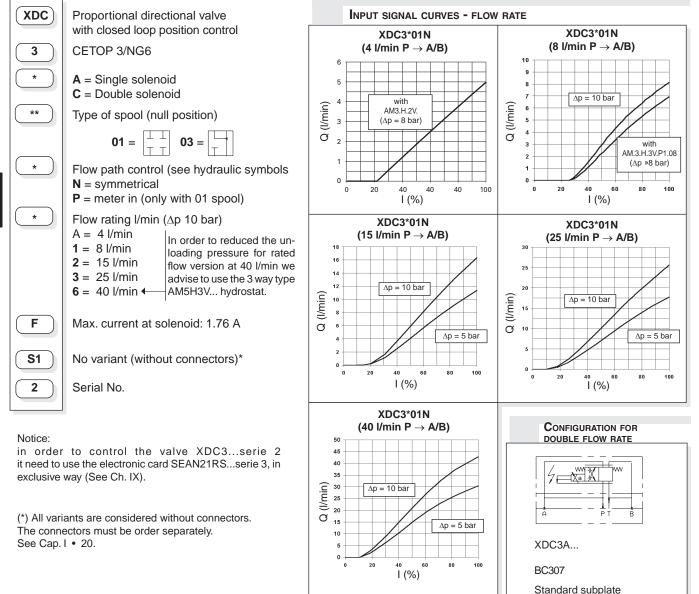
In the electronic card (type SE.AN.21.RS...serie 3) the error between the actual position and the reference signal is used to obtain a greater precision of the spool positioning, reducing also considerably the hysteresis and the repeatibility error of the valve. For a more accurate flow control, 2 or 3-way pressure compensators modular plate design are available.

The shown flow rates are typical for one line operation (e.g. from P to B). By using the valve with the base for capacity doubling type BC.3.07 greater capacity can be obtained.



CE Registered mark for industrial environment with reference to the electromagnetic compatibility.

European norms: EN50082-2 - general safety norm - industrial environment; EN50081-1 -emission general norm - residential environment





Max. operating pressure ports P/A/B	350 bar
Dynamic pressure port T	210 bar
Static pressure port T	210 bar
Nominal flow	8 / 15 / 25 / 40 l/min
Duty cycle	Continuous 100% ED
Type of protection (depending on the connectors used)	IP 65
Performance curves	See diagrams
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-20°C ÷ 75°C
Ambient temperature	-20°C ÷ 70°C
Max. contamination level class 7 to 9 in accordance to NA	
Weight XDC3A (single solenoid)	1,94 Kg
Weight XDC3C (double solenoid)	2,55 Kg
Max. current	1.76 A
Solenoid coil resistance at 20°C (68°F)	4.55 Ω
Solenoid coil resistance when hot	7.34 Ω
Hysteresis P/A/B/T with pressure compensator AM3H3V	<1%
Transient function with stepped electrical input signals Δp = 5 bar (P/A)
0 ÷ 100%	65 ms
100% ÷ 0	75 ms
Repeatibility	<0,5%
Frequency response -3db (Input signal ±25% Vmax)	10 Hz
Insulation class wire	Н
Weight of solenoid	0,6 Kg

Operating specifications are valid for fluids with 46 mm²/s viscosity at 40°C, using the SE3AN21RS... serie 3 electronic control unit powered to 24V.

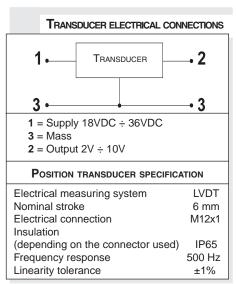
AMPLIFIER UNIT AND CONTROL

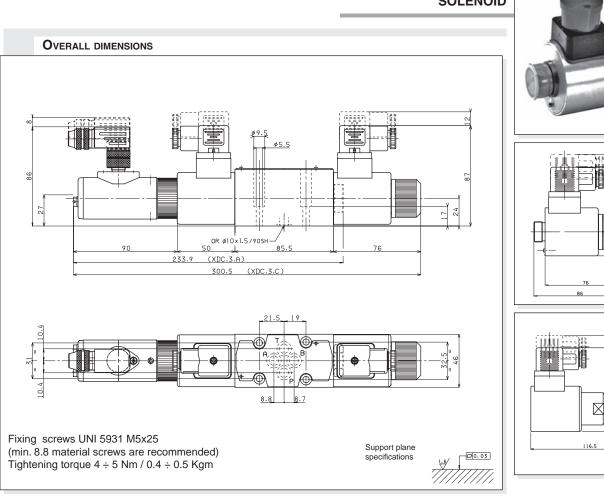
SE3AN21RS...serie 3 - Electronic card EURO-CARD format for control of the proportional valve equipped with transducer

AM3H2VP1 / AM3H3VP1 AM5H3VP1 (*)

Hydrostats 2 or 3 way

(*) for rated flow XDC3 version at 40 l/min) only





PROPORTIONAL SOLENOID

VIII • 11





АМЗН..

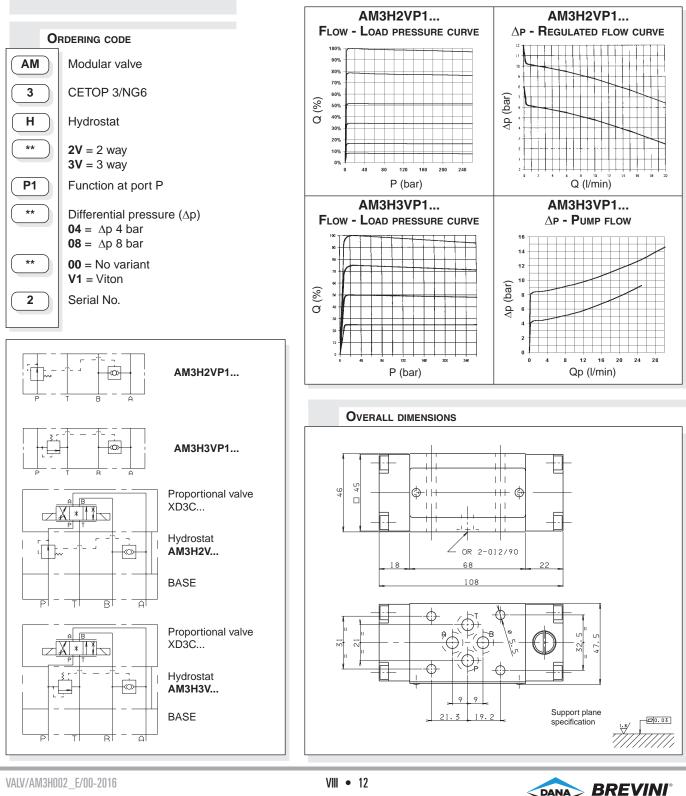
AM3H... 2 AND 3 WAY HYDROSTATS CETOP 3

The 2 or 3 way pressure regulator type AM3H ensure the constant set flow rate in the presence of varying system load (pressure) by keeping constant the pressure drop ($\Delta p = 4/8$ bar) in relation to the flow rate regulation.

In order to achieve the direction and flow rate dual control function, it is normally used together with a proportional solenoid valve

Max. flow	25 l/min
Max. operating pressure	350 bar
∆p adjustment	4 bar
	8 bar
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level class 8 i	n accordance with
NAS 163	8 with filter ß ₁₀ ≥75
Weight	1,4 Kg

Motion Systems



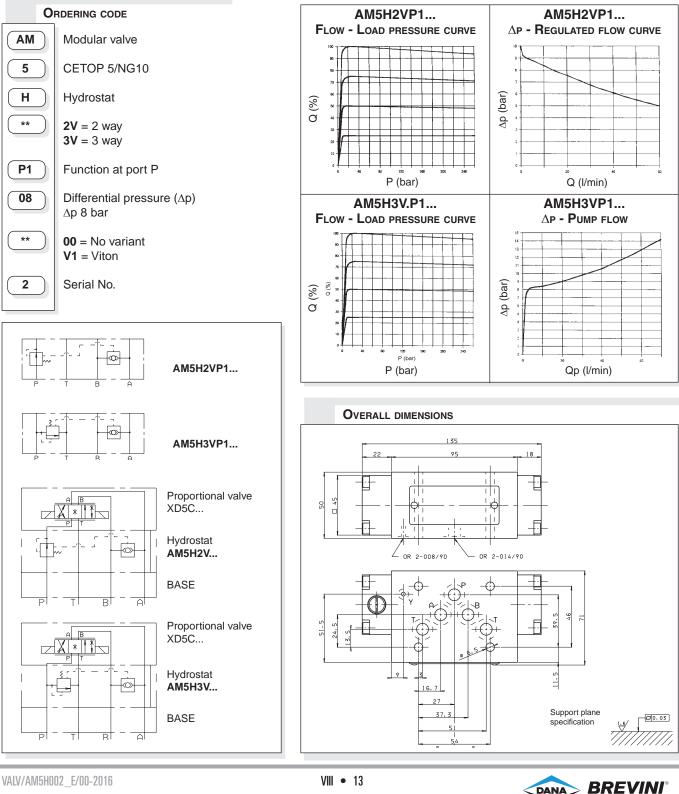


AM5H..

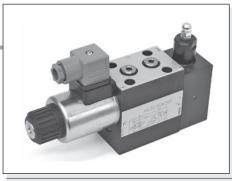
AM5H... 2 AND 3 WAY HYDROSTATS CETOP 5

The 2 or 3 way pressure regulator type AM5H ensures a constant set flow rate in the presence of varying system load (pressure) by keeping constant the pressure drop ($\Delta p = 8 bar$) in relation to the flow rate regulation. In order to achieve the direction and flow rate dual control function, it is normally used together with a proportional solenoid valve.

Max. flow AM5H2V	65 l/min
Max. flow AM5H3V	70 l/min
Max. operating pressure	350 bar
∆p adjustment	8 bar
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level class 8 in	accordance with
NAS 1638	s with filter ມີ₁₀≥75
Weight	2,7 Kg



Motion Systems



XQ3	
STANDARD CONNECTORS	Cap. I • 20
"D15P" PROPORT. SOLENOIDS	Cap. VIII • 15
REMSRA	Cap. IX • 4
BC308. / BC309. / BC06XQ3.	CAP. VII • 13

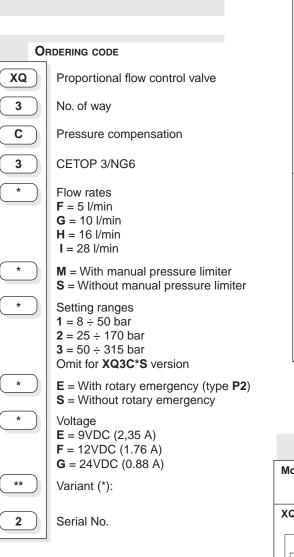
XQ3... PROPORTIONAL FLOW CONTROL VALVES PRESSURE COMPENSATED CETOP 3

This is a proportional valve where both the flow rate and pressure control flow functions have been integrated according to the 3 way regulation concept.

The interface UNI ISO 4401 - 03 - 02 - 0 - 94 standard (ex CETOP R 35 H 4.2-4-03) allows for direct mounting on modular block or multiple sub-bases, which makes possible many advantageous and extremely compact application solution as a consequence of their simplicity of installation.

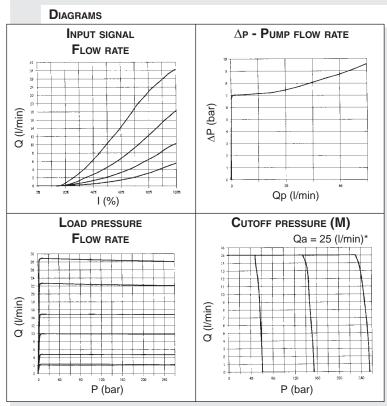
The 3 way type pressure compensator, inserted into the valve, holds the pressure drop across the flow rate proportional regulator constant (approx. 8 bar) independently from the controlled load variations, whereby ensuring proportional between the set flow rate and the electrical command signal.

Additionally, the system maximum safety pressure can be regulated through a manual command. This valve, if mounted on the feed line to the manifold block, can be used to control several circuits which are not operating at the same time.



TAB.1 - VARIANTS (*)	
No variant (without connectors)	S1
Viton	SV
Emergency lever	L5
Rotary emergency180°	R5

(*) All variants are considered without connectors. The connectors must be order separately. See Cap. I • 20.



The fluid used is a mineral based oil (with a viscosity of 46 mm²/s at 40°C. The tests have been carried out at with a fluid of a 40° C.

(*) Tested with 25 l/min supply

TABLE 1 - FLOW / PRESSURE SPECIFICATIONS

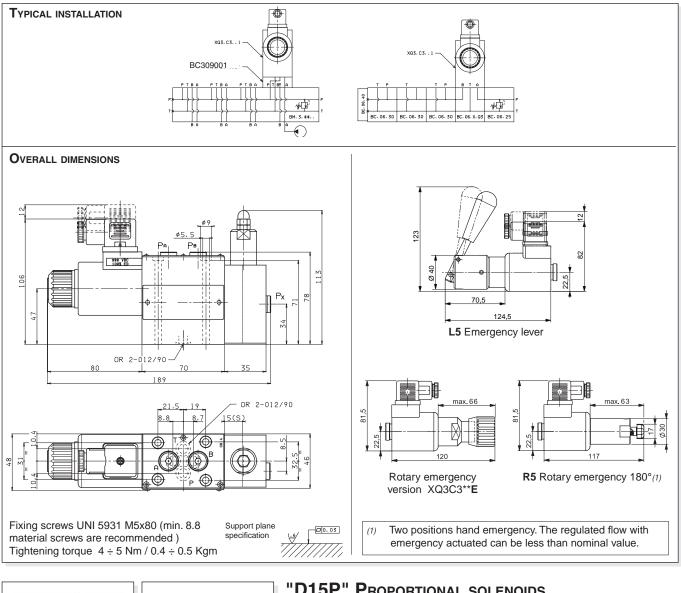
TABLE T - FLOW / PRESSURE SPECIFICATIONS						
Model Hydraulic symbol	Max flow rate (I/min)	Max flow in P (I/min)	Max limiter pressure (bar)	Max load pressure (bar)	∆p ^{Control} (bar)	
XQ3C3*M						
в	5		8÷50			
	10	40	25÷170	250	8	
	16		50÷315			
	28					
XQ3C3*S						
в	5					
	10	40		250	8	
	16					
	28					



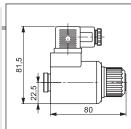


XQ3... PROPORTIONAL FLOW CONTROL VALVES PRESSURE COMPENSATED

Max. operat. pressure ports A/B / With P po	rt blocked on subp	late	315 bar	ELECTRONIC CONTROL UNIT
Max. operating pressure ports T - for dynam Regulated flow rate Relative duty cycle	nic pressure see no	See diagram Continuc	ous 100% ED	REMSRA ** Card type control for single solenoid. Recommended dither frequency 100 Hz.
Type of protection Flow rate gain Hysteresis with connection P/A/B/T $\Delta p = 5$ I Fluid viscosity Fluid temperature Max. contamination level Weight version XQ3C*M	bar (P/A)	IEC 144 class IP 65 See diagrams ≤4% of max. flow rate 10 ÷ 500 mm²/s -20°C ÷ 75°C class 8 in accordance with NAS 1638 with filter ß ₁₀ ≥75 2,89 Kg		SE3AN2100 EUROCARD type control for single solenoid
Weight version XQ3C*S		(0)/	2,39 Kg	
Type of voltage Max. current Solenoid coil resistance at 25°C (77°F)	9V 2.35A 2.25 Ohm	12V 1.76 A 4.0 Ohm	24V 0.88 A 16.0 Ohm	• Operating specifications are valid for fluid with 46 mm ² /s viscosity at 40°C, using the specified electronic control units
(*) Pressure dynamic allowed for 2 millions of	cycles.			



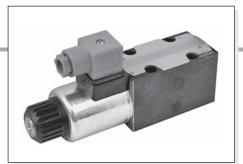




"D15P" PROPORTIONAL SOLENOIDS

Type of protection (in relation to connector used) Duty cycle Insulation class wire Weight (coil)	IP 66 100% ED H 0,354 Kg
Weight (solenoid)	0,354 Kg 0,608 Kg



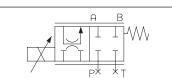


XQP3... OPEN LOOP 2/3 WAY PROPORTIONAL PRESSURE COMPENSATED FLOW REGULATORS

The open loop proportional flow regulator is 2 and 3 way compensated with priority function. It is designed to regulate flow in proportion to an applied electrical current (REM or SE3AN power amplifier). Flow regulation is load independent - B port. Load compensation is achieved by a spool compensator which holds the pressure drop constant across the proportional spool.

Valves are available in the following versions (see hydraulic symbol):

- 2 way pressure compensated - 3 way pressure compensated with priority function. - 3 way pressure compensated with priority and venting function.



• In order to obtain the 2 way pressure compensated version the cavities P and T HYDRAULIC SYMBOLS have be closed on the subplate. В A MW **O**RDERING CODE Open loop 2/3 way В * т Ρ proportional compensated . In order to obtain the 3 way pressure flow regulator compensated version the cavity T have be closed on the subplate. CETOP 3/NG6 2/3 way compensation DIAGRAMS with priority function $\Delta P - FLOW RATE A \rightarrow B$ ΔP - Secondary line flow 3 way version (standard) (with 5 l/min to P) $(A \rightarrow P \text{ FREE})$ For to obtain 2-way version the P line 16 14 must be closed on the subplate 14 12 Nominal flow rates 12 10 $\mathbf{F} = 6 \, \text{l/min}$ 10 (bar) (bar) G = 12 l/min 8 6 $H = 22 \, \text{l/min}$ 6 d⊳ d∆ I = 32 I/min4 $L = 40 \, \text{l/min}$ 2 2 0 0 **S** = without decompression 10 15 20 25 30 35 40 45 50 10 30 50 5 **D** = with decompression Q (I/min) Q (I/min) Max. current to solenoid FLOW RATE FLOW RATE E = 2.35 ABACK PRESSURE ON PRIORITY LINE BACK PRESSURE ON SECONDARY LINE **F** = 1.76 A **G** = 0.88 A 45 40 40 Variants (*): 35 **S1** = No variant Q (l/min) 30 (I/min) 30 25 **P2** = Rotary emergency 20 R5 = Rotary emergency 180° õ 15 SV = Viton 10 10 5 0 0 Serial No. 0 50 100 150 200 250 50 100 150 200 250 0 P (bar) P (bar) **INPUT SIGNAL** 2 WAY COMPENSATION 2 WAY COMPENSATION (A 270 bar - B VARIABLE) FLOW (A VARIABLE - B 30 bar) (*) All variants 50 40 are considered 45 35 40 without connec-40 35 35 tors. The connec-30 30 (uim/l) 20 (I/min) (I/min) tors must be order 30 25 25 separately. 20 26 See Cap. I • 20. Ø Ø 15 Ø 15 16 10 10 5 0 100 150 200 250 150 250 I (%) P (bar) P (bar)

> The fluid used is a mineral based oil with a viscosity of 46 mm²/s at 40°C. The tests have been carried out at with a fluid of a 40°C.

XQP

3

С

3

**





OPERATING SPECIFICATIONS

Max. operat. pressure ports A/B /P see note	(*) With T port blo		
Regulated flow rate			32 / 40 l/min
Decompression drain flow			nax 0,7 l/min
Relative duty cycle		Continuo	us 100% ED
Type of protection (in relation to the connector	,		IP 65
Flow rate gain	See	diagram "Input	0
Fluid viscosity			÷ 500 mm²/s
Fluid temperature			20°C ÷ 75°C 20°C ÷ 70°C
Ambient temperature Max. contamination level	from	class 7 to 9 in	
		NAS 1638 with	
Weight	WICH	1000 With	1,7 Kg
			. 0
Max. current	2.33A	1.76 A	0.88 A
Solenoid coil resistance at 25°C (77°F)	2.25 Ohm	4.0 Ohm	16.0 Ohm
Hysteresis with ∆p 7 bar	≤5%	<5%	<8%
Response to step $\Delta p = 7$ bar		10	0.5
0 ÷ 100%	32 ms	40 ms	85 ms
$100\% \div 0$	33 ms	33 ms	33 ms
Frequency response -3db (Input signal 50%	,	2211-	1011-
	22Hz	22Hz	12Hz
(*) Pressure dynamic allowed for 2 millions	of cycles		
Operating specifications are valid for fluids with 46 mm ² /s viscosity at 40°C, using specified electronic control units.			

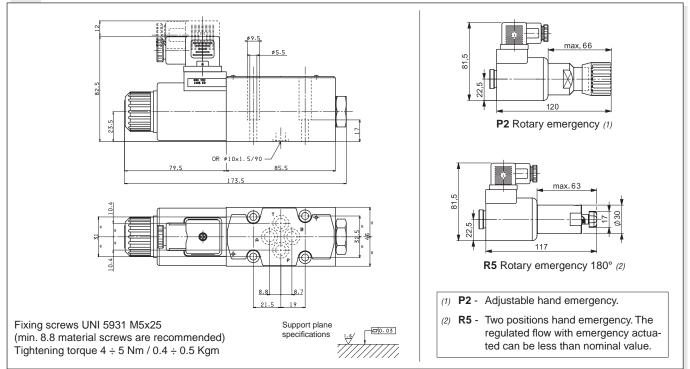
Performance data are carried out using the specified power amplifier SE3AN...

AMPLIFIER UNIT AND CONTROL

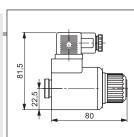
REMSRA...** Electronic card for control single proportional solenoid valve. Recommended dither frequency 100 Hz.

OVERALL DIMENSIONS

powered to 24V.







"D15P" PROPORTIONAL SOLENOIDS

Type of protection (in relation to connector used)	IP 66
Duty cycle	100% ED
Insulation class wire	н
Weight (coil)	0,354 Kg
Weight (solenoid)	0,608 Kg







XQP5	
STANDARD CONNECTORS	Cap. I • 20
"D19P" PROPORT. SOLENOIDS	Cap. VIII • 19
REMSRA	Cap. IX • 4

Open loop 2/3 way

flow regulator

CETOP 5/NG10

proportional compensated

ORDERING CODE

XQP

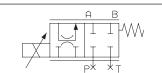
5

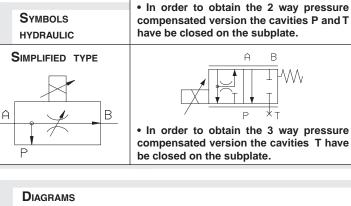
XQP5 OPEN LOOP 2/3 WAY PROPORTIONAL PRESSURE COMPENSATED FLOW REGULATORS CETOP 5

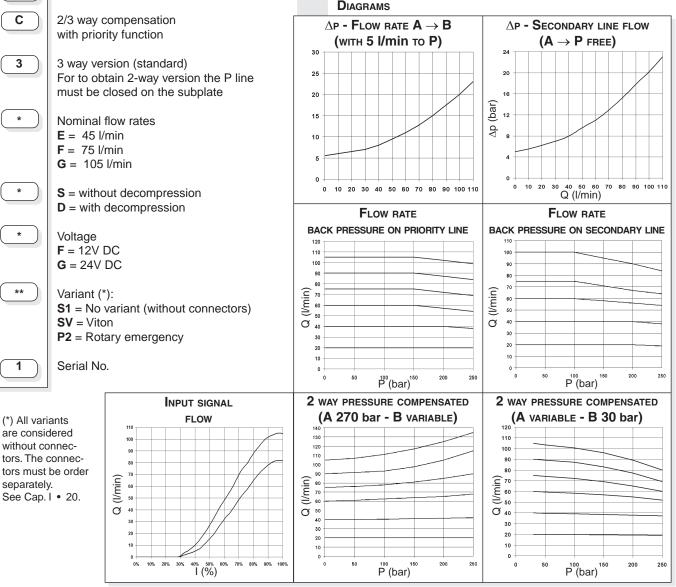
The open loop proportional flow regulator is 2 and 3 way compensated with priority function. It is designed to regulate flow in proportion to an applied electrical current (REM power amplifier). Flow regulation is load independent - B port. Load compensation is achieved by a spool compensator which holds the pressure drop constant across the proportional spool.

Valves are available in the following versions (see hydraulic symbol):

- 2 way pressure compensated
- 3 way pressure compensated
 - with priority function.
- 3 way pressure compensated with priority and venting function.





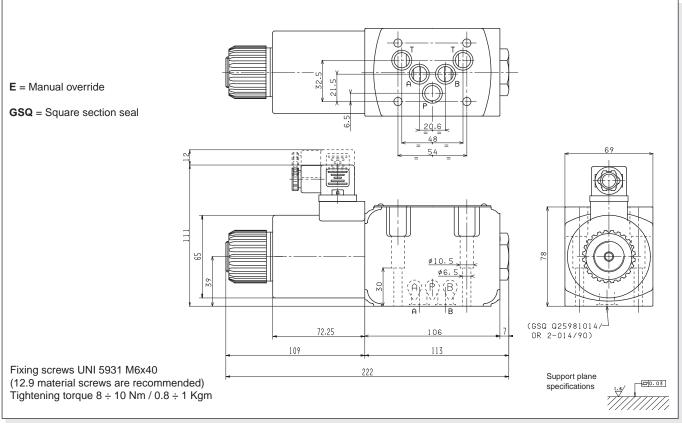


The fluid used is a mineral based oil with a viscosity of 46 mm²/s at 40°C. The tests have been carried out at with a fluid of a 40°C.



OPERATING SPECIFICATIONS 250 bar AMPLIFIER UNIT AND CONTROL Max. operating pressure ports A/B /P (*) Regulated flow rate 75 / 105 l/min REMSRA**... Decompression drain flow max 0,7 l/min Electronic regulator for control single proportional Relative duty cycle Continuous 100% ED solenoid valve. Type of protection (in relation to the connector used) IP 65 Recommended dither frequency 100 Hz. Flow rate gain See diagram "Input signal flow" Fluid viscosity 10 ÷ 500 mm²/s -20°C ÷ 75°C Fluid temperature Ambient temperature -20°C ÷ 60°C Max. contamination level from class 7 to 9 in accordance with NAS 1638 with filter $\beta_{10} \ge 75$ 4,9[']7 Kg Weight Type of voltage 12V 24V (*) Pressure dynamic allowed for 2 millions of Max. current 2.5 A 1.25 A cycles. T ports closed on the subplate. Solenoid coil resistance at 20°C (68°F) 2.85 Ohm 11.4 Ohm Operating specifications are valid for fluids Hysteresis with Δp 7 bar <5% <8% with 46 mm²/s viscosity at 40°C, using speci-Response to step $\Delta p = 7$ bar (P/A) fied electronic control units. 0 ÷ 100% ~ 65 ms $100\% \div 0$ Performance data are carried out using the ~ 30 ms specified power amplifier type REMSRA... Frequency response -3db (Input signal 50% ± 25% Vmax.) 7Hz power supplied at 24V.

OVERALL DIMENSIONS

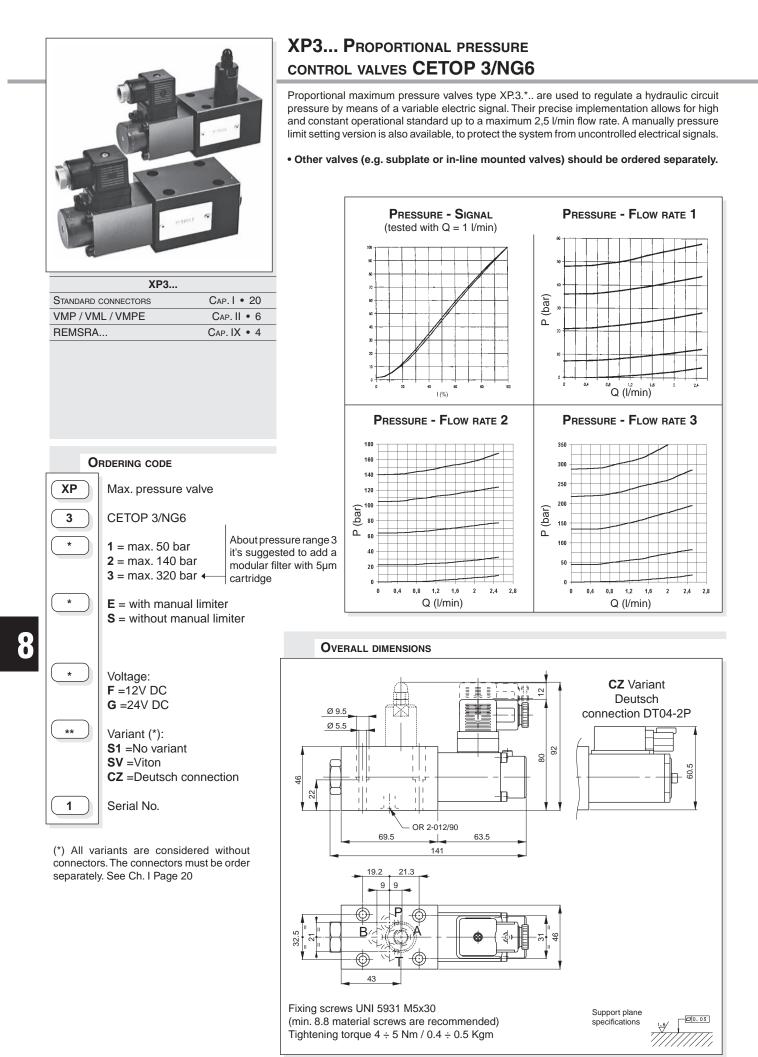


"D19P" **PROPORTIONAL SOLENOIDS** Type of protection (in relation to connector used) IP 65 Ambient temperature -54°C ÷ 60°C Duty cycle 100% ED Insulation class wire Weight 1,58 Kg





Н



VALV/XP3001_E/06-2016

VIII • 20

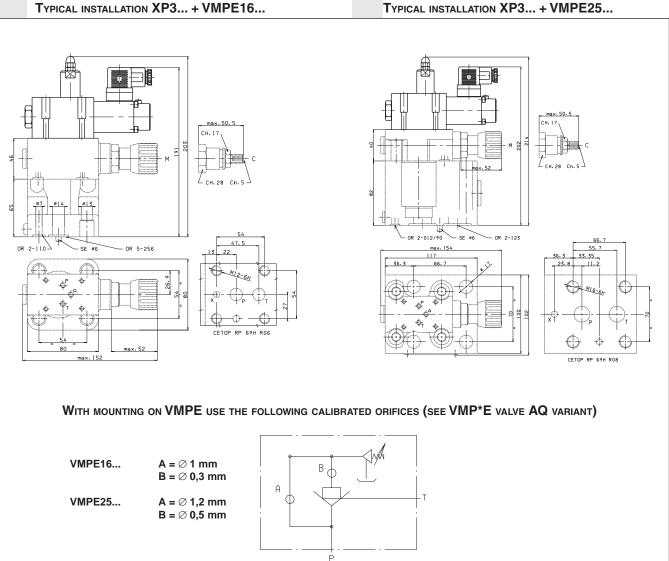


XP3... PROPORTIONAL PRESSURE CONTROL VALVES CETOP 3

Max. operating pressure (depending on the flow rate) Max. flow	350 bar 2,5 l/min
Max. ambient temperature	50° C
Linearity	See diagrams
Max. hysteresis	<3% of nominal value
Repeatibility error (between 150 and 680 mA)	<2%
Resistance at 20°C (24V)	24.6 Ohm
Resistance at 20°C (12V)	7.2 Ohm
Max. resistance (ambient 20°C) (24V) at op. temp.	31 Ohm
Max. resistance (ambient 20°C) (12V) at op. temp.	9 Ohm
Max. current at (24V)	0.68A
Max. current at (12V)	1.25A
Type of protection	IEC 144 class IP 65
Max. contamination level class 8 in accordance with N	10
Fluid temperature	-20°C÷75°C
Fluid viscosity	10÷500 mm²/s
Weight	1,4 Kg
• Operating specifications are valid for fluids with 33 mm ² /s electronic control units.	at 50°C, using specified

REMSRA** Card type control for single solenoid 12V and 24V. Recommended dither frequency 330 Hz.

ELECTRONIC CONTROL UNITS





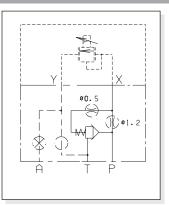




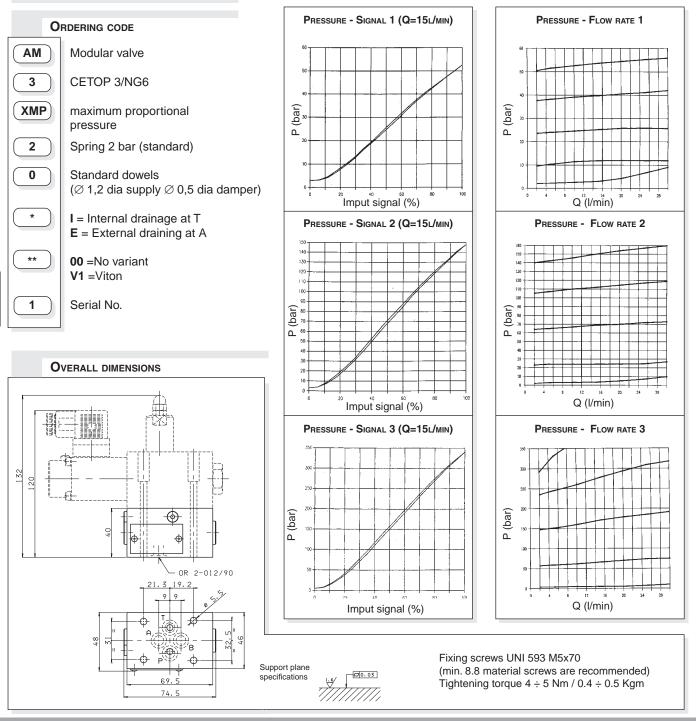
AM3XMP... AMPLIFIER VALVES FOR PROPORTIONAL CONTROL VALVES

	,
Weight 0,8 Kg	1
Fluid viscosity 10÷500 mm ² /s	
Fluid temperature -20°C÷75°C	
with NAS 1638 with filter ß ₁₀ 375	
Max contamination level class 8 in accordance	
Repeatibility error (150 ÷ 680 mA) XP3 <3%	
Max. hysteresis <3% of nominal value)
Linearity See diagrams	
Max. ambient temperature 50° C	
Min. flow 2 l/min	
Max. flow 30 l/min	1
Max. operating pressure 320 bar	
Max. operating pressure 320 bar	r

Operating specifications are valid for fluids with 33 mm²/s viscosity at 40°C, using control units



Modular valve type AM.3.XMP... used together with the pressure proportional pilot type XP.3.. becomes a pressure control valve piloted by proportional command for rates up to 30 lt/min. The possibility of external drainage on A ensures its correct operation even with back pressure on the discharge side. Other valves types should be ordered separately.





ELECTRONICS

ELECTRONICS



CEPS	Cap. IX • 2
REMSRA	Cap. IX • 4
REMDRA	Cap. IX • 7
SE3AN21RS	Cap. IX • 11
LAB3	*
MAV1152	*
MAV4211	*
JC3D	Cap. IX • 13
JC5D	Cap. IX • 15
JCFD	Cap. IX • 17

(*) see catalogue BPE electronics on www.brevinifluidpower.com website.

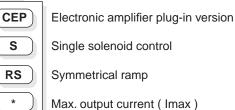
	ABBREVIATIONS
AP	HIGH PRESSURE CONNECTION
AS	PHASE LAG (DEGREES)
BP	LOW PRESSURE CONNECTION
С	Stroke (MM)
СН	ACROSS FLATS
Сн	INTERNAL ACROSS FLATS
DA	AMPLITUDE DECAY (DB)
DP	DIFFERENTIAL PRESSURE (BAR)
F	Force (N)
1%	INPUT CURRENT (A)
M	MANOMETER CONNECTION
NG	KNOB TURNS
OR	SEAL RING
P	LOAD PRESSURE (BAR)
PARBAN	
PL D-	PARALLEL CONNECTION
Pr Q	REDUCED PRESSURE (BAR)
QP	
SE	PUMP FLOW (L/MIN) ELASTIC PIN
SE	ELASTIC PIN BALL
SR	
Sn X	SERIES CONNECTION PILOTING
Ŷ	
-	DRAINAGE





CEPS		
ELECTRICAL SPECIFICATIONS	Cap. IX • 2	
OVERALL DIMENSIONS	Cap. IX • 2	
FUNCTIONAL BLOCK DIAGRAM	Cap. IX • 3	
ELECTRICAL CONNECTIONS	Cap. IX • 3	
SETTINGS TOPOGRAPHY	Cap. IX • 3	
REFERENCE SIGNAL	Cap. IX • 3	

ORDERING CODE



Max. output current (Imax X = 0.88 Amp Y = 1.76 Amp Z = 2.50 Amp

Input reference signal 0 ÷ 10V

PWM frequency 2 = 400 Hz (per XP.3) 3 = 150 Hz (standard)

00 = No variant RW = Electrical circuit protected with silicone paint, for more moisture resistance

Serial number

mark with reference to the electromagnetic compatibility.

European norms: - EN61000-6-2 Generic standards. Immunity for industrial environments;

- EN61000-6-3 Generic standards. Emission standard for residential, commercial and light-industrial environments.

Product in accordance with **RoHS** 2011/65/UE Europe Directive.

CEPS.. ELECTRONIC AMPLIFIER PLUG VERSION FOR SINGLE SOLENOID PROPORTIONAL VALVE.

The electronic amplifier Plug version was designed in compliance whit EN 175301-803 (ex DIN43650), for direct mounting on the valve solenoid. The CEP.S can used whit proportional valves XD*A..., XDP*A..., XP3..., XQP*..., CXQ3...

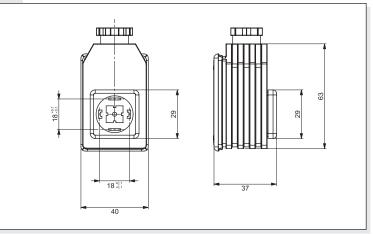
The output stage operates on the pulse width modulation principle (P.W.M.) and is provided with current feedback in order to obtain a solenoid output current proportional to the reference input signal.

Gain, minimum current and rise and fall ramp time adjustments are possible through the corresponding potentiometers fitted on top side of the card, and can be accessed by slackening the relative screw and opening the cover of the connector. While the output current to the solenoid can be measured via the Valve Current test points.

SERIE 2, has the diode reverse polarity protection inside on the power line.

ELECTRICAL SPECIFICATIONS	
Power supply Peak supply Minimum power supply Required power Type of protection	12VDC o 24VDC 40VDC 10.5VDC 30W IP65
Output current All range values are come from the ordering code	Imax = 0.88Amp Imax = 1.76Amp Imax = 2.50Amp
External reference potentiometer	+10V, Imax =5mA
Input signal reference	0 ÷ 10V
I minimum adjustment Gain adjustment	0 ÷ 50% of Imax 30% ÷ 100% of Imax
Ramp time adjustment	0 ÷ 10 secondi
Operating Ambient temperature Current test point Weight	-10C° ÷ +70°C 1V = 1Amp Kg. 0, 250

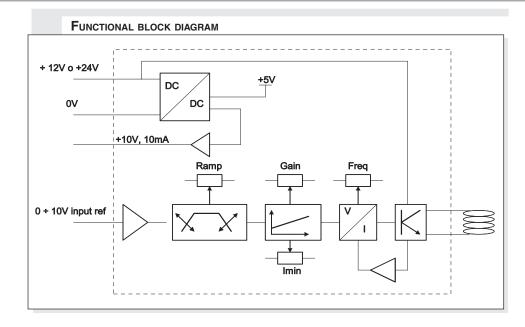
OVERALL DIMENSIONS OF BOX AND CONNECTOR

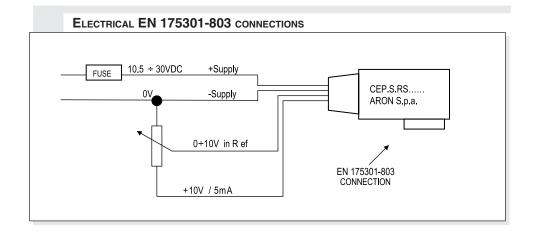


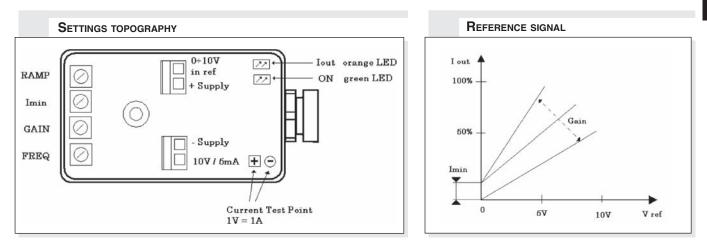


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POWER SUPPLY AND ELECTRICAL CONNECTIONS

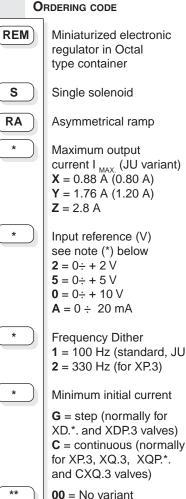
The power supply voltage must be rectified and filtered, whit a capacitor 4700 uF minimum. **Protect the power supply circuit whit 3 A fuse. Respect the polarity supply.** Use the cabling wire whit 0.75 mm² or 1.0 mm² section. In order to facilitate the operation of wires connection, extracts the card from the enclosure, introduce the wires through the gland-nut, connects the wires to the clips and finally to lodge the card to the inside of the connector.

Installation and settings, see instruction manual (code P35160008) supplied with the product.





CALIBRATION PROCEDURE	Cap. IX • 5
OVERALL DIMENSIONS	Cap. IX • 10
MOUNTING BASES	Cap. IX • 10



4 Serial No.

(*) If the input reference is a current signal (mA) the regulator has to be pre-setted in the factory.

CE mark with reference to the electromagnetic compatibility. European norms: EN61000-6-2 Generic standards. Immunity for industrial environments; - EN61000-6-3 Generic standards. Emission standard for residential,

commercial and light-industrial environments. Product in accordance with RoHS

2011/65/UE Europe Directive.

REMSRA... TYPE ELECTRONIC REGULATORS FOR

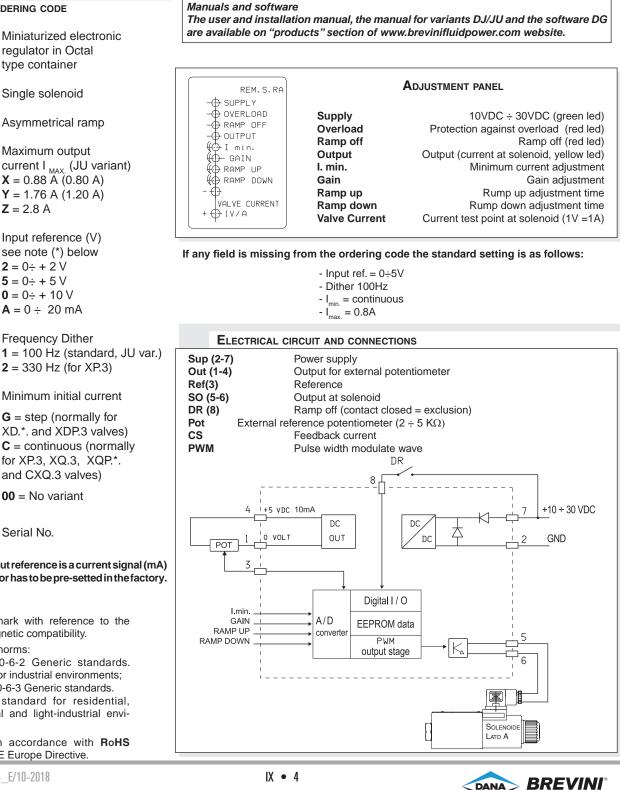
SINGLE SOLENOID PROPORTIONAL CONTROL VALVES

The electronic control card type REM.S.RA has been designed to drive the "XD.*.A, XDP.3.A, XP.3, XQ.3, XQP.*. and CXQ.3" series single solenoid proportional valves without integral position transducer. The control card is enclosed in an "OCTAL" type housing, a typical relay mounting standard. The output stage operates on the pulse width modulation principle (P.W.M.) and is provided with current feedback in order to obtain a solenoid output current proportional to the reference input signal. Output short circuit and supply polarity inversion protection is provided.

Gain, minimum current and rise and fall ramp time adjustments are possible through the corresponding front panel trimming potentiometers, while the output current to the solenoid can be measured via the Valve Current test points, and the ramp operation can be excluded.

The product incorporates a serial interface for adjustment of parameters.

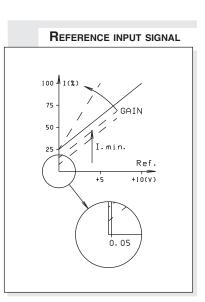
Pay attention please: electronic regulators must be used in dampness and water protected places.



Motion Systems

ELECTRONIC REGULATORS FOR SINGLE SOLENOID PROPORTIONAL CONTROL VALVES

Power supply	10 ÷ 30 VDC
Maximum supply voltage	36 V
Power absorption	40 W
Current output setting by dip switches	Imax = 2.8A Imax = 1.76A Imax = 0.88A
External potentiometer supply output short circuit protected	+5V 10mA
Reference input signal setting by dip switches	0 ÷ +2V 0 ÷ +5V 0 ÷ +10V 0 ÷ 20mA
Polarization current adjustment	lmin = 0 ÷ 50% lmax
Current gain adjustment	50% ÷ 100% Imax
Ramp time adjustment	0 ÷ 20 sec
Ambient operating temperature	-20 ÷ +70°C
Current test point	1 Volt = 1 Ampere
Weight	0.101 Kg



(*) For the current signal (mA) the regulator has to be pre-setted in the factory.

REMSRA... INSTRUCTIONS FOR USE

CALIBRATION PROCEDURE

Connect the card in the proper way following the previous page diagram but <u>without powering</u> <u>it</u> or in the way following the next page "Typical connections". Turn completely anticlockwise (20 turns about) the trimming potentiometers of Minimu Current (I_{min}) and Ramp Time (Rampup and Ramp-down), and position the reference potentiometer on zero. Before powering the card, <u>ensure that any unforeseen hydraulic system movement cannot cause material damage</u> <u>or injury to people</u>. Power now the card; the green LED should light up.

MINIMUM CURRENT OR POLARIZATION CURRENT ADJUSTMENT

Turn slowly the minimum current trimming potentiometer clockwise (I_{min}) until an actuator movement can be visually detected. Turn slowly anticlockwise the potentiometer: the minimum current setting will be adjusted correctly when the actuator movement stops. For the REM model with minimum initial threshold current, set the reference signal to a Vref. of 150 mV.

MAXIMUM CURRENT GAIN ADJUSTMENT

Turn first the ramp time trimming potentiometers clockwise by at least 10 turns, if the system could be damaged by a too fast solenoid operation (<u>evaluate the application carefully</u>). The maximum actuator speed can now be adjusted. Turn the reference signal to its maximum setting and rotate slowly the GAIN trimming potentiometer (GAIN) until the maximum required speed is obtained. The speed can now be varied by moving the potentiometer.

RAMP TIME ADJUSTMENT (RAMP-UP E RAMP-DOWN)

The ramp time is the time taken to pass from the minimum to the maximum current value, and vice versa. It's adjustable from a minimum of 0s up to a maximum of 20s (to reach the maximum current value setted). Turning clockwise the trimming potentiometer, the ramp time increases.

Notes:

- The ramp fall time affects the actuator stop position. Moving the reference to zero Volt, the actuator goes on moving till the setted ramp time is elapsed. Therefore it's necessary to adjust it properly.

- When the overload red LED lights up, it will be necessary to switch off the power to the card, switching it on again after having eliminated the cause of overload.

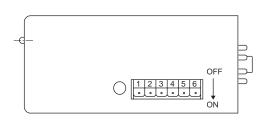


REMSRA... DIP SWITCHES TABLE

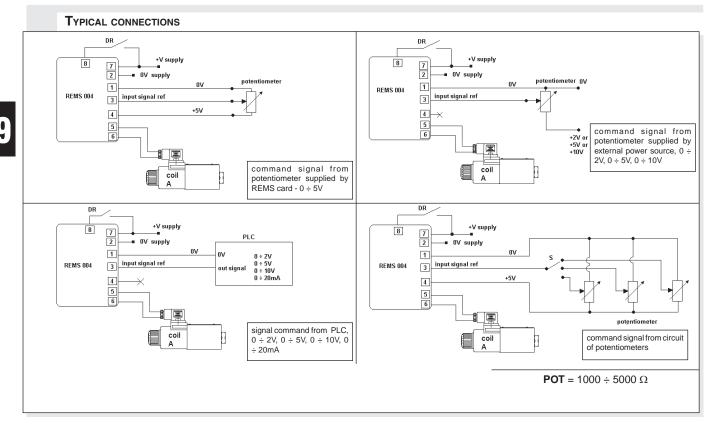
Foi	our propor	tional valves are rec	commended the following settings:
660000000000000000000000000000000000000	XD3A XDP3A XQ3 XQP3 CXQ3 XD2A XD2A XDP5A XDP5A XQ3 XQP5 XP3 CXQ3 XD2A XDP5A XD2A XD2A XD2A XD2A XD2A XD2A XD2A XD2	DITHER =100Hz DITHER =100Hz	$I_{max.} = 2.35A \text{ with 9V coil} \\I_{max.} = 1.4A \text{ with 12V coil} \\I_{max.} = 1.76A \text{ with 12V coil} \\I_{max.} = 0.7A \text{ with 24V coil} \\I_{max.} = 0.88A \text{ with 24V coil} \\I_{max.} = 0.68A \text{ with 24V coil} \\I_{max.} = 0.68A \text{ with 24V coil} \\I_{max.} = 0.88A \text{ with 24V coil} $

Six miniature switches are mounted internally on one of the REM sides. The REM configuration to suit any particular application can be implemented by setting these switches.

PWM frequency (100 to 330 Hz), minimum (continuous or step) current, reference voltage range and maximum current (I_{max}) can thus be adjusted.



Function	DITHER		l min		Input ref.			I.max.			
DIP sw	100 Hz	330 Hz	С	G	0÷10 V	0÷5 V	0÷2 V	0÷20 mA	2.8 A	1.76 A	0.88 A
1	OFF	ON									
2			OFF	ON							
3					OFF	ON	OFF	ON			
4					OFF	OFF	ON	OFF			
5									OFF	ON	OFF
6									OFF	OFF	ON



• The connection between REM and the solenoid must be direct

The common one of return to proportional solenoid must not' be shared between

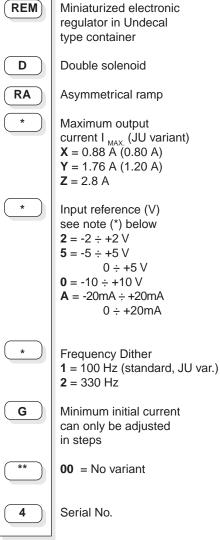
other valve connections or electrical equipment worker.





REMDRA		
	CALIBRATION PROCEDURE	Cap. IX • 8
OVERALL DIMENSIONS MOUNTING BASES		Cap. IX • 10
		Cap. IX • 10

ORDERING CODE



(*) If the input reference is a current signal (mA) the regulator has to be pre-setted in the factory.

mark with reference to the electromagnetic compatibility.

European norms:

- EN61000-6-2 Generic standards. Immunity for industrial environments:

- EN61000-6-3 Generic standards.

Emission standard for residential, commercial and light-industrial environments.

Product in accordance with RoHS 2011/65/UE Europe Directive.

REMDRA... TYPE ELECTRONIC REGULATORS

DOUBLE SOLENOID PROPORTIONAL CONTROL VALVES

The electronic control card type REMDRA has been designed to drive the double solenoid proportional valves series "XD.*.C...and XDP.3.C" without integral position transducer. The control card is enclosed in an "UNDECAL" type housing, a typical relay mounting standard. The output stage operates on the pulse width modulation principle (P.W.M.) and is provided with current feedback in order to obtain a solenoid output current proportional to the reference input signal.

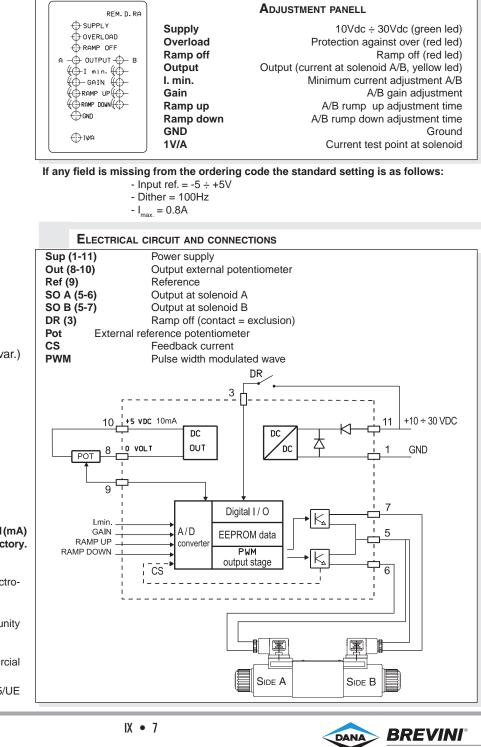
Output short circuit and supply polarity inversion protection is provided. Gain, minimum current and rise and fall ramp time adjustments are possible through the corresponding front panel trimming potentiometers, while the output current to the solenoid can be measured via the Valve Current test points, and the ramps can be excluded.

The product incorporates a serial interface for adjustment of parameters.

Pay attention please: electronic regulators must be used in dampness and water protected places.

Manuals and software

The user and installation manual, the manual for variants DJ/JU and the software DG are available on "products" section of www.brevinifluidpower.com website.





Power supply	10 ÷ 30 VDC
Maximum supply voltage	36 V
Power absorption	40 W
Current output setting by dip switches	Imax = 2.8A Imax = 1.76A Imax = 0.88A
External potentiometer supply output short circuit protected	+5V I.max.10mA
Reference input signal setting by dip switches	-2V ÷ +2V -5V ÷ +5V -10V ÷ +10V -20A ÷ +20mA (*)
Signal input reference (pin n° 9) setting by dip switches	0V ÷ +5V 0 ÷ +20mA (*)
Polarization current adjustment	Imin = 0 ÷ 50% Imax
Current gain adjustment	50% ÷ 100% Imax
Ramp time adjustment	0 ÷ 20 sec
Ambient operating temperature	-20 ÷ +70°C
Current test point	1 Volt = 1 Ampere
Weight	0.120 Kg

SIGNALS INPUT REFERENCE

The REMD can recive two kinds of command signal inputs, differential input (non inverting, inverting voltage $-5V \div +5V$), or positive voltage (0V $\div +5V$).

(*) For the current signal (mA) the regulator has to be pre-setted in the factory.

REMDRA... INSTRUCTIONS FOR USE

CALIBRATION PROCEDURE

Connect the card in the proper way following the next page "Typical connections" but <u>without powering it</u>. Turn completely anticlockwise (20 turns about) the trimming potentiometers of Minimu Current (I_{min}) and Ramp Time (Ramp-up and Ramp down), and position the reference potentiometer on zero. Before powering the card, ensure that any unforeseen hydraulic system movement cannot cause material damage or injury to people. Power now the card; the green LED should light up

Two channel minimum current (I $_{_{\rm MIN}}$) adjustment (dead band)

Set the reference signal of approx. Vref +150mV. Than turn clockwise the trimmer until an actuator movement can be visually detected (A channel Output LED lights up). Than turn the same trimmer anticlockwise until the movement stops. Repeat the I_{min} calibration for the other channel B.Set the reference signal of approx. Vref -150mV (B channel Output LED lights up).

GAIN ADJUSTMENT

Turn first the ramp time trimming potentiometers (RAMP UP) clockwise by at least 10 turns, if the system could be damaged by a too fast solenoid operation (evaluate the application carefully). The maximum actuator speed can now be adjusted. Turn the reference signal to the maximum positive setting value and rotate slowly the gain trimming potentiometer (GAIN) until the maximum required speed is obtained. The speed can now be varied by moving the potentiometer lever. Repeat the above operations for the other channel after turning the reference signal to the maximum negatif value.

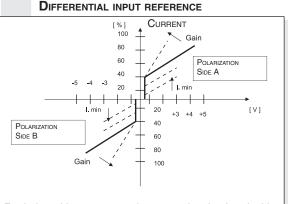
RAMP TIME ADJUSTMENT

The ramp time is the time taken to pass from the minimum to the maximum current value, and vice versa. It's adjustable from a minimum of 0s up to a maximum of 20s (to reach the maximum current value setted) separately for channel A and B. Turning clockwise the trimming potentiometer, the ramp time increases.

Notes

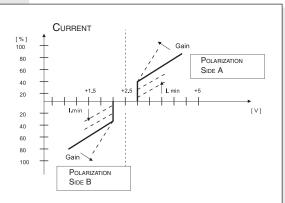
1) The ramp fall time affects the actuator stop position. Moving the reference potentiometer to zero Volt, the actuator goes on moving till the setted ramp time is elapsed. Therefore it's necessary to adjust it properly.

2) When the overload red LED lights up, it will be necessary to switch off the power to the card, switching it on again after having eliminated the cause of overload.



For being able to command a proportional valve double solenoid with a differential input command voltage in income at contact 9 of REMD is necessary not to connect the contact 10 of REMD.

POSITIVE INPUT REFERENCE



For being able to command a proportional valve double solenoid with a positive command voltage in income at contact 9 of REMD is necessary to connect the contact 10 of REMD a resistive load:

- potentiometer (minimum 1000, max 5000 Ohm) [with external potentiometer command signal, pin n° 9]
- resistor (minimum 1000, max 5000 Ohm) [with external reference value generator, e.g. by a PLC , pin n° 9].



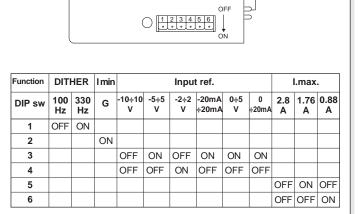
REMDRA... DIP SWITCHE TABLE

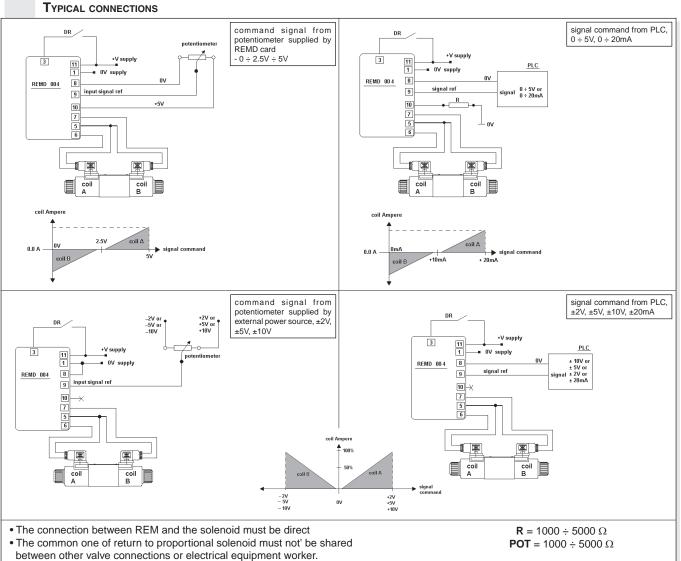
Six miniature switches are mounted internally on one of the REM sides. The REM configuration to suit any particular application can be implemented by setting these switches. PWM frequency (100 to 330 Hz), reference voltage range and maximum current (I_{max}) can thus be adjusted.

For our proportional valves are recommended the following settings:

G	XD3C	DITHER =100Hz	I = 2.35A with 9V coils
G	XDP3C	DITHER =100Hz	$I_{max} = 2.35A$ with 9V coils
G	XD2C	DITHER =100Hz	$I_{max.}$ = 1.4A with 12V coils
G	XD3C	DITHER =100Hz	I_{max}^{max} = 1.76A with 12V coils
G	XDP5C	DITHER =100Hz	$I_{\rm max} = 2.5 A$ with 12V coils
G	XDP3C	DITHER =100Hz	$I_{max.}^{max.}$ = 1.76A with 12V coils
G	XD2C	DITHER =100Hz	$I_{max} = 0.7A$ with 24V coils
G	XD3C	DITHER =100Hz	$I_{max} = 0.88A$ with 24V coils
G	XDP5C	DITHER =100Hz	$I_{max} = 1.25A$ with 24V coils
G	XDP3C	DITHER =100Hz	$I_{max.}$ = 0.88A with 24V coils
_			

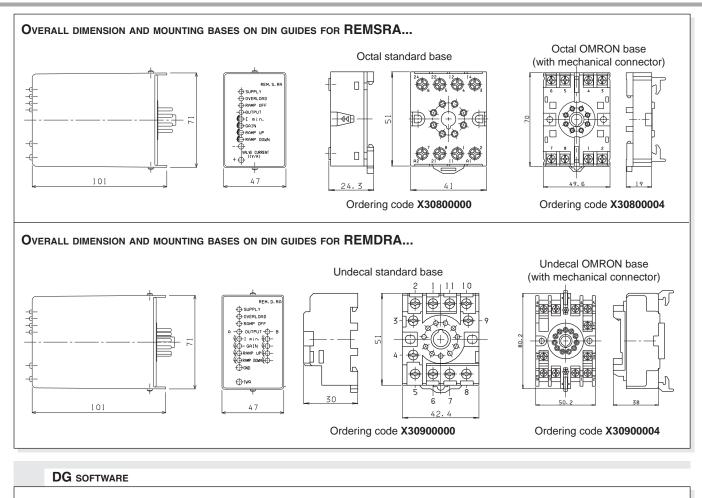
For the version with reference signal in current it needs to be preset in-factory.

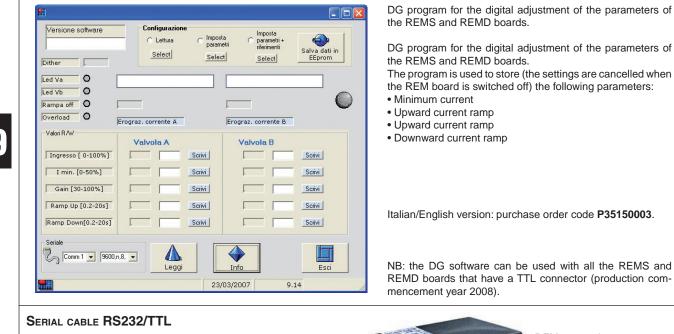






REMS/DRA... TYPE ELECTRONIC REGULATORS SINGLE / DOUBLE SOLENOID PROPORTIONAL CONTROL VALVES





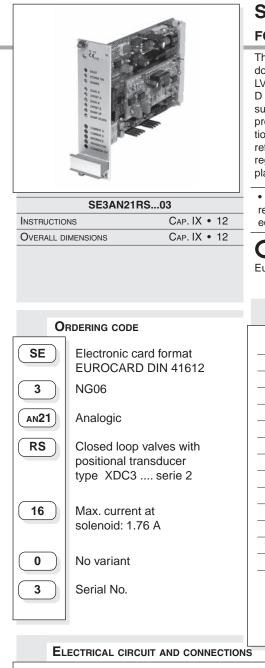
REM connecting at computer with serial cable.

Ordering code VE0110001





VALV/TREMO04 E/02-2008



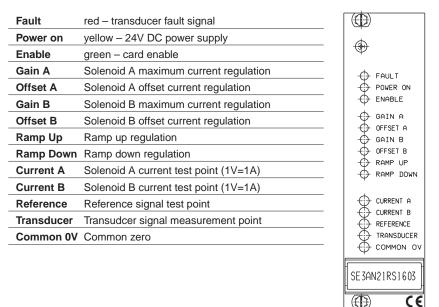
SE3AN21RS... ELECTRONIC CARDS FORMAT EUROCARD FOR POSITIONAL TRANSDUCER VALVES CONTROL

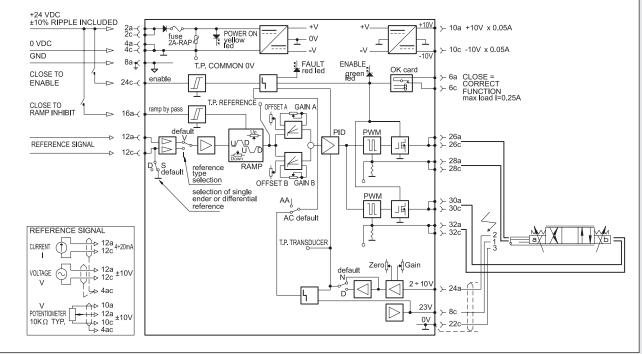
The electronic cards type SE3AN21RS...serie 3 have been planned for controlling single and double solenoid proportional valves XDC3....serie 2 equipped with position transducer type LVDT. The card has a EUROCARD format for being assembled on a connector type DIN 41612 D 32. The output stage operates on the basis of the Pulse Width Modulation (PWM) and is subject to the current feedback so that it is possible to obtain an output solenoid current directly proportional to the input signal. The regulator is supplied with standard calibration for proportional valve control. The card is equipped with a control module type PI which compares the reference signal with the position transducer signal: the eventual error is used to optimize the regulation. It is possible to carry out further regulations by operating on the relative trimmers placed on the frontal panel (see picture).

• The connection between the card and the solenoid must be direct • The common one of return to proportional solenoid must not be shared between other valve connections or electrical equipment worker.

CE Registered mark with reference to the electromagnetic compatibility. European norms: EN50082-1 - General safety norm; EN50081-1 -Emission general norm.

ADJUSTMENT PANEL FOR CARD







Instructions for use

For proportional valves with code XDC3C..F.... serie 2 (SE3AN21RS16...serie 3)

Power electric supply

24 VDC nominal 22÷30 VDC rectified and stabilized (30W max.) 2A fast-acting fuse is fitted for power circuit protection.

Reference voltage

The card gives 2 stabilized voltage values: +10V 50mA (a10) and -10V 50mA (c10).

Available inputs

± 10V (a12, c12) presetted (a12, c12) move SW 1 bank in "I" position 4 ÷ 20mA

Card enable (Enable)

Usually the card is not enable. For enabling it, apply in c24a voltage between 22 and 30VDC. Green led signal.

Ramp exclusion

Ramps are usually on. In order to disable them apply a16 a voltage between 22 ÷ 30VDC.

Calibration procedure

Connect the card according to the scheme (See the preceding page). Set zero the reference potentiometer. Before applying the voltage, make sure that the hydraulic system does not move suddenly causing damages to people or things. Apply the voltage to the card: the green led will start blinking. Enable the card and disconnect the ramps (led "FAULT" off) and disable the ramps.

Minimum current regulation

A channel: put the reference signal on 3÷5% of the max. value. Turn the minimum current trimmer clockwise (Imin A) until the actuator moves; then turn the trimmer counterclockwise until the actuator stops.

B channel: repeat the above procedure for the A channel by operating on the I_{min} B trimmer for negative values of the reference signal.

Maximum current regulation

A channel: put the reference signal on the max. (positive) value and turn the gain trimmer (I_{max} A) slowly, until the max. speed requested is reached. Now the speed can be varied by changing the reference signal.

B channel: repeat the above procedure for the A channel by operating on the I_{max} B trimmer and by putting the reference signal on the max. negative value.

Ramp time calibration

Connect the ramps. The ramp time is the time which is necessary for going from the minimum current value to the max. current value and vice versa. The time can be set from a minimum value of 0.1 sec. (ramp excluded) up to a maximum value of 10 sec. (valve max. opening) whether downwards or upwards. By turning the trimmers clockwise the ramp time increases.

Notes:

The ramp down time influences the lock position of the actuator. By setting to zero the reference signal, the actuator keeps moving until the ramp time set (in a downward direction) has passed. For this reason it is necessary to carry out the adjustment carefully and properly.

The card block (FAULT) is automatically reset after that the error has been eliminated.

LVDT connection

See the preceding page:

- terminal 1 della LVDT c8 of the card
- terminal 2 della LVDT a24 of the card

- terminal 3 della LVDT c22 of the card Use screened cable with earth braid.

Solenoid current test point

On the frontal card panel: 1V = 1A

Command signal test point

Enables reading in voltage of referencesignal sent to the card. Reading is direct, but of opposite sign, with voltage reference while current conversation is: 4mA = +10V, 20mA = -10V.

Feedback signal test point

On the frontal card panel: ± 5V according to the spool position

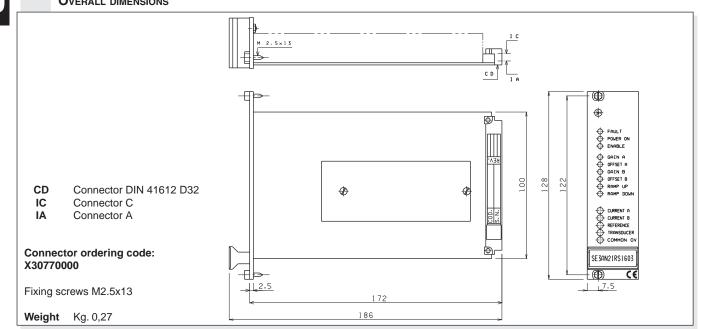
Ambient temperature range 0°÷ 50°C

Electric connections

The connections concerning the reference potentiometers must be carried out with a wire having a section of ≥0.75mm². It is advised to use a screened cable with earth braid.



OVERALL DIMENSIONS







JC3D...

ORDERING CODE JC Heavy duty single Joystick 3 Handle (3 switches) D **Directional switches** 1 Functional operation singe axis (Y) Α With operator present trigger switch ** 00 = No variants **GD** = With silicon rubber protection on the switches handle 1 Serial number

JC3D... HEAVY DUTY SINGLE JOYSTICK BASE

This is a rugged joystick with single axis Y potentiometer and ergonomic handle. The joystick has a spring return lever for center position. The panel material for this joystick and thickness must be strong and rigid. The panel thickness should have a dimension of minimum 3.5mm and maximum 6mm. The joystick has two directional micro-switches per Y axis. The handle has 3 pushbuttons and it is possible to have the operator present switch too.

The IP protection of joystick is referred to above mounting panel and it can be max. IP65. N.B. below mounting panel the rating is IP40.

APPLICATIONS

The joystick has been designed for aerial platform, agricultural and forestry machinery. The use of this product with the electronic control unit for non contemporary movements gives the maximum advantage for hydraulic solutions controlled with a proportional valve.

Electrical features Potentiometer resistance Max. supply voltage Max. supply voltage Y pot Max. output current	1.4 ÷ 2.2 KΩ VDD = 32V DC 0 − 100% VDD 5 mA
Directional switches Maximum supply voltage Max. output current	VCC = 32V DC 200 mA Resistive load
Mechanical features Mechanical angle Maximum operating load (Measured 130 mm above the m Mechanical Life (Y axis) Weight (handle include)	± 20° 390 N ounting surface) 7.500.000 cycles 0,900 Kg
	-40°C ÷ +80°C IP65 GType½ sine6ms locks 1350 per axis

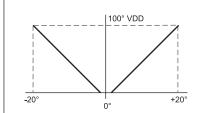
E Registered mark for industrial environment with reference to the compatibility. European norms:

- IEC 61000-4-3 "Electromagnetic immunity"
- EN6550022 "Electromagnetic emissions"

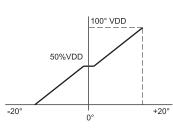
• Product in accordance with RoHS 2011/65/UE Europe Directive.

Connectors and electrical contacts included in the fourniture.

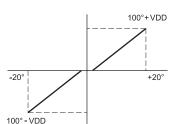
POTENTIOMETER OUTPUT AXIS Y



In order to obtain the Y axis output signal from the joystick as indicated in the diagram over it is necessary to connect the pin 9 and 11 of the AMP 16 way connector at +VDD, and to connect the pin 12 of the AMP 16 way connector at 0V.



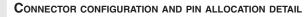
IIn order to obtain the Y axis output signal from the joystick as indicated in the diagram over it is necessary to connect the pin 9 of the AMP 16 way connector at 0V, and to connect the pin 11 of the AMP 16 way connector at +VDD.

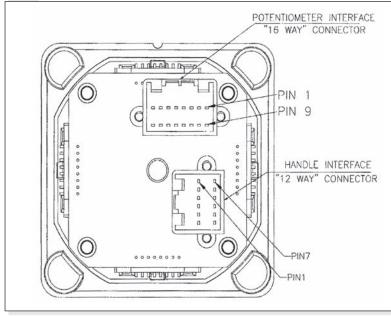


In order to obtain the Y axis output signal from the joystick as indicated in the diagram over it is necessary to connect the pin 9 of the AMP 16 way conector at -VDD, and to connect the pin 11 of the AMP 16 way connector at +VDD.









FROM THE 16 WAY PRIMARY POTENTIOMETER CONNECTIONS SINGLE POTENTIOMETER PER Y AXIS

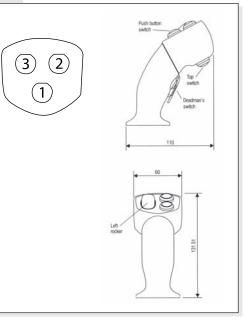
AMP		Pin allocation description
1	Υ	Switch track forward
9	Υ	Pot track back
10	Υ	Pot track signal
11	Υ	Pot track forward
12	Υ	Pot track centre tap
13	Υ	Switch track common
14	Y	Switch track back
16	Y	Switch track centre on

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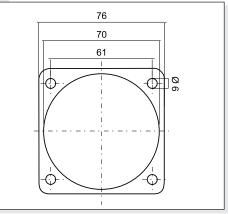
SPARE PARTS AMP 040			
	Receptacle contacts P.No. 175062-1 * Loose piece		
	Plug housing 12 position P.No. 174045-2*		
	Plug housing 16 position double row P.No. 174046-2 *		
* AMP code			
Spare parts kit, connectors and	electrical contacts: V89900000		

12 way handle Connections		
AMP	Pin allocation description	
2	Switch 3 - contact N/O	
3	Switch 2 - contact N/O	
4	Switch 1 - contact N/O	
8	Operator present trigger switch	
11	Switch track common	
12	Operator present trigger switch	

OVERALL DIMENSIONS



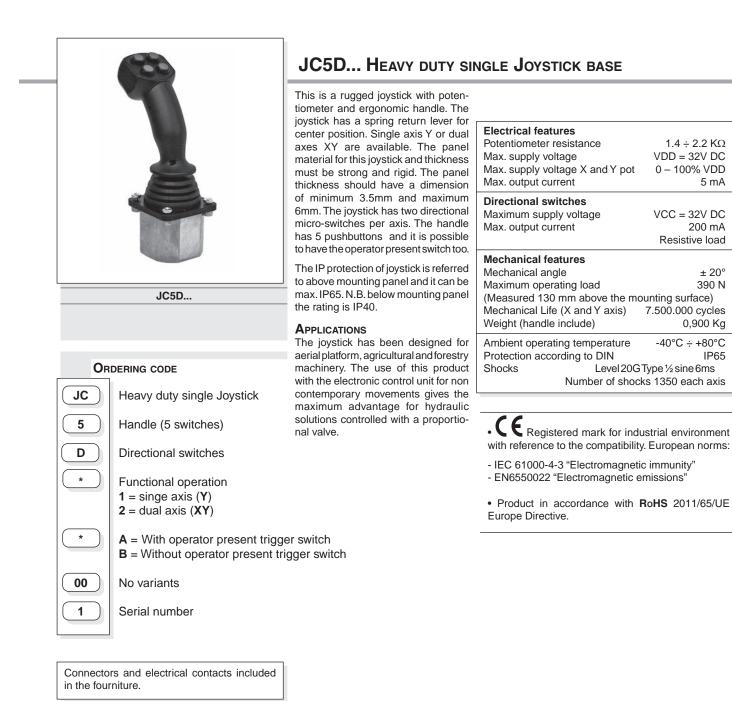
HANDLE ADAPTER PLATE



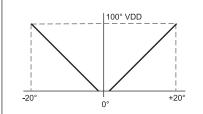
Analogue Joystick ControlLers

VALV/JC3D001_E/04-2015 (P35160006)





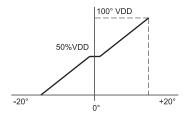
POTENTIOMETER OUTPUT AXIS X,Y



In order to obtain the output signal from the joystick as indicated in the diagram over it is necessary:

- for the X axis output signal, connect the pin 3 and 5 of the AMP 16 way connector at +VDD, and connect the pin 6 of the AMP 16 way connector at 0V.

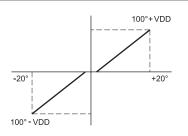
- for the Y axis output signal, connect the pin 9 and 11 of the AMP 16 way connector at +VDD, and connect the pin 12 of the AMP 16 way connector at 0V.



In order to obtain the output signal from the joystick as indicated in the diagram over it is necessary:

- for the X axis output signal, connect the pin 3 of the AMP 16 way connector at 0V, and connect the pin 5 of the AMP 16 way connector at +VDD.

- for the Y axis output signal, connect the pin 9 of the AMP 16 way connector at 0V, and connect the pin 11 of the AMP 16 way connector at +VDD.



In order to obtain the output signal from the joystick as indicated in the diagram over it is necessary:

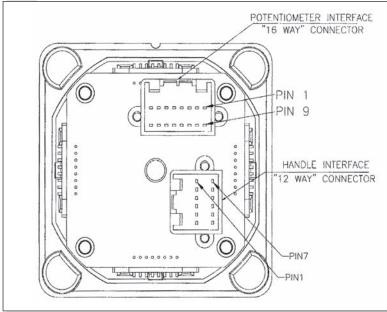
- for the X axis output signal, connect the pin 3 of the AMP 16 way connector at -VDD, and connect the pin 5 of the AMP 16 way connector at +VDD.

- for the Y axis output signal, connect the pin 9 of the AMP 16 way conector at -VDD, and connect the pin 11 of the AMP 16 way connector at +VDD.

IX • 15

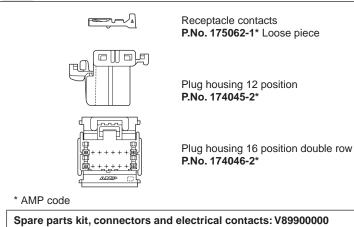






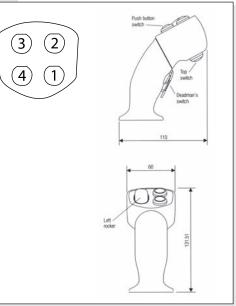
16 WAY PRIMARY POTENTIOMETER CONNECTIONS			
	Pin allocation description		
	Single potentiometer per axis		
Υ	Switch track forward		
Х	Switch track centre on		
Х	Pot track left		
Х	Pot track signal		
Х	Pot track right		
Х	Pot track centre tap		
Х	Switch track common		
Х	Switch track left		
Υ	Pot track back		
Υ	Pot track signal		
Υ	Pot track forward		
Y	Pot track centre tap		
Y	Switch track common		
Υ	Switch track back		
Х	Switch track right		
Υ	Switch track centre on		
	Y X X X X X X X Y Y Y Y Y Y Y X		

SPARE PARTS AMP 040 SERIES MULTILOCK

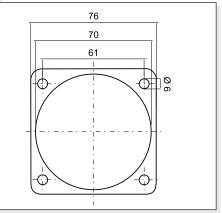


12 WAY HANDLE CONNECTIONS		
AMP Pin allocation description		
1	Switch 4 - contact N/O	
2	Switch 3 - contact N/O	
3	Switch 2 - contact N/O	
4	Switch 1 - contact N/O	
5	Switch 5 - contact N/O	
8	Operator present trigger switch	
11	Switch track common	
12	Operator present trigger switch	

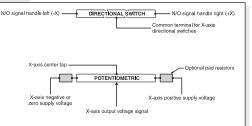
OVERALL DIMENSIONS



HANDLE ADAPTER PLATE



ANALOGUE JOYSTICK CONTROLLERS







ORDERING CODE

Joystick

Fingertip

Directional

Singolo asse

Serial number

00 = No variants

GG = 10-90% output signal

switches

JC

F

D

1

**

1

JCFD... SINGLE-AXIS FINGERTIP JOYSTICK

Electrical features

Developed for applications where | ergonomics and system integrity are paramount, the JCFD is a compact, low profile joystick that provides precise fingertip control. Designed for use with an electronic controller, the plastic track generates analogue and switched reference signals, proportional to the distance and direction over which the handle is moved. The analogue output is configured to provide signals for fault detection circuits within the controller. A center tap on the analogue track provides an accurate voltage reference for the center position or a zero point for a bipolar supply voltage.

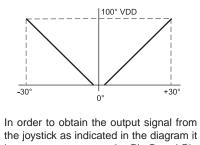
Potentiometer resistance Max. supply voltage Output signal Y pot Output signal Y pot GG variant Max. output current	5 KΩ VDD = 32V DC 0 - 100% VDD 10 - 90% VDD 2mA	
Directional switches		
Maximum supply voltage	VCC = 32V DC	
Max. output current	2mA	
	Resistive load	
Mechanical features		
Mechanical angle	± 30°	
Maximum operating load	50 N	
(Measured 130 mm above the mounting surface)		
Mechanical Life	5.000.000 cycles	
Weight	0,045 Kg	
Ambient operating temperature Protection according to DIN	-25°C ÷ +70°C IP66	
i locolion according to Dire	11 00	

. CE Registered mark for industrial environment with reference to the compatibility. European norms:

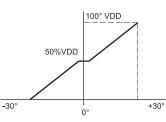
- IEC 61000-4-3 "Electromagnetic immunity" - EN6550022 "Electromagnetic emissions"
- Product in accordance with **RoHS** 2011/65/UE Europe Directive.

Connectors and electrical contacts included in the fourniture.

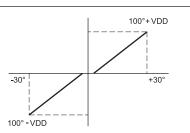
OUTPUT VOLTAGE SIGNAL



In order to obtain the output signal from the joystick as indicated in the diagram it is necessary: connect the Pin B and Pin D of the connector at +VDD, and connect the Pin A at 0V.



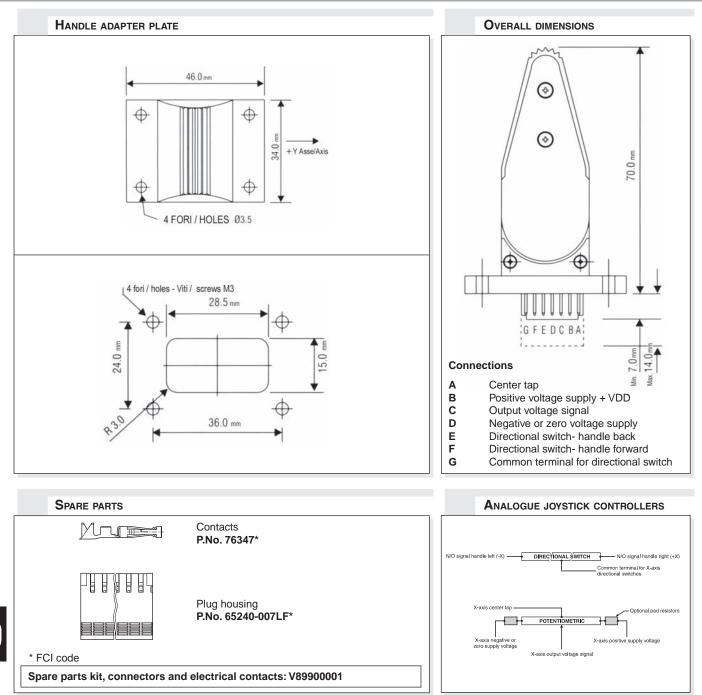
In order to obtain the output signal from the joystick as indicated in the diagram it is necessary: connect the Pin B of the connector at +VDD, and connect the Pin D at 0V.



In order to obtain the output signal from the joystick as indicated in the diagram it is necessary: connect the Pin B of the connector at +VDD, and connect the Pin D at -VDD.



JCFD... SINGLE-AXIS FINGERTIP JOYSTICK

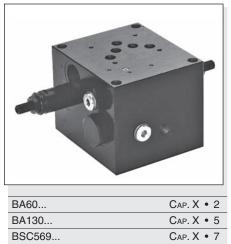


IX • 18



SYSTEMS

Low / HIGH PRESSURE UNITS



SPECIAL SUBPLATE MOUNTINGS WITH AUTOMATIC EXCLUSION **REGENERATING CIRCUIT**



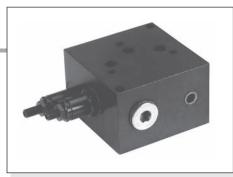
BS5RGA	Cap. X • 8
BS5RGI	Cap. X • 8
AD5IP2T1	Cap. I • 47

S5RGA	Cap. X • 8
S5RGI	Cap. X • 8
D5IP2T1	Cap. I • 47



AP	HIGH PRESSURE CONNECTION
AS	Phase lag (degrees)
BP	LOW PRESSURE CONNECTION
С	Stroke (MM)
СН	ACROSS FLATS
Сн	INTERNAL ACROSS FLATS
DA	Amplitude decay (dB)
DP	DIFFERENTIAL PRESSURE (BAR)
F	Force (N)
1%	Input current (A)
Μ	MANOMETER CONNECTION
NG	KNOB TURNS
OR	SEAL RING
Ρ	Load pressure (bar)
PARBAK	PARBAK RING
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	
Y	Drainage





BA60					
BA06/10	Cap. X • 3				
CMP10	Cap. VII • 30				
BC0630/32 / BC0640	Cap. VII • 15				
BC530/32	Cap. VII • 26				
BC540	Cap. VII • 25				
CETOP 3/NG06	Cap. I • 5				
CETOP 5/NG10	Cap. I • 33				

ORDERING CODE

BA

60

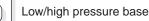
U*

С

*

**

1



Capacity I/min

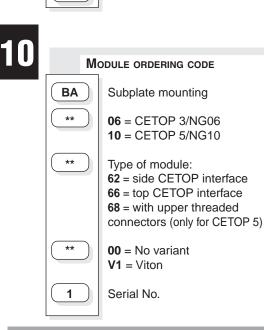
TDouble pump exclusion valve setting $2 = \max. 30 \text{ bar}$ $3 = \max. 75 \text{ bar}$ $4 = \max. 100 \text{ bar}$

Type of adjustment: grub screw

Max. pressure valve setting 1 = max. 50 bar2 = max. 150 bar3 = max. 320 bar

00 = No variant **V1** = Viton

Serial No.



BA60... Low / high pressure units

The low/high pressure groups are usually employed in hydraulic systems fed by dual pumps that form a single pressure circuit.

The main feature of this system consists in being able to set a pressure value in correspondence of which one of the two pumping sections is changed over to drain.

These groups are fitted with an adjustable maximum pressure valve to protect the hydraulic system.

3 pressure adjustment ranges are available for the exclusion valve, which is fitted with cast iron or steel seat, while the maximum pressure valve type CMP10 is available with 3 adjustment ranges.

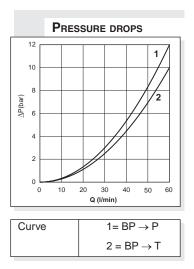
Minimum permissible setting pressure depending on the spring: see cartridge valve type CMP10.

The series connection modular small block (BC0632/ BC532) or the parallel connection type (BC0630/ BC530) with blanking plate (BC0640/BC540) and the solenoid valve should be ordered separately.

For the subplate mounting ordering code see "Subplates" chapter; whilst for the valve ordering code see "Directional control valves" chapter.

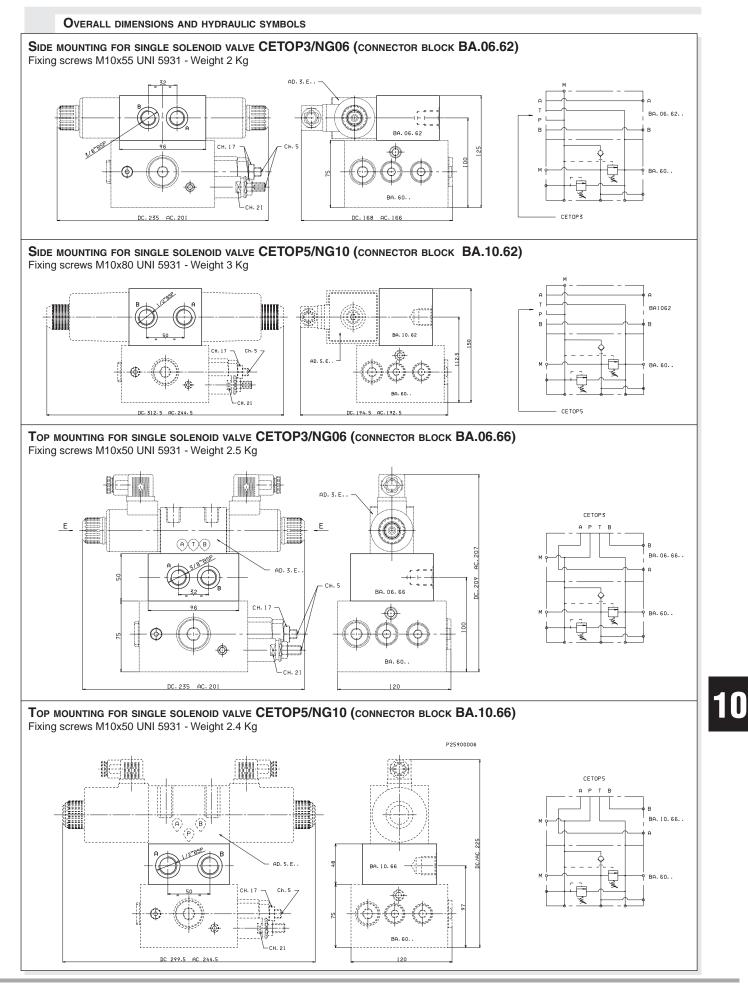
The CETOP3/NG06 connector blocks have 2 rods, the CETOP5/NG10 have 3 rods.

BC1006 = reduction plate to be used only for assembly of modular blocks CETOP3/NG06.

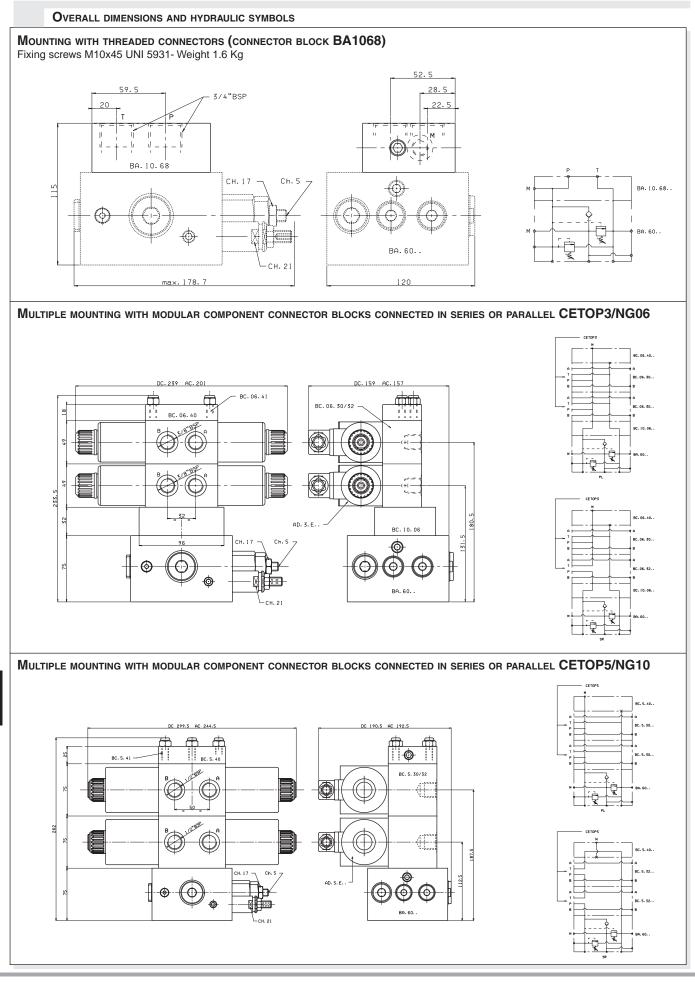


OVERALL DIMENSIONS AND HYDRAULIC SYMBOL Fixing screws M6x100 UNI 5931 Weight 6.6 Kg Fixing screws M6x100 UNI 5931 Fixing screws M6x100 UNI 5931 Weight 6.6 Kg Weight 6.6 Kg Fixing screws M6x100 UNI 5931 Weight 6.6 Kg Weight 6.6 Kg Weight 6.6 Kg Weight 6.6 Kg Weight 6.6 Kg









10

BREVINI

Motion Systems

DANA



BA130					
BA10	Cap. X • 3				
CMP10	Cap. VII • 30				
BSC569	Cap. X • 7				
BC530/32	Cap. VII • 26				
BC540	Cap. VII • 25				
CETOP 5/NG10	Cap. I • 33				
ADP5E	Cap. I • 41				

Low/high pressure base

exclusion valve setting

ORDERING CODE

Capacity I/min

Double pump

BA

130

U*

BA130... Low / HIGH PRESSURE UNITS

The low/high pressure groups are usually employed in hydraulic systems fed by dual pumps that form a single pressure circuit. The main feature of this system consists in being able to set a pressure value in correspondence of which one of the two pumping sections is changed over to drain. These groups are fitted with an adjustable maximum pressure valve to protect the hydraulic system.

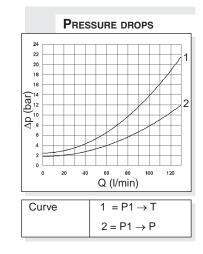
2 pressure adjustment ranges are available for the exclusion valve, which is fitted with a steel seat, while the maximum pressure valve type CMP10 is available with 3 adjustment ranges.

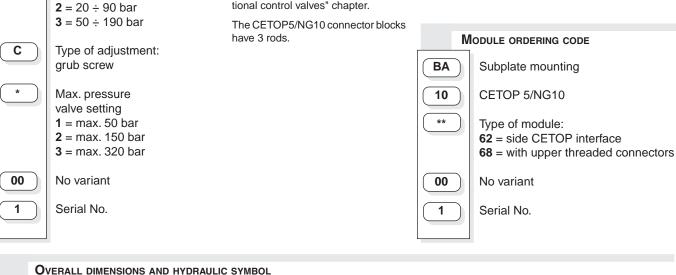
Minimum permissible setting pressure depending on the spring: see cartridge valve type CMP10.

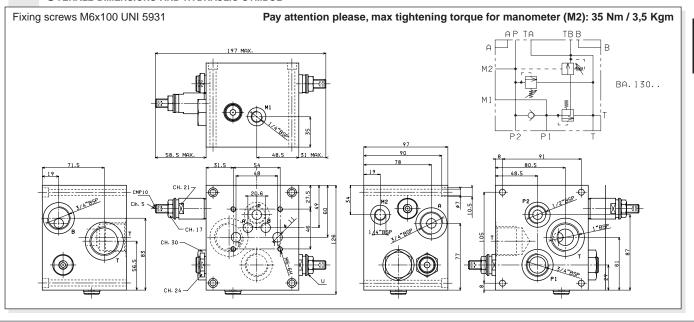
The series connection modular small block (BC532) or the parallel connection type (BC530) with blanking plate (BC540) and the solenoid valve should be ordered separately.

For the subplate mounting ordering code see "Subplates" chapter; whilst for the valve ordering code see "Directional control valves" chapter.

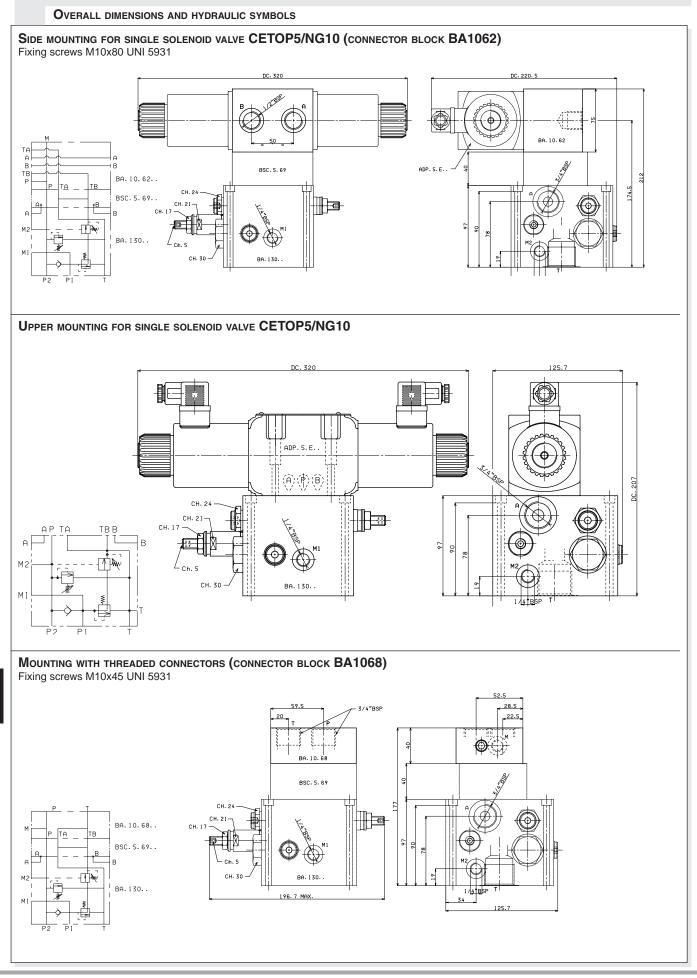
Max. flow	130 l/min
Max. operating pressure	320 bar
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-25°C ÷ 75°C
Ambient temperature	-25°C ÷ 60°C
Max. contamination level	class 10 in accordance
with NA	AS 1638 with filter B ₂₅ ≥75
Weight	8 Kg







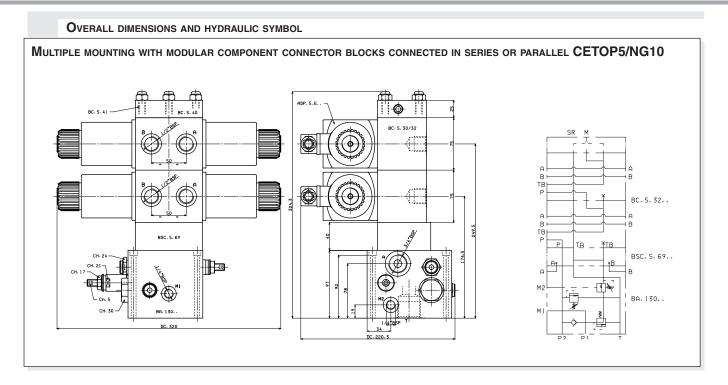




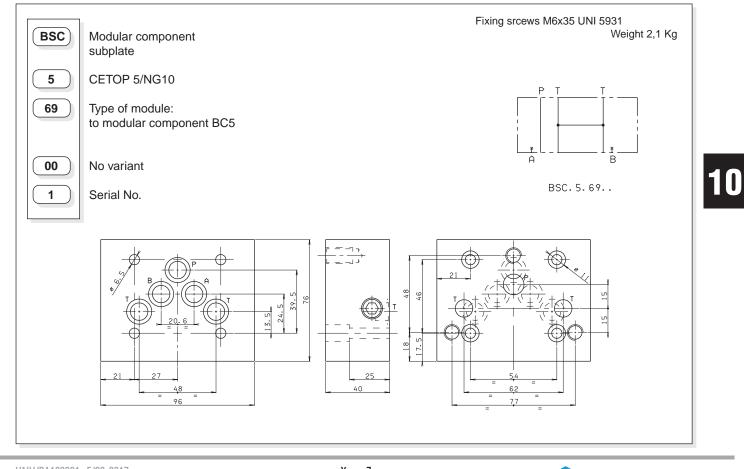
10

X • 6





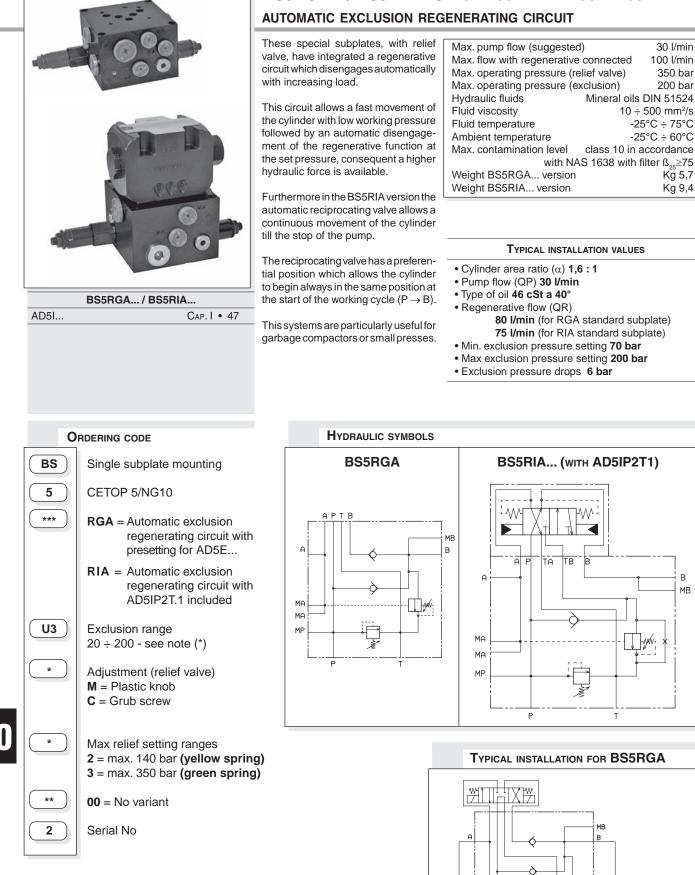
BSC569... TRANSFORMATION MOUNTING CETOP 5 INTERFACE TO MODULAR COMPONENT BC5...



X • 7

BREVINI

Motion Systems



(*) These values depend on the hydraulic circuit configuration: flow, dimensions and system's frictions.

VALV/BS5R\$A002 E/03-2017

30 l/min

350 bar

200 bar

Kg 5,7

Kg 9,4

в

MR

-25°C ÷ 75°C

-25°C ÷ 60°C

100 l/min

BS5RGA... / BS5RIA... Special subplate mountings with

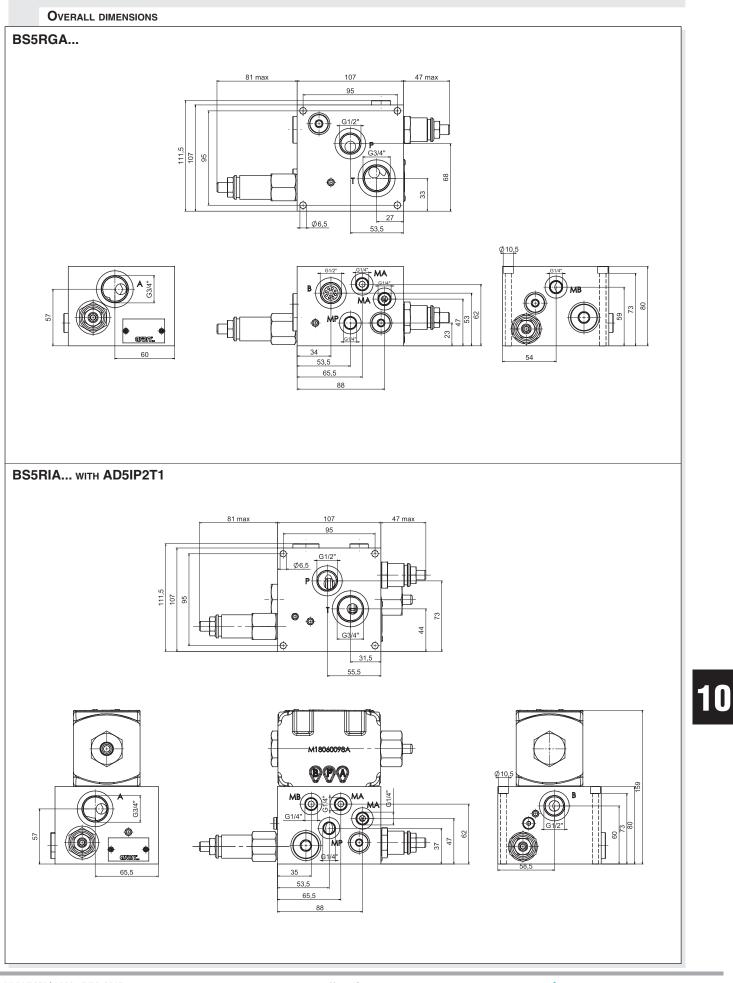
MA

MF

MP



BS5RGA... / BS5RIA... SPECIAL SUBPLATE MOUNTINGS WITH AUTOMATIC EXCLUSION REGENERATING CIRCUIT





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Motion Systems

DANA



ABBREVIATIONS

AP	HIGH PRESSURE CONNECTION
AS	PHASE LAG (DEGREES)
BP	LOW PRESSURE CONNECTION
С	Stroke (MM)
СН	ACROSS FLATS
Сн	INTERNAL ACROSS FLATS
DA	Amplitude decay (dB)
Dp	DIFFERENTIAL PRESSURE (BAR)
F	Force (N)
1%	INPUT CURRENT (A)
Μ	MANOMETER CONNECTION
NG	KNOB TURNS
OR	SEAL RING
Ρ	Load pressure (bar)
PARBA	C PARBAK RING
PL	PARALLEL CONNECTION
Pr	Reduced pressure (bar)
Q	FLOW (L/MIN)
QP	PUMP FLOW (L/MIN)
SE	ELASTIC PIN
SF	Ball
SR	SERIES CONNECTION
Х	PILOTING
Y	Drainage

COMPENSATED BANKABLE VALVES

SEE CATALOGUE CODE DOC00046









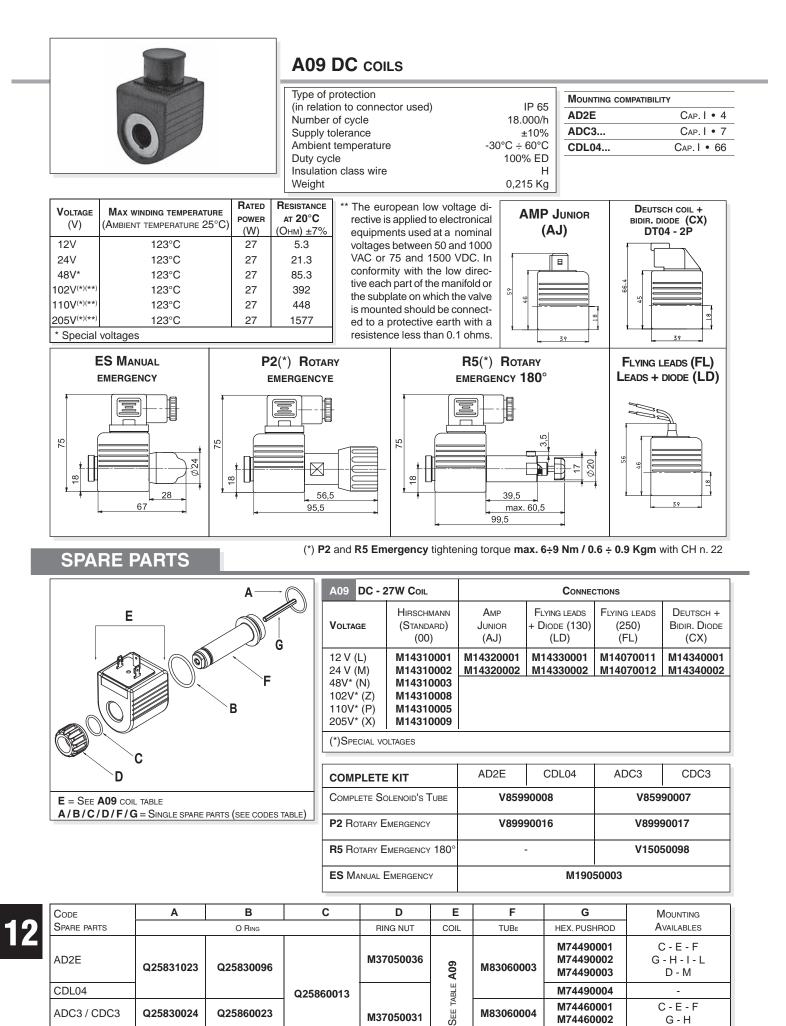
DC AND AC STANDARD COILS "UL RECOGNIZED" TYPE COILS



A09 DC COIL	Cap. XII • 2		
20W DC COIL	Cap. XII • 3		
D15 DC COIL	Cap. XII • 4		
ECOAT D15 DC COIL	Cap. XII • 5		
40W COIL	Cap. XII • 6		
B14 AC SOLENOID	Cap. XII • 7		
A16 DC COIL	Cap. XII • 8		
D19 DC SOLENOID	Cap. XII • 9		
K16 AC SOLENOID	Cap. XII • 10		
22W DC COIL (FOR CARTRIDGE VALVE)			
	CAP. XII • 11		
30W DC COIL (FOR CARTRIDGE VALVES)			
	Cap. XII • 12		
UL RECOGNIZED COILS	Cap. XII • 13		

AP	HIGH PRESSURE CONNECTION
AS	PHASE LAG (DEGREES)
BP	LOW PRESSURE CONNECTION
С	Stroke (MM)
СН	ACROSS FLATS
Сн	INTERNAL ACROSS FLATS
DA	Amplitude decay (dB)
Dp	DIFFERENTIAL PRESSURE (BAR)
F	Force (N)
1%	INPUT CURRENT (A)
Μ	MANOMETER CONNECTION
NG	KNOB TURNS
OR	Seal ring
Р	Load pressure (bar)
PARBA	C PARBAK RING
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	
Y	Drainage





C3V03		Q25861025	Q25860024	
	E/11	2 2017		

M83060002



-

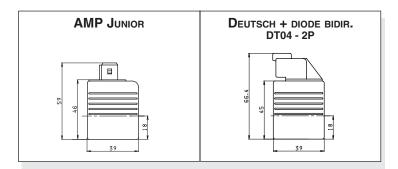
M74480001



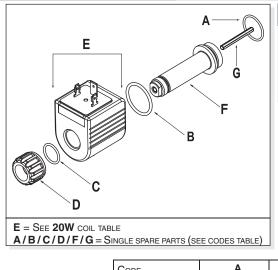
"20W" DC COILS FOR OFF-HIGHWAY MACHINERY

Type of protection		MOUNTING COMPATIBILITY	
(in relation to connector used)	IP 65	CRD03	CARTRIDGE CATALOGUE
Number of cycle	18.000/h	C3V05	CARTRIDGE CATALOGUE
Supply tolerance	±10%	03405	CARTRIDGE CAIALOGUE
Ambient temperature	-30°C ÷ 60°C		
Duty cycle	100% ED		
Insulation class wire	н		
Weight	0,212 Kg		

Voltage (V)	Max. winding temperature (Ambient temperature 25°C)	Rated power (W)	Resistance at 20°C (Онм) ±10%
12V	-	20	7.2



SPARE PARTS

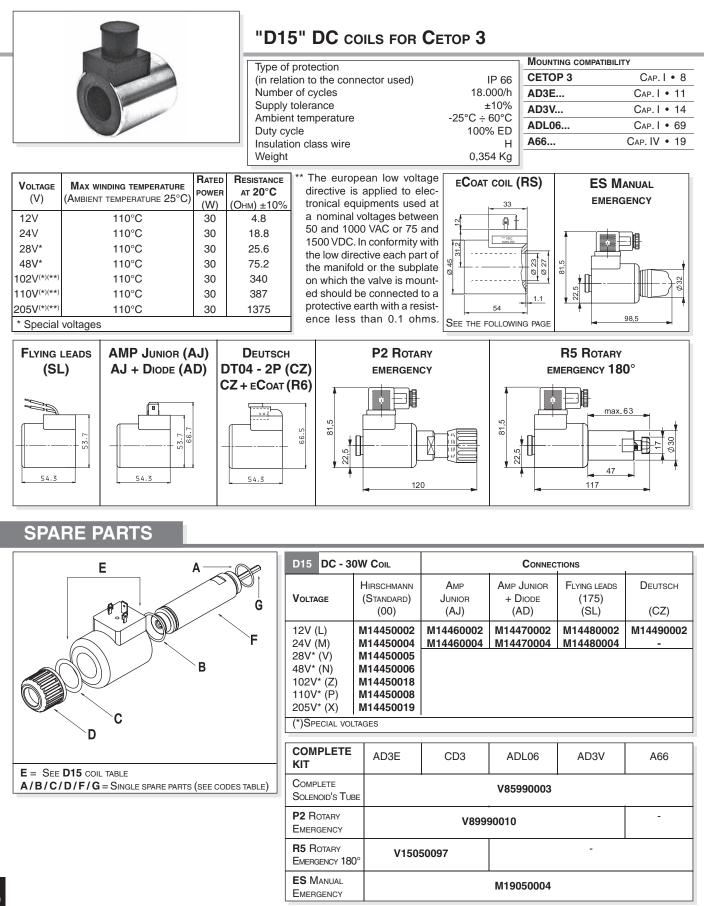


20W DC ColL	CONNECTIONS		
TENSIONE	Amp Junior (A)	DEUTSCH + BIDIR. DIODE (D)	
12V (L)	M14321001	M14341001	

12

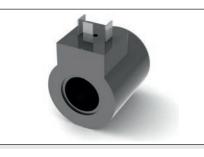
CODE	Α	В	С	D	Е	F	G
SPARE PARTS		O Ring		RING NUT	COIL	TUBE	HEX. PUSHROD
CRD03 C3V05	Q25861010	Q25860023	Q25830022	M37050031 M37050036	Vedi 20W	M83060007 M83060006	M74480003 M74480002





CODE	Α	В	С	D	E	F	G	MOUNTING		
SPARE PARTS		O Ring		RING NUT	COIL	TUBE	HEX. PUSHROD	AVAILABLES		
AD3E CD3 AD3V ADL06	Q25830024	Q25860033	Q25830185	M37050030	ee table D15	a b	2 PBL	M83130001	M74470001 M74470002 M74470003	C - E - F - M G - H - I - L D
A66					S		M74470004	-		





HIRSCHMANN ECOAT(1) COILS (D15 RS VARIANT)

Type of protection (in relation to the connector)IP 66Number of cycles18.000/hSupply tolerance $\pm 10\%$ Ambient temperature $-25^{\circ}C \div 60^{\circ}C$ Duty cycle100% EDInsulation class wireHWeight0,354 Kg

MOUNTING COMPATIBILITY				
CETOP 3	Cap. I • 8			
AD3E	Cap. I • 11			
ADL06	Cap. I • 69			

VOLTAGE	MAX. WINDING TEMPERATURE	RATED	RESISTANCE AT 20°C	
(V)	(AMBIENT TEMPERATURE 25°C)	POWER (W)	(Онм) ±10%	
12V	110°C	30	4.8	
24V	110°C	30	18.8	
28V*	110°C	30	25.6	
110V ^{(*)(**)}	110°C	30	387	
* Special	voltages			

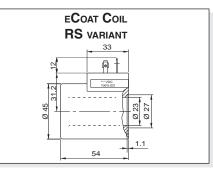
(1) Sealed coil winding with steel out housing with eCoat protection. Has succesfully overcome more than 700 hours of salt spray test before red rust (test according to UNI EN ISO 9227 and test evaluation according to UNI EN ISO 10289).

** The european low voltage directive is applied to electronical equipments used at a nominal voltages between 50 and 1000 VAC or 75 and 1500 VDC. In conformity with the low directive each part of the manifold or the subplate on which the valve is mounted should be connected to a protective earth with a resistence less than 0.1 ohms.

SPARE PARTS

D15	ECOAT COIL (DC / 30W)			
Voltage		Hirschmann (Standard)		
12V (L)	M14820001		
24V (M)	M14820002		
28V*	(V)	M14820005		
110V* (P)		M14820008		
(*)Spe	ECIAL VOLTAGES			

	de Spare parts C / D / E / F / G	FOR RS VARIANT
в	Or (tube)	Q25830024
С	RING NUT	M37050062
D	O RING (RING NUT)	Q25830185
Е	O RING (COIL)	Q25860033
F	Тиве	M83130001
G	HEX. PUSHROD (MOUNTING C-E-F) (MOUNTING G-H-I) (MOUNTING D)	M74470001 M74470002 M74470003



SEE "D15" COIL STANDARD FOR BOTH EMERGENCY MANUAL ES AND ROTARY P2.



DEUTSCH ECOAT(1) COILS (D15 R6 VARIANT)

Type of protection (in relation to the connector) IP 69K		
Number of cycles	18.000/h	
Supply tolerance	±10%	
Ambient temperature	-20°C ÷ 60°C	
Duty cycle	100% ED	
Insulation class wire	н	
Weight	0,354 Kg	

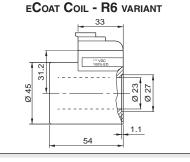
MOUNTING COMPATIBILITY				
CETOP 3	Cap. I • 8			
AD3E	Cap. I • 11			
ADL06	Cap. I • 69			

VOLTAGE	Max. WINDING TEMPERATURE	RATED	RESISTANCE AT 20°C
(V)	(AMBIENT TEMPERATURE 25°C)	POWER (W)	(Онм) ±10%
12V	110°C	30	4.8
24V	110°C	30	18.8

(1) Sealed coil winding with steel out housing with eCoat protection. Has succesfully overcome more than 700 hours of salt spray test before red rust (test according to UNI EN ISO 9227 and test evaluation according to UNI EN ISO 10289).

SPARE PARTS

D15 ECOAT COIL (DC / 30W)		CODE SPARE PARTS B / C / D / E / F / G		FOR R6 VARIANT	
TENSIONE	DEUTSCH	в	Or (tube)	Q25830024	
12V (L)	M14830001	С	RING NUT	M37050062	
		D	O RING (RING NUT)	Q25830185	
24V (M)	M14830002		O RING (COIL)	Q25860033	
		F	Тиве	M83130001	
		G	HEX. PUSHROD (MOUNTING C-E-F) (MOUNTING G-H-I) (MOUNTING D)	M74470001 M74470002 M74470003	



See "D15" coil standard for both emergency manual ES and rotary P2.

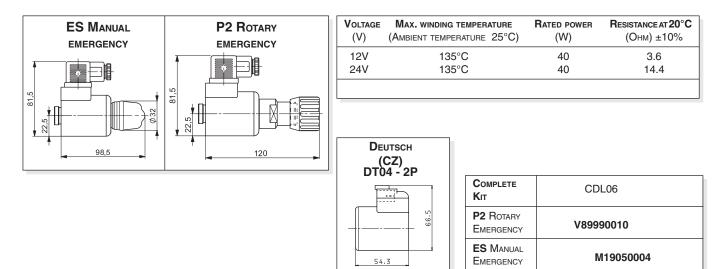




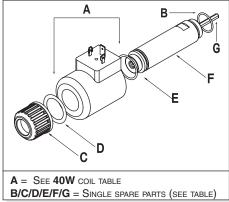
"40W" DC COIL (FOR CDL.06...)

Type of protection (in relation to	o the connector) IP 66
Number of cycles	18.000/h
Supply tolerance	±10%
Ambient temperature	-54°C ÷ 60°C
Duty cycle	100% ED
Insulation class wire	Н
Weight	0,354 Kg

MOUNTING COMPATI	BILITY		
CDL06 CAP. 1 • 68			
	0		



SPARE PARTS



40W DC CoiL	CONNECTIONS
Voltage	Hirschmann (Standard)
12V (L)	M14600001
24V (M)	M14600002
	DEUTSCH (CZ)
12V (L)	M14610001
24V (M)	M14610002

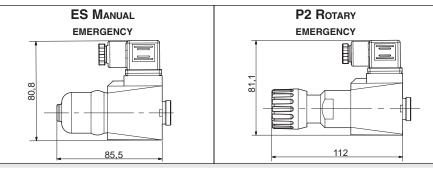
CODE SPARE PARTS B / C / D / E / F / G		FOR CDL06
в	O RING (TUBE)	Q25830024
С	RING NUT	M37050030
D	O RING (RING NUT)	Q25830185
Е	O RING (COIL)	Q25860033
F	Тиве	M83130001
G	HEX. PUSHROD	M74470003





"B14" AC SOLENOIDS FOR CETOP 3

Type of protection		MOUNTING COMPATI	BILITY
(in relation to the connector used)	IP 65	CETOP 3 *	Cap. I • 8
Number of cycles	18.000/h	AD3.E*	CAP. I • 11
Supply tolerance	+10% / -10%		
Ambient temperature	-30°C ÷ 60°C	(*) serial No. 3 (AC voltage)	
Duty cycle	100% ED	()(
Insulation class wire	Н		
Weight	0,436 Kg		
_	-		

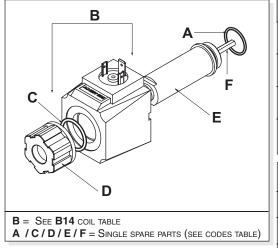


	Max. winding temperature (Ambient temperature 25°C)	Resistance at 20°С (Онм) ±10%	RATED POWER (VA)	PICKUP CURRENT (A)
24V/50Hz - 24V/60Hz	100°C - 96°C	1.7	54 - 40	5.6 - 5
48V/50Hz - 48V/60Hz	112°C - 98°C	6.8	45 - 34	5.3 - 5
115V/50Hz - 120V/60Hz *	133°C - 101°C	32.5	61 - 51	3.2 - 3.2
230V/50Hz - 240V/60Hz *	120°C - 103°C	134	62 - 52	1.6 - 1.6

ments used at a nominal voltages between 50 and 1000 VAC or connected to a protective earth with a resistence less than 0.1 ohms. 75 and 1500 VDC. In conformity with the low directive each part of

* The european low voltage directive is applied to electronical equip- the manifold or the subplate on which the valve is mounted should be

SPARE PARTS



B14 AC CoiL	CONNECTION
Voltage	Hirschmann (Standard)
24V/50-60Hz (A) 48V/50-60Hz (B)	M14640003 M14640007
115V/50Hz (J) 120V/60Hz	M14640006
230V/50Hz (Y) 240V/60Hz	M14640001
COMPLETE KIT	Code
Тиве Кіт	V85990011
ROTARY EMERGENCY P2	V89990021
Manual Emergency ES	M19050001

Code	Α	В	С	D	E	F	Montaggi
SPARE PARTS	O Ring	Coil	O Ring	RING NUT	TUBE	HEX. PUSHROD	Possibili
AD3E*	Q25830024	See table B14	Q25860036	M37050041	M831100001	M74520001 M74520002 M74520003	C - E - F - M G - H - I - L D

(*) Steridail Sterie 33 (Attensolutagier) AC)





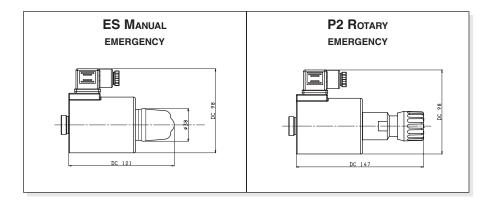
"A16" DC COILS FOR CETOP 5

Type of protection	
(in relation to the connector used)	IP 65
Number of cycles	18.000/h
Supply tolerance	±10%
Ambient temperature	-30°C ÷ 60°C
Duty cycle	100% ED
Insulation class wire	Н
Weight	0,9 Kg

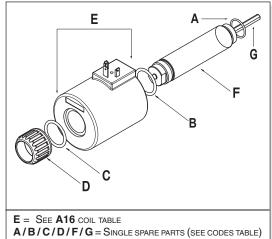
MOUNTING COMPA	TIBILITY
CETOP 5	Cap. I • 33
AD5E	Cap. I • 36
CDL10	Cap. I • 71
ADL106	Cap. I • 72
A88	CAP. IV • 33

Voltage (V)	Max winding temperature (Ambient temperature 25°C)	RATED POWER (W)	Resistance at 20°C (Онм) ±7%	
12V	106°C	45	3.2	
24V	113°C	45	12.4	
48V*	-	45	-	
102V ^{(*)(**)}	-	45	-	
110V ^{(*)(**)}	118°C	45	268	
205V ^{(*)(**)}	-	45	-	
* Special voltages				

** The european low voltage directive is applied to electronical equipments used at a nominal voltages between 50 and 1000 VAC or 75 and 1500 VDC. In conformity with the low directive each part of the manifold or the subplate on which the valve is mounted should be connected to a protective earth with a resistence less than 0.1 ohms.



SPARE PARTS



A16 DC/45W Coil	CONNECTION
Voltage	Hirschmann (Standard)
12V (L)	M14220002
24V (M)	M14220004
48V* (N)	M14220006
102V* (Z)	M14220013
110V* (P)	M14220008
205V* (X)	M14220014
(*)SPECIAL VOLTAGES	

COMPLETE KIT	AD5E	CDL10	ADL10	A88
P2 ROTARY EMERGENCY		V89990011		-
ES MANUAL EMERGENCY		M19050002		

CODE	Α	В	С	D	Е	F	G	MOUNTING
SPARE PARTS		O RING		RING NUT	COIL	TUBE	HEX. PUSHROD	POSSIBBLE
AD5E ADL/CDL10	Q25830026	Q25860040	Q25860040	M37050033	ee table A15	M83160001	M74440002 M74440003 M74440004	C - E - F - M G - H - I - L D
A88					See A		M74440006	-



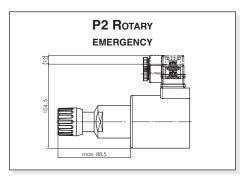


"D19" DC SOLENOIDS

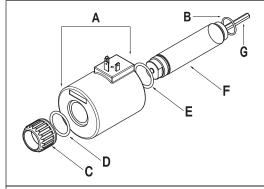
Type of protection		MOUNTING COMPA	TIBILITY
(in relation to the connector used)	IP 66	ADP5E	CAP. I
Number of cycle Supply tolerance	18.000/h ±10%	ADP5V	CAP. I
Ambient temperature	-25°C ÷ 60°C		
Duty cycle	100% ED		
Max static pressure	210 bar		
Insulation class wire	H		
Weight	1,63 Kg		

Voltage (V)	Max winding temperature (Ambient temperature25°C)	Rated power (W)	Resistance at 20°С (Онм) ±10%
12V	105°C	42	3.43
24V	105°C	42	13.71
48V*	105°C	42	55
102V ^{(*)(**)}	105°C	42	248
110V ^{(*)(**)}	105°C	42	288
205V ^{(*)(**)}	105°C	42	1000
* Special	voltage		

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SPARE PARTS



A = SEE D19 COIL TABLE B/C/D/E/F/G = SINGLE SPARE PARTS (SEE CODES TABLE)

COMPLETE KIT	ADP5E	ADP5V
P2 Rotary Emergency	V8999	90012

D19 DC/42W CoiL	
Voltage	Hirschmann (Standard)
12V (L)	M14270001
24V (M)	M14270002
48V* (N)	M14270003
102V* (Z)	M14270007
110V* (P)	M14270005
205V* (X)	M14270008
(*)SPECIAL VOLTAGES	

	DDE SPARE PARTS / C / D / E / F / G	FOR ADP5E AND ADP5V
В	O RING (TUBE)	Q25830101
С	RING NUT	M37050022
D	O RING (RING NUT)	Q25830035
Е	O RING (COIL)	Q25860035
F	Тиве	M83170002
G	HEX. PUSHROD	M74380002

DANA	BREVINI®
	Motion Systems

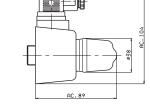
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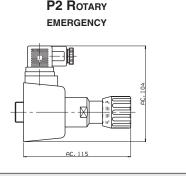
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"K16" AC SOLENOIDS FOR CETOP 5

Type of protection		MOUNTING COMPATI	BILITY
(in relation to the connector used)	IP 66	CETOP 5	Cap. I • 33
Number of cycles Supply tolerance Ambient temperature Duty cycle Max. pressure static Insulation class wire Weight	18.000/h +10% / -10% -54°C ÷ 60°C 100% ED 210 bar H 0,8 Kg	AD5.E	Cap. I • 36
ES MANUAL EMERGENCY		P2 Rotary Emergency	

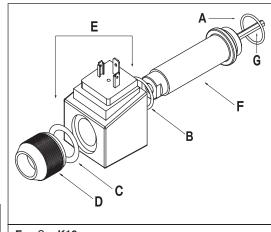




Voltage	Max. WINDING TEMPERATURE	RATED	IN RUSH CURRENT	RESISTANCE AT 20°C
(V)	(Ambient temperature25°C)	POWER(VA)	(VA)	(Онм) ±10%
24V/50Hz	134°C	124	454	0.56
24V/60Hz*	115°C	103.5	440	0.55
48V/50Hz*	134°C	113	453	2.10
115V/50Hz-120V/60Hz ^{(*)(**)}	121°C - 138°C	121-101	471-487	10.8
230V/50Hz-240V/60Hz ^{(*)(**)}	121°C - 138°C	120-101	478-485	43.0
240V/50Hz ^{(*)(**)}	134°C	120	456	47.39
* Special voltage				

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SPARE PARTS



K16 AC ColL	CONNECTION	
Voltage	Hirschmann (Standard)	
24V/50Hz (A) 24V/60Hz* (F) 48V/50Hz* (B)	M14300010 M14300012 M14300014	COMPLETE
115V/50Hz (J) 120V/60Hz	M14300029	P2 Rotary
230V/50Hz (Y) 240V/60Hz	M14300027	Emergency
240V/50Hz* (E	M14300025	ES MANUAL EMERGENCY
(*)Special volta	GES	

12

E = SEE K16 COIL TABLE
A/B/C/D/F/G = SINGLE SPARE PARTS (SEE CODES TABLE)

Code	А	В	С	D	Е	F	G	MOUNTING
SPARE PARTS		O RING		RING NUT	COIL	TUBE	HEX. PUSHROD	AVAILABLES
AD5E	Q25830026	Q25860026	Q25830187	M37050005	See table K15	M83300000	M74210000 M74160000 M74700000	C - E - F - M G - H - I - L D





AD5E

V89990002

M19050002

		٢.	
	0		

VOLTAGE

(V)

12V

24V

48V*

102V^{(*)(**)}

205V^{(*)(**)}

* SPECIAL VOLTAGE

MAX. WINDING TEMPERATURE

(AMBIENT TEMPERATURE 25°C)

116 °C

115 °C

114 °C

"22W" DC COILS

RATED POWER

(W)

22

22

22

22

22

Type of protection (in relation to the connector) IP 65 Number of cycles , 18.000/h Supply tolerance +10% / -10% Ambient temperature -30°C ÷ 60°C 100% ED Duty cycle Insulation class wire 0,2 Kg Weight

RESISTANCE AT 20°C

(Онм) ±10%

6.3

25.6

102

467.85

1954

MOUNTING COMPATIBILITY					
CRP/CRD CARTRIDGE CATALOGU					
C2V02	CARTRIDGE CATALOGUE				

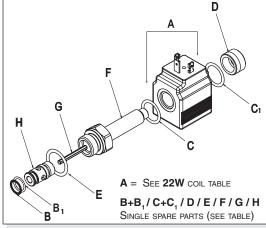
** The european low voltage directive is applied to electronical equipments used at a nominal voltages between 50 and 1000 VAC or 75 and 1500 VDC. In conformity with the low directive each part of the manifold or the subplate on which the valve is mounted should be connected to a protective earth with a resistence less than 0.1 ohms.

PS ROTARY EMERGENCY					
CH. 19 CH. 13 P3 Ch. 3	76				

AMP JUNIOR (AJ) 60,7 47,7 38,5

Н

SPARE PARTS



22W DC Coil	CONNECTIONS				
Voltage	STANDARD	AMP JUNIOR (AJ)			
12V (L) 24V (M) 48V* (N) 102V* (Z) 205V* (X)	M14040001 M14040002 M14040003 M14040006 M14040007	M14730001 M14730002 — — —			
(*) Special voltages					

	١.						
		Complete Kit	CRP02NA	CRD01/02	CRP02NC	C2V02	C3V02
G/H .BLE)		PS Rotary Emergency	V89990014	V89990005		-	

Code Spare parts	B PARBAK VALVE	B ₁ O RING SEAT	C + C ₁ O RING (R. NUT/COIL)	C + C ₁ RING NUT	E + F TUBE (+ O RING TUBE)	G HEX. PUSHROD	H VALVE SEAT
CRP02NCE					R83100B83	M86150006	
CRP02NCS	Q25780026	Q25830015		-	R83100B82	M86150004	M70150003
CRP02NAE					R83100B84	M86150004	
CRD01A	Q25780026	Q25830015	Q25860055	M37050026		N7440000	M70150004
CRD01B	Q25780030	Q25830021			R83100B85	M74440000	M70150005
CRD02A	Q25780026	Q25830015]		00100000	M74440001	M70150004
CRD02B	Q25780030	Q25830021					M70150005

CODE	B PARBAK	B ₁ O RING	C + C ₁ O RING	$C + C_1$	E O RING	F	G	H		
SPARE PARTS	VALVE	SEAT	(R. NUT/COIL)	RING NUT	(TUBE)	TUBE	HEX. PUSHROD	VALVE SEAT		
C2V02NC	00550000						M50070002	1170 100000		
C2V02NA	Q25780026	Q25830015	Q25830015	Q23030015					M50070003	M70400002
C3V02	-	Q25880036 Q25880045	Q25860055	60055 M37050026	Q25861010	M83040005	M50070001	M70400001		



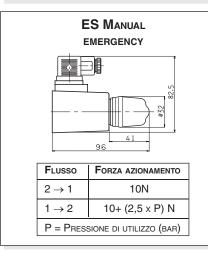


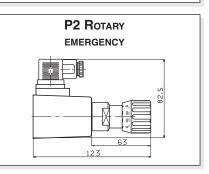


"30W" DC COILS

Type of protection		MOUNTING CO	OMPATIBILITY
(in relation to the connector used)	IP 65	CRD04	CARTRIDGE CATALOGUE
Number of cycles	18.000/h		
Supply tolerance	+10% / -10%		
Ambient temperature	-54°C ÷ 60°C		
Duty cycle	100% ED		
Insulation class wire	Н		
Weight	0,2 Kg		

Voltage (V)	Max. winding temperature (Ambient temperature 25°C)	Rated power (W)	Resistance at 20°С (Онм) ±10%
12V	108°C	30	4.7
24V	108°C	30	18.8





SPARE PARTS

	$\frac{B}{H} = \frac{B_1}{B_2} \frac{B_2}{B_1} \frac{B_2}{B_2} \frac{B_2}{B_1} \frac{B_2}$		D D D D		30W DC Co 12V M14100010 (L)	01L 24V M14100011 (M)		TE KIT		CDL04 /89990007 /119050001
	B PARBAK	B ₁ O RING SEDE FILETTATA	B₂ O RING	C O RING (TUBE)	D RING NUT	E O RING (COIL)	E ₁ O RING (RING NUT)	F TUBE	G HEX. PUSHROD	H VALVE SEAT
Vrno A	Q25780026	Q25830015	Q25831017	Q25861010	M37050004	Q25830026	Q25830183	R83200997	M74360000	M70150004
	Q25780030	Q25830021	Q23031017	G25001010	1037 030004	Q23030020	42000100	1103200397	10174300000	M70150005



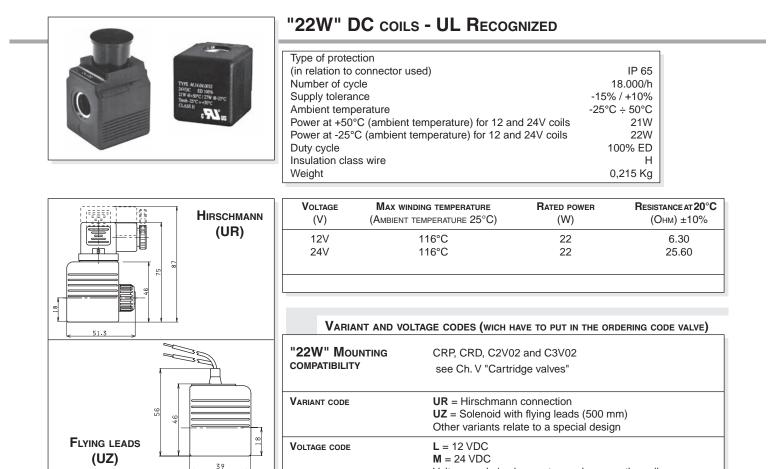


 A P	TYPE M.14.04.0032 34VDC ED 100% 21W @-50C C 127W @-2 Dath_50C - 1	500						
	22 W	us .			on compone or system. T and accepte	cognized Component Mark may be use ent parts that are part of a larger produc 'he UL Mark is the most widely recognise ed evidence of product's compliance wit nd USA safety requirements.		
Nus Nus	0	5	UL CATEGORY CODE - U.S.A. YSY - Canada YSY	/12	to identify w Certification solenoid op valve assem as parts of e	v code number (CCN) is assigned in order ich product categories are covered by UL n. Our category covers valve parts, such a erators, coil assemblies, coil enclosurer ablies and similar items intended to be use electrically operated valves as indicated in al Recognitions.		
•			UL FILE NUMBER MH45162			UL web site (www.ul.com), linking <i>certific</i> riting the correct UL File Number you ca rification.		
					assigned to	Number is an alphanumeric designatic any Company upon successful completic t evaluation or company certification.		
"22		.S		"2	27W" DC COIL	S		
Ide	NTIFICATION MAR	к		ID				
	3 12V 21 Tan	PE M.14.**.**** 'DC ED 100' W@ +50'C / 27 W Mb -25'C + +50'C ASS H	^{® -25°C} 5		3	YPE M.14.**.*** 2VD ED 100% 2W@ +50°C / 32W @-25°C amb-25°C + +50°C 5 *LASS H C Us 1		
1		Recognized	Component Mark	1		Recognized Component Mark		
2	Type M14040021 M14040022 M14040031 M14040032	12 VDC (H 24 VDC (H 12 VDC (N	oltage and connector type Hirschmann) Hirschmann) With flying leads) With flying leads)	2	Type M14310011 M14310012 M14070021 M14070022	Coil code, voltage and connector type 12 VDC (Hirschmann) 24 VDC (Hirschmann) 12 VDC (With flying leads) 24 VDC (With flying leads)		
3	21W@+ 50°C	Power at +5 for 12 and 2	0°C (ambient temperature) 3	22W@+ 50°C	Power at +50°C (ambient temperature) for 12V coils		
	27W@- 25°C	Power at -2 for 12 and 2	5°C (ambient temperature 24V coils)	22W@+ 50°C	Power at +50°C (ambient temperature) for 24V coils		
					32W@- 25°C	Power at -25°C (ambient temperature) for 12 and 24V coils		
4	ED 100%	Duty cycle		4	ED 100%	Duty cycle		
4	_	Duty cycle	erating temperature	4	ED 100% Tamb -25°C ÷ +50°C	Duty cycle Ambient operating temperature		



product safety symbol.







FLYING LEADS (UZ)

"27W" DC COILS - UL RECOGNIZED

IP 65
18.000/h
-15% / +10%
-25°C ÷ 50°C
22W
27W
32W
100% ED
Н
0,215 Kg

Voltage code is always stamped over on the coil

Voltage (V)	Max winding temperature (Ambient temperature 25°C)	Rated power (W)	Resistance at 20°С (Онм) ±7%
12V	123°C	27	5.30
24V	123°C	27	21.30

VARIANT AND VOLTAGE CODES (WICH HAVE TO PUT IN THE ORDERING CODE VALVE)

"27W" MOUNTING COMPATIBILITY	AD2E ADC3E and CDL04 see Ch. I "Directional control" C3V03 see Ch. V "Cartridge valves" CDC3 see Ch. XI "Stackable valves"
VARIANT CODE	UR = Hirschmann connection UZ = Solenoid with flying leads (250 mm) Other variants relate to a special design
VOLTAGE CODE	L = 12 VDC M = 24 VDC Voltage code is always stamped over on the coil







Code DOC00078 - Rev. 09

Dana Motion Systems Italia S.r.I.

Fluid Power Division

NSTEM CED

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Sede legale: Via Luciano Brevini 1/A, 42124 Reggio Emilia - Italy Tel: +39.0522.9281 - Fax: +39.0522.928300

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