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We reserve the right to change or modify our product specifications, configurations, or dimensions at any time without notice.
Each product configuration listed below is subject to availability: please contact Sales Dpt. for more commercial detailed info.

INTRODUCTION

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

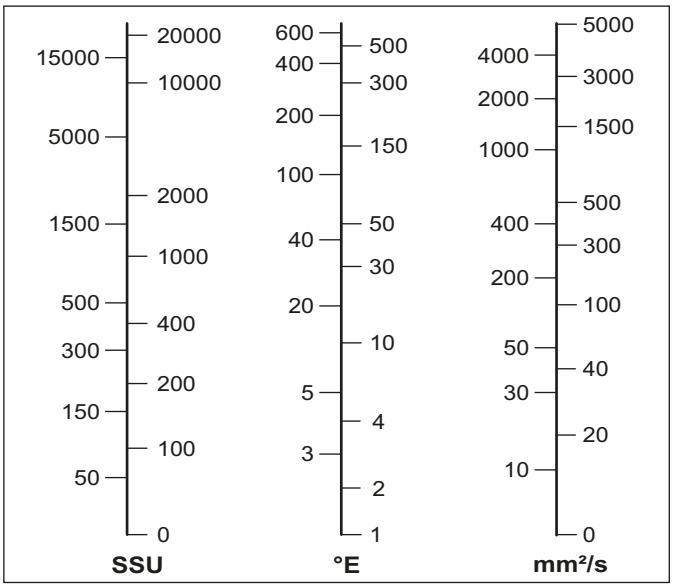
The user must periodically inspect, based on the conditions of use and the substances used, the presence of corrosion, dirt, the state of wear and correct function of the valves.

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.

CONVERSION TABLE SSU / °E / mm²/s



VISCOSITY

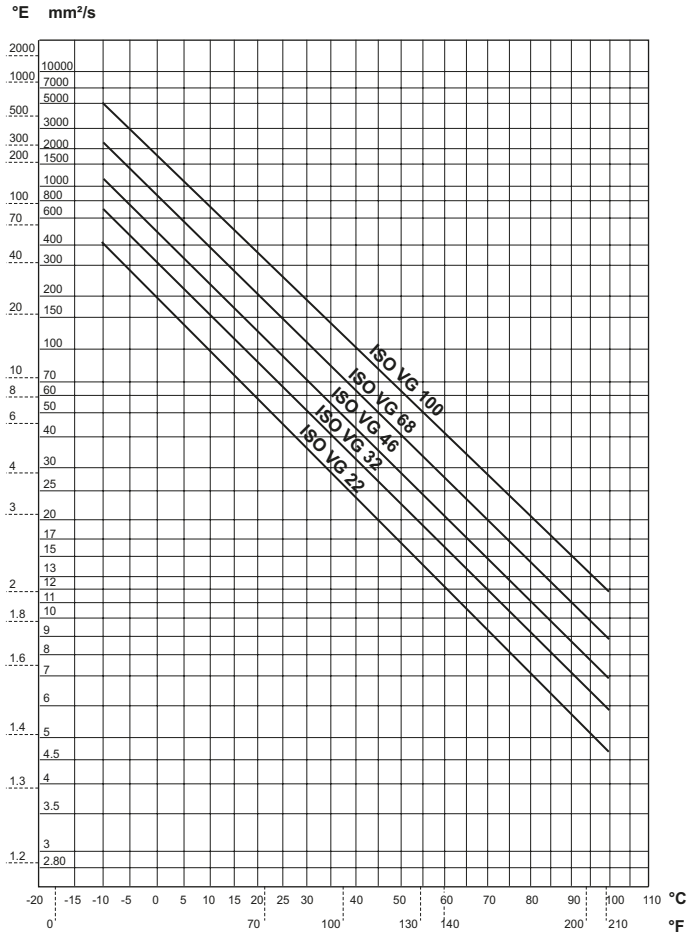
Observe the recommendations given in the data sheet of the valve.The oil viscosity must be in the range of 10 mm²/s to 500 mm²/s.
Recommended oil viscosity 46 mm²/s (32 mm²/s for Cartridge valves)

Table 1: ISO viscosity grades

Average kinematic viscosity mm²/s @ 40°C	Viscosity grade	Kinematic-viscosity limits 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"

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 µm, 6 µm e 14 µm, in 1 ml of fliuid.

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

Table 2: Reccomanded contamination level.

Type of system Type of valve	Oil filtration recommendations		
	Cleanliness class recommended		Absolute filtration micron rating (**)
	ISO 4406 : 1999	NAS 1638 (*)	
Systems or components operating at HIGH PRESSURE > 250 bar (3600 psi) HIGH DUTY CYCLE APPLICATIONS Systems or components with LOW dirt tolerance	18 / 16 / 13	7 - 8	5
Systems or components operating at MEDIUM / HIGH PRESSURE Systems and components with moderate dirt tolerance	19 / 17 / 14	9	10
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°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 ±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 components 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 ≤ 1.6µm and flatness ≤ 0.03 mm over 100 mm length. Normally in cartridge valve for sealing diameters of the cavities, is required roughness Ra ≤ 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.

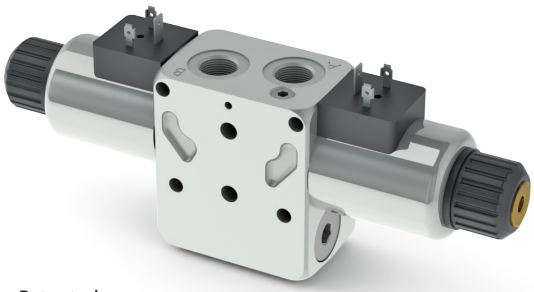
TRANSPORT AND STORAGE

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.

CONVERSION CHART

Type	SI units		Alternative units		Conversion factor
Force	Newton	(N) [kgm/s^2]	Kilogram force	(kgf)	1 kgf = 9.807 N
			pound force	(lbf) [lbf/s^2]	1 lgf = 4.448 N
Length	millimeter	(mm) [10 m]	inch	(in)	1 in = 25.4 mm
	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	MegaPascal	(MPa) [N/mm^2]	bar		1 MPa = 10 bar
			psi (lbf/ln^2)		1 MPa = 145 psi
			ton/f/ln^2		1 ton/f/ln^2 = 15.45 MPa
Flow rate	liter/min	(l/min)	UK gal/min		1 UK gal/min = 4.546 l/min
			US gal/min		1 US gal/min = 3.785 l/min
Temperature	Degrees Celsius	(°C)	Farenheit	(°F)	1°F = 1.8 °C+32

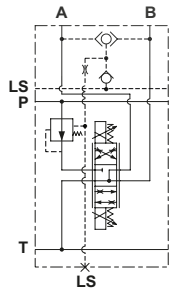
A pressure compensated valve maintains a constant flow rate across the main spool regardless of the load induced pressure, therefore the movement speed of actuator is not affected by load. Local compensator on every section allows simultaneous movement of multiple functions.
Compensated valves can be of two types: pre-compensated or post-compensated.



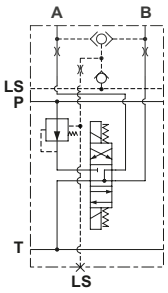
Patented

PRE-COMPENSATED VALVE CXDH3-CDH3

- Compact and simple solution
- Proportional control with valves CXDH3 or ON/OFF control with valves CDH3
- Available pressure rielief LSa-LSb valves on every working section
- Valve body with the same interface of other bankable valves (for example ON/OFF valves type CD3-CDC3 and CD5)
- If the total amount of flow required by single function exceed the available pump flow (flow saturation) then the function with lower load will have priority, and function with higher load will stop



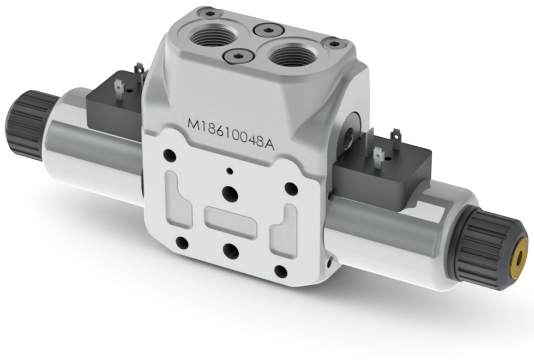
CXDH.3 proportional

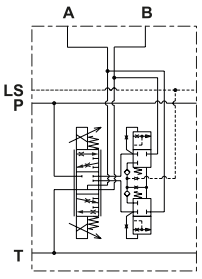


CDH.3 on/off

POST-COMPENSATED VALVE (FLOW SHARING) CFS3

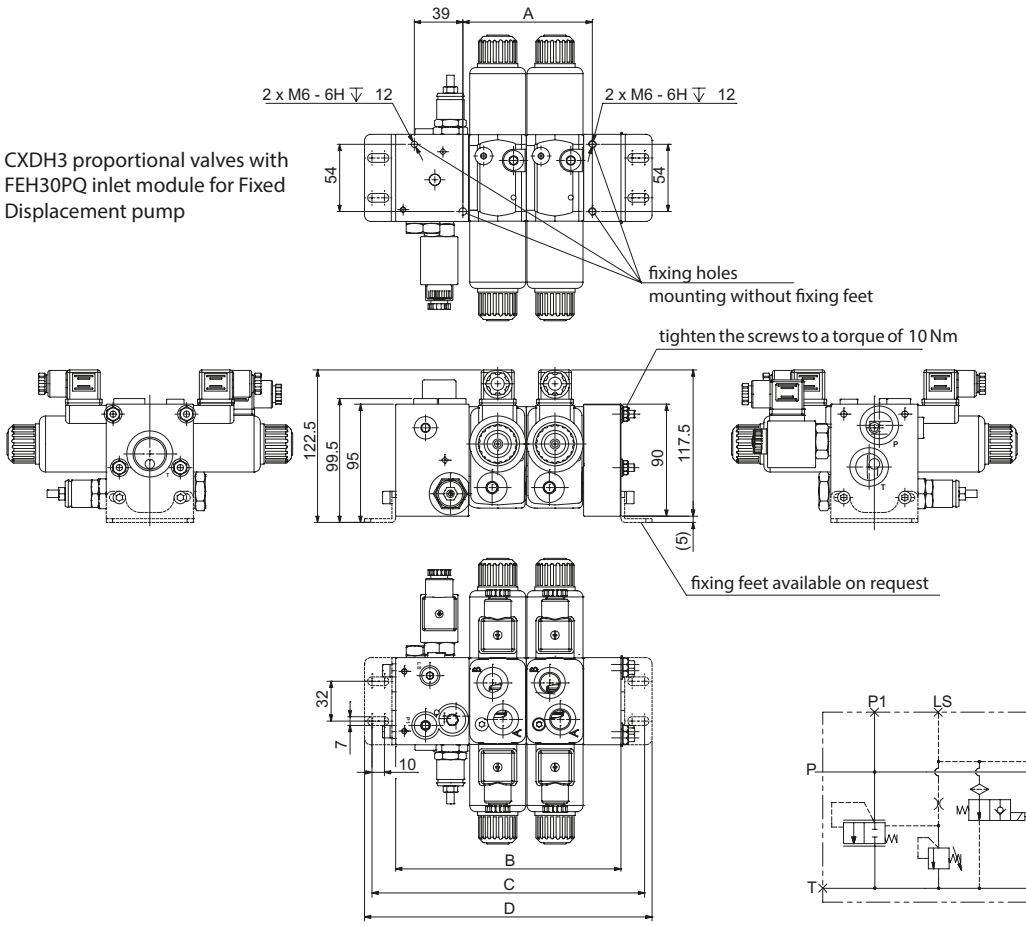
- If flow saturation occurs then the function will proportionally reduce the flow (Flow Sharing) and will continue the movement
- This solution permits high efficiency and energy saving
- Valve body with the same interface of other bankable valves (for example ON/OFF valves type CD3-CDC3 and CD5)





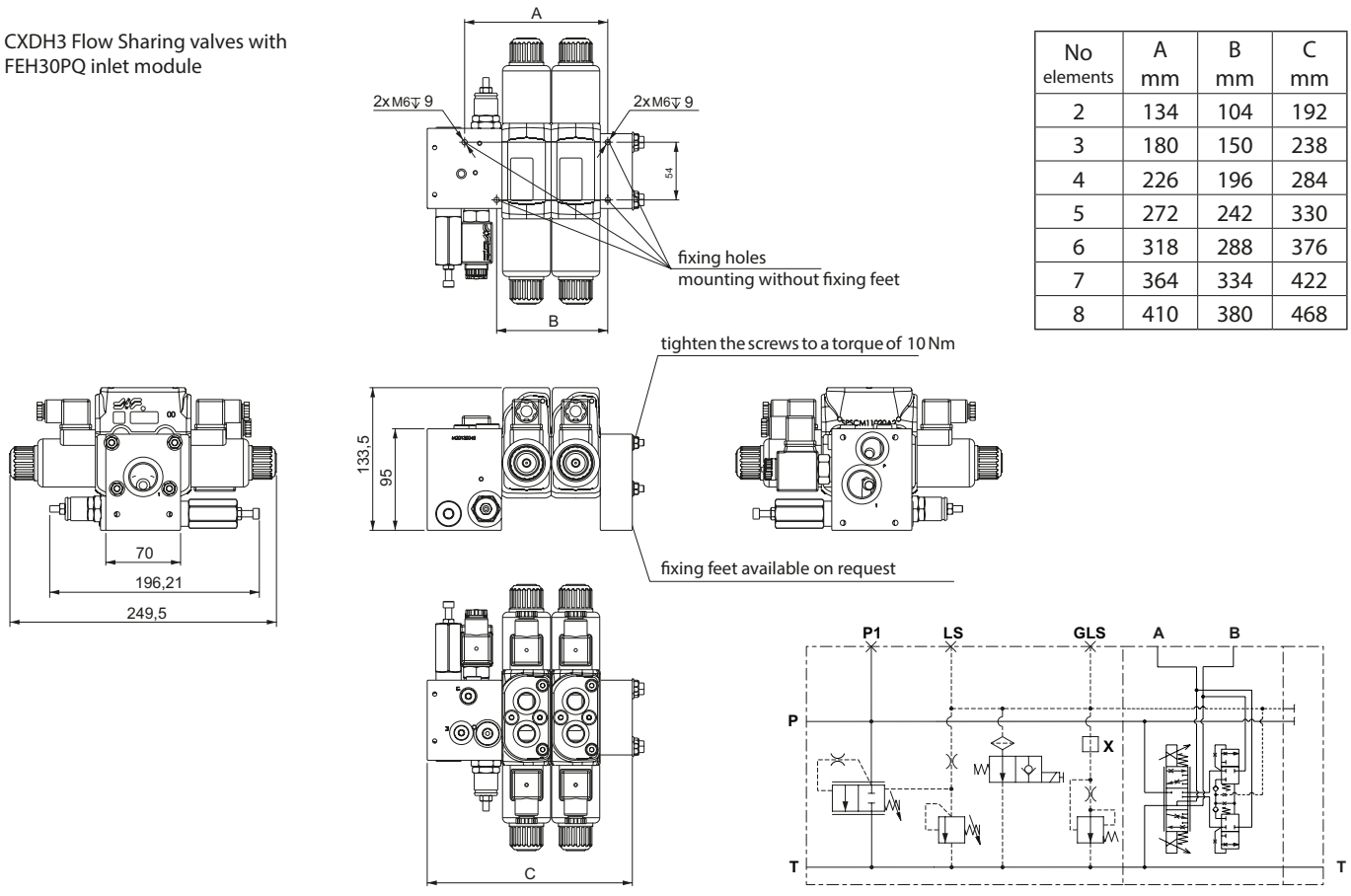
CFS3C.03 ..

CXDH3 proportional valves with FEH30PQ inlet module for Fixed Displacement pump



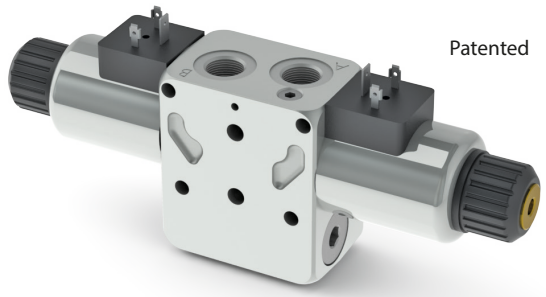
No elements	A mm	B mm	C mm	D mm
2	104	171	209	221
3	150	217	255	267
4	196	263	301	313
5	242	309	347	359
6	288	355	393	405
7	334	401	439	451
8	380	447	485	497

CXDH3 Flow Sharing valves with FEH30PQ inlet module



No elements	A mm	B mm	C mm
2	134	104	192
3	180	150	238
4	226	196	284
5	272	242	330
6	318	288	376
7	364	334	422
8	410	380	468

PROPORTIONAL PRE COMPENSATED VALVES



Patented

Connector to be ordered separately, see page 105.

Stackable proportional directional valves CXDH with LS signal locally compensated

- Used for controlling fluid direction and flow rate as a function of the supply current to the proportional control solenoid.
- Flow regulation load indipendent.
- Load compensantionis achieved by a 2 way pressure compensator wich holds, the pressure drop constants across the proportional spool.
- Emergency control.
- Threaded ports or interface for modular valves
- Regulated flow rate until 35 l/min.
- Standard connectors DIN 43650 ISO 4400, AMP Junior and Deutsch

ORDERING CODE

CXDH Proportional compensated bankable valve

3 Size

***** Mounting (see table 1)

***** Body type:
A = Ports G3/8" parallel
G= Interface for modular valves
B= Ports SAE 9/16" - 18UNF
L= Ports G3/8" parallel with valves LSA LSB
M= Interface for modular valves with valves LSA LSB

****** Type of spool (1)
03 = 

N Symmetrical flow path control

***** Flow rating

*	Δp 8bar	Δp 4bar
D	8 l/min	6 l/min
2	16 l/min	12 l/min
3	22 l/min	18 l/min
4	35 l/min	28 l/min

***** Differential pressure Δp
8 = Δp 8 bar
4 = Δp 4 bar

***** Max. current at solenoid (2):
E = 2.35 A (9 Vdc) - Special coil
F = 1.76 A (12 Vdc)
G = 0.88 A (24 Vdc)

****** Variants (3):
S1 = No variant
LF/LV = Emergency control lever (see page 72)
For body type G and M order LR variant (emergency lever 180° rotated)
SV = Viton
ES = Emergency button (4)
P2= Rotary emergency (4)
R5 = Rotary emergency 180° (4)
AJ = AMP Junior coil (see page 111)
CZ = Deutsch DT04-2P coil (see page 111)

1 Serial No.

Calibrated diaphragms on P line, see page 104.

(1) Available spool 01  A and B ports are n ot sealed: fluid can escape from LS line (see hydraulic scheme).
(2) Coils technical data, see page 111
Voltage codes are not stamped on the plate, their are readable on the coils
(3) Connector to be ordered separately, see page 105; Other variants available on request.
(4) Emergency see page72

FEATURES

Max. operating pressure	300 bar
Max. operating pressure ports T (Pressure dynamic allowed for 2 millions of cycles)	250 bar
Regulated flow rate (A / B ports)	up to 35 l/min
Relative duty cycle	Continuous 100% ED
Type of protection (Hirschmann coil)	IP 65
Fluid viscosity	10 ÷ 500 mm²/s
Fluid temperature	-20°C ÷ 75° C
Ambient temperature	-20°C ÷ 60°C
Max. contamination level (filter $ß_{10} \geq 75$)	ISO4406:1999:class19/17/14 NAS 1638: class 8
Weight with single solenoid Weight with double solenoid	2.38 kg 2.77 kg

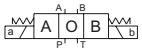
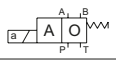
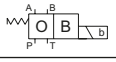
Solenoid	@ 9Vdc	@ 12Vdc	@ 24Vdc
Current supply	PWM(pulsewidthmodulation)		
Max. current solenoid	2.35 A	1.76 A	0.88 A
Solenoid coil resistance at 25°C (77°F)	2.25Ohm	4.0 Ohm	16.0Ohm
PWM or superimposed dither frequency	100 ÷ 150 Hz		
Response time 0 ÷ 100% 100% ÷ 0	 32 ms 33 ms	 40 ms 33 ms	 85 ms 33 ms
Frequency response -3db (input signal 50% ±25% Vmax)	22 Hz	22 Hz	12 Hz

Operating specifications are valid for fluid with 46 mm²/s viscosity at 40°C, using the specified Dana electronic control units. (input voltage = 24V).

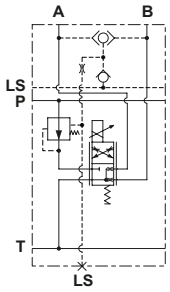
Accessories

REM.S.RA.*.*. REM.D.RA.*.*.	Card type control for single and double solenoid
CEP.S...	Electronic amplifier plug version for signle solenoid
MAV	Electronic module for integrate control of proportional valves and ON/OFF
JMPEI0M700101	Joystick with standard handle
JMPIU0M700138	Joystick Person present handle
Modular valves	CM3P (page 95) and CM3M (page 97)

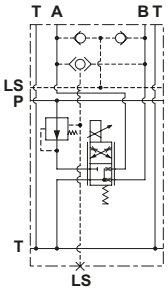
Tab.1 - Mounting

Code	Symbol
C	
A	
B	

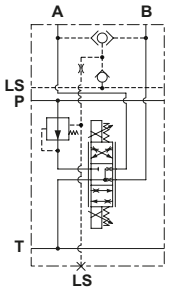
HYDRAULIC SYMBOLS



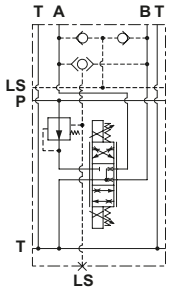
CXDH3AA03 ..



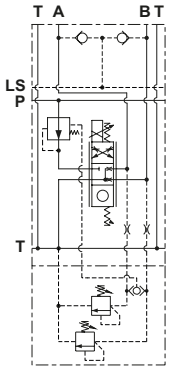
CXDH3AG03 ..



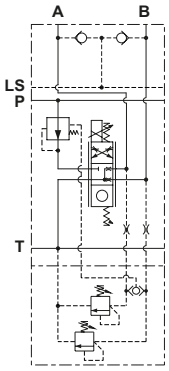
CXDH3CA03 ..



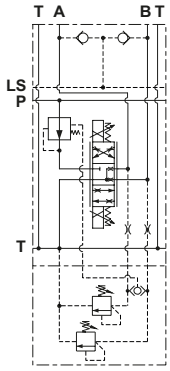
CXDH3CG03 ..



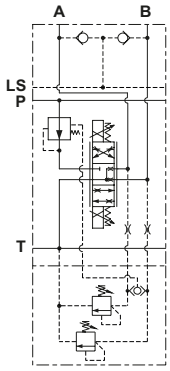
CXDH3AM03 ..



CXDH3AL03 ..



CXDH3CM03 ..



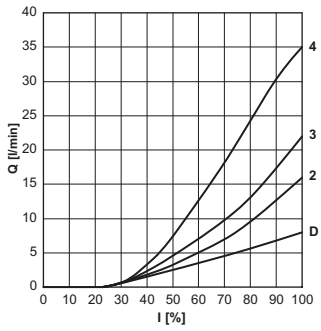
CXDH3CL03 ..

* Thanks to the design of the modular body (type G), an anti-shock modular valve can works same with CXDH3 valve energized or de-energized (see hydraulic symbol)

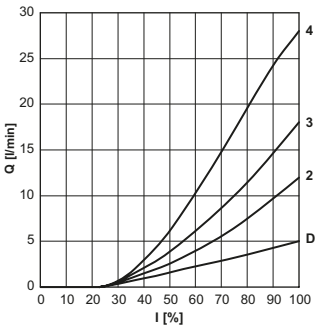
CHARACTERISTIC CURVES

I-Q curves - (Curves acquired with REM card, opening stroke)

Differential Pressure Δp = 8 bar

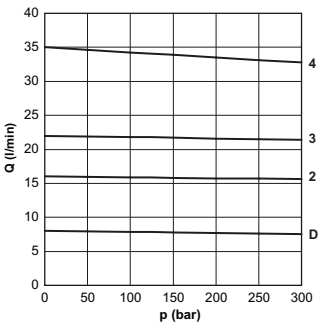


Differential Pressure Δp = 4 bar

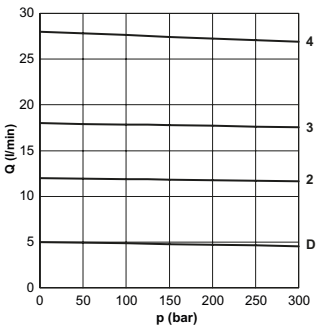


Compensation curves (curves acquired with FEH30.PQ inlet module)

Differential Pressure Δp = 8 bar



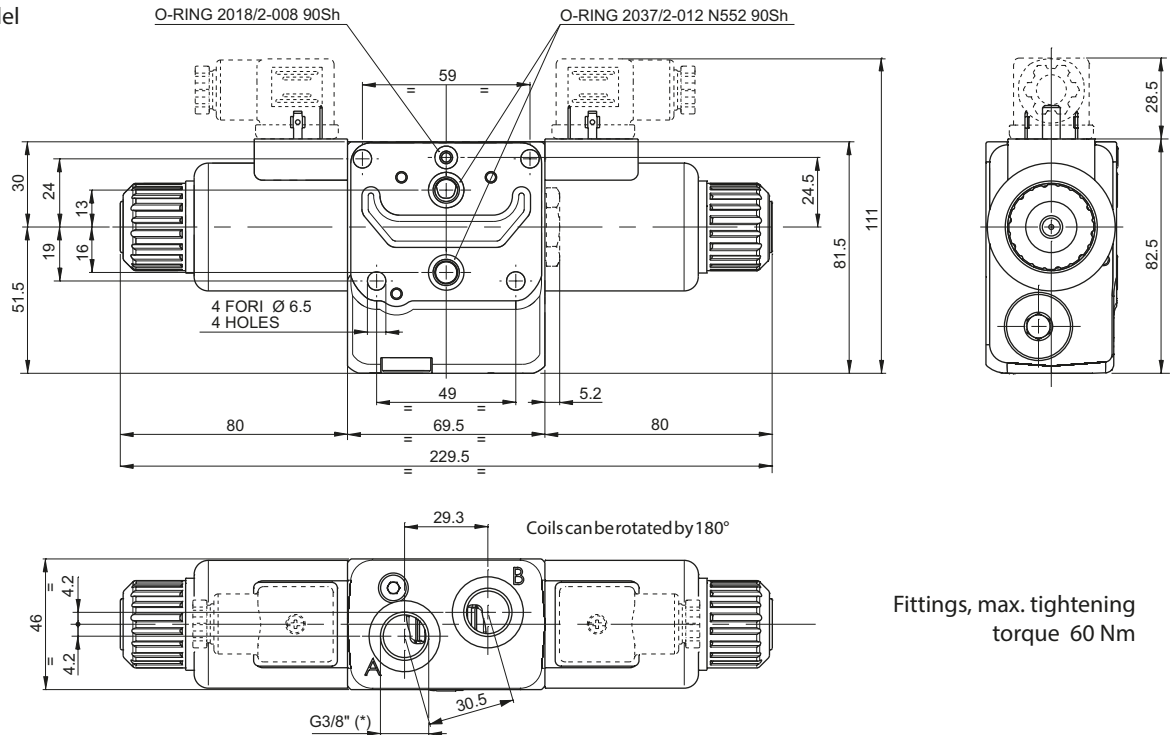
Differential Pressure Δp = 4 bar



The fluid used is a mineral based oil with a viscosity of 46 mm^2/s at 40°C. The tests have been carried out at with a fluid of a 40°C.

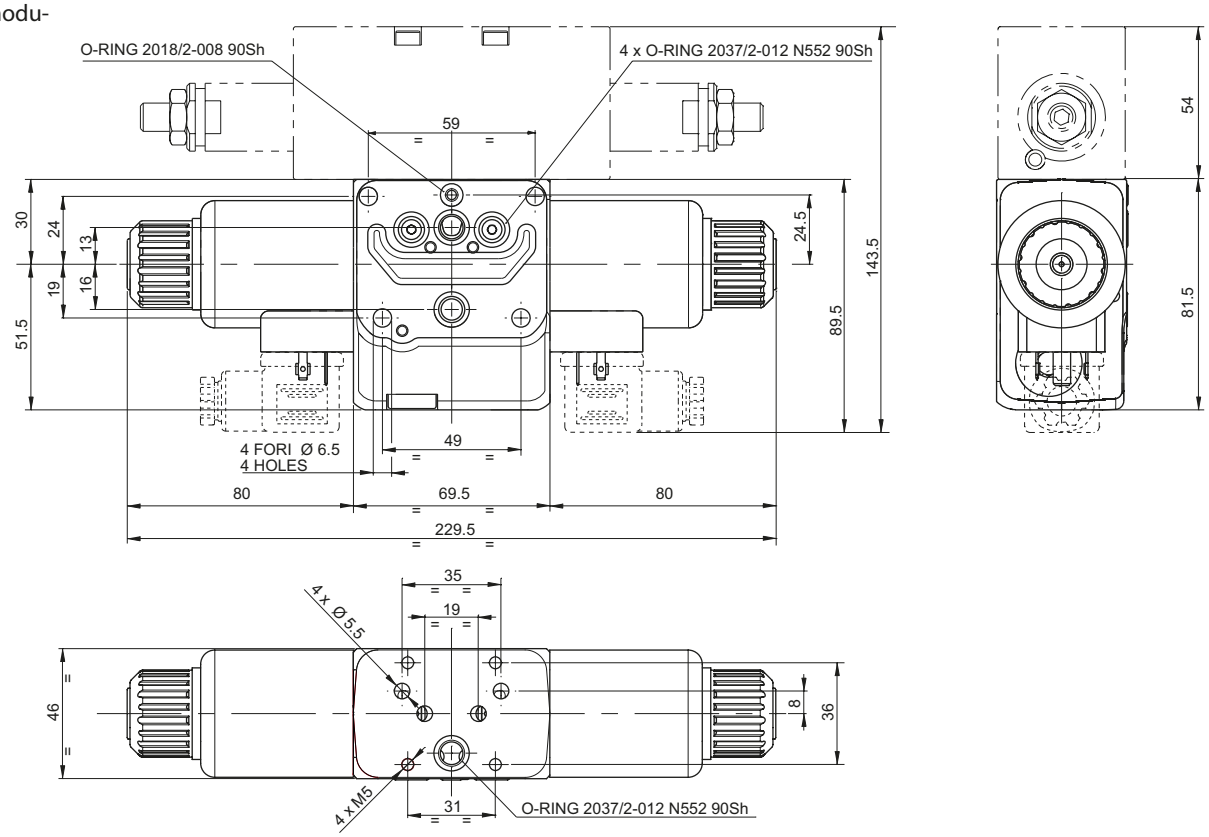
OVERALL DIMENSIONS

Body type A
Ports G3/8" Parallel



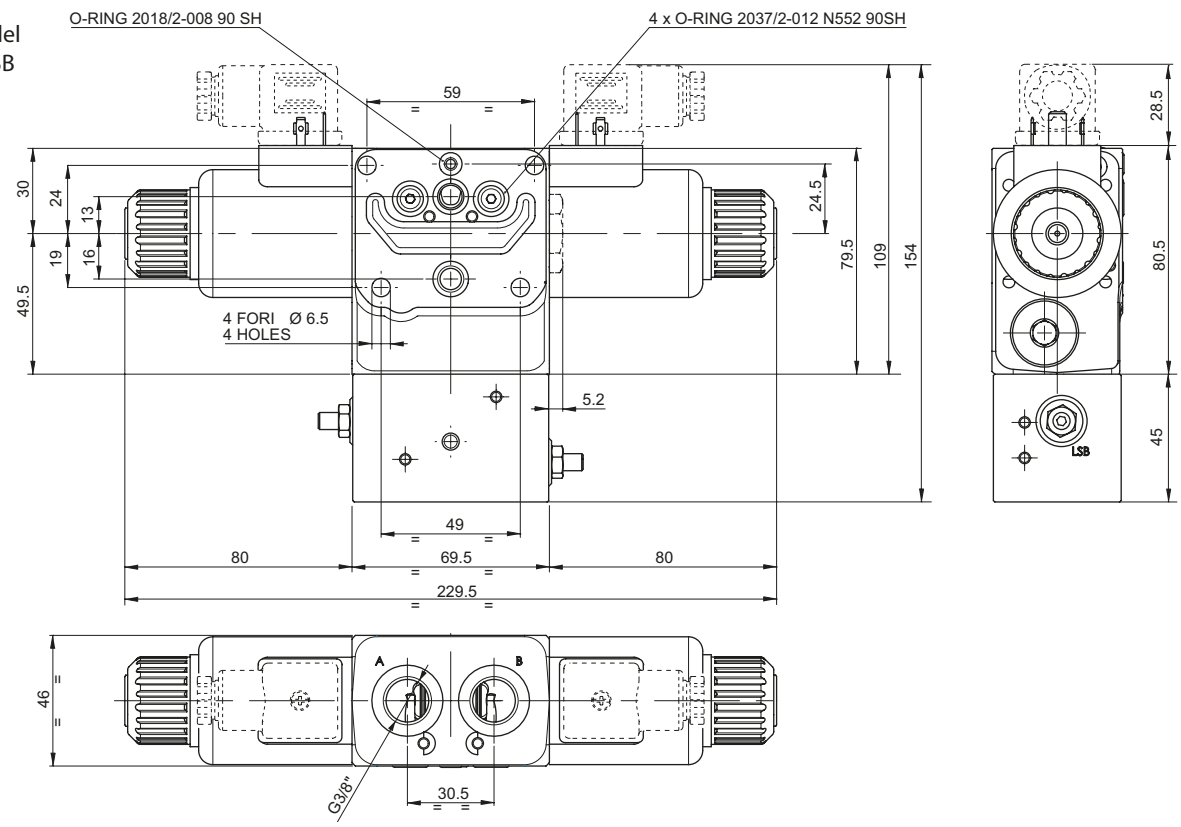
Fittings, max. tightening torque 60 Nm

Body type G
Interface for modular valves

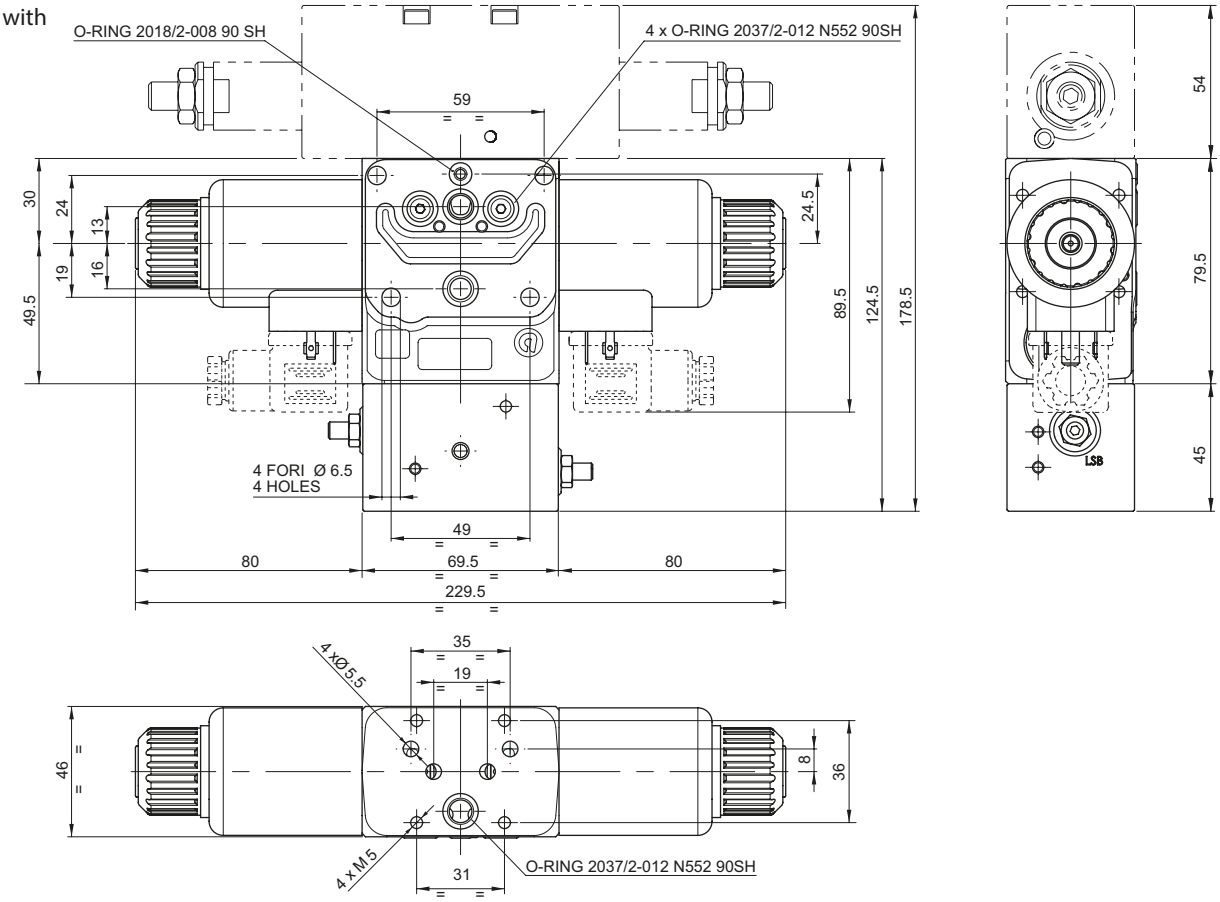


OVERALL DIMENSIONS

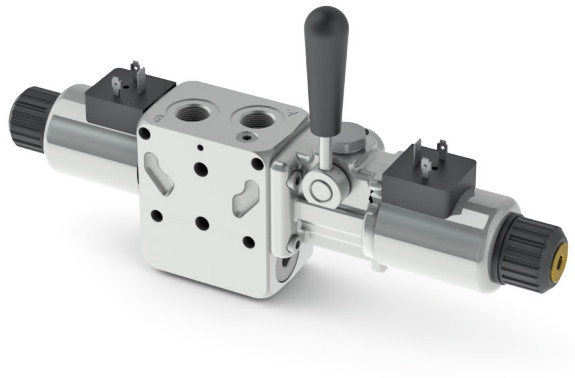
Body type L
Ports G3/8" parallel
with valves LSA LSB



Body type M
Interface for modular valves with valves LSA LSB



"LF", "LR" AND "LV" VARIANTS - EMERGENCY CONTROL LEVER



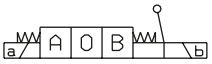
Thanks to his flexibility, the component is designed to be inserted between the valve body and the spool, providing total interchangeability between the different types of solenoid body valves manufactured by Dana (*). The control can be used as an emergency device in the event of power cuts.

HYDRAULIC SYMBOL

Var. LF/LR lever on the side A:



Var. LV lever on the side B:

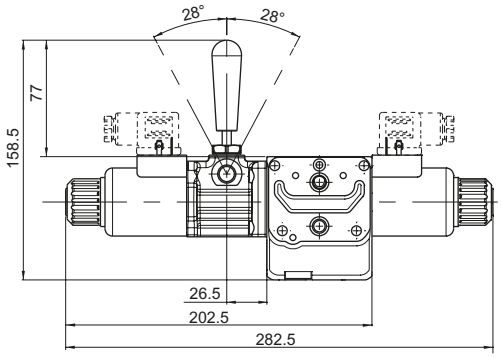


Spool 01 available on request

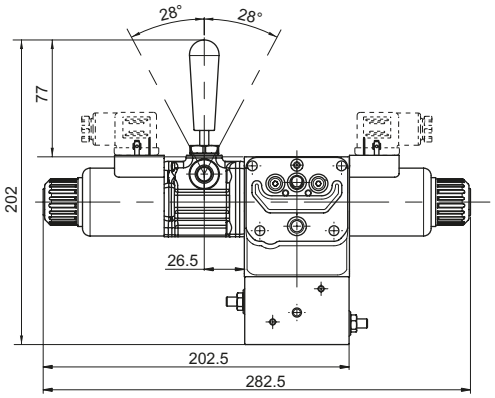
Max operating pressure port T	dynamic	160 bar
	static	210 bar
Mounting type Var. LF/LR Mounting type Var. LV		C - B - F - H C-A
Spools type		01-02-03-04 16-17-66
Weight with single solenoid Weight with double solenoid		3.34 kg 3.73 kg

* Max flow of proportional valves can be reduced compared to versions without emergency control lever when electrical operated. Max flow of proportional valves lever operated is increased compared to the max flow given when valves are electrical operated.

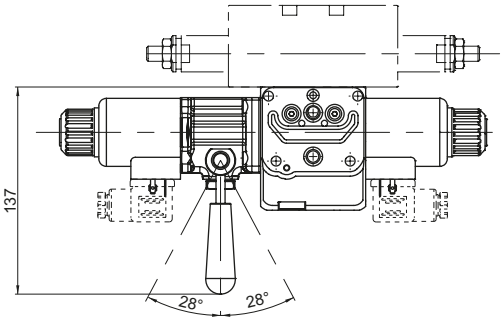
LF Variant
(CXDH3 / CDH3)



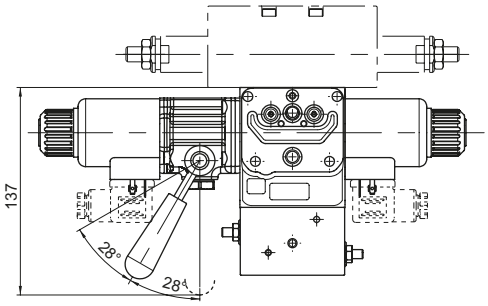
LF Variant
Body L
(CXDH3)



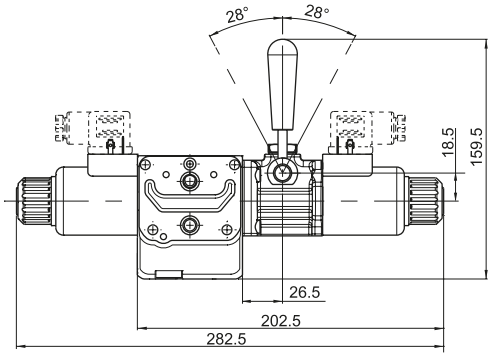
LR Variant
(CXDH3 / CDH3)



LR Variant
M Body
(CXDH3)

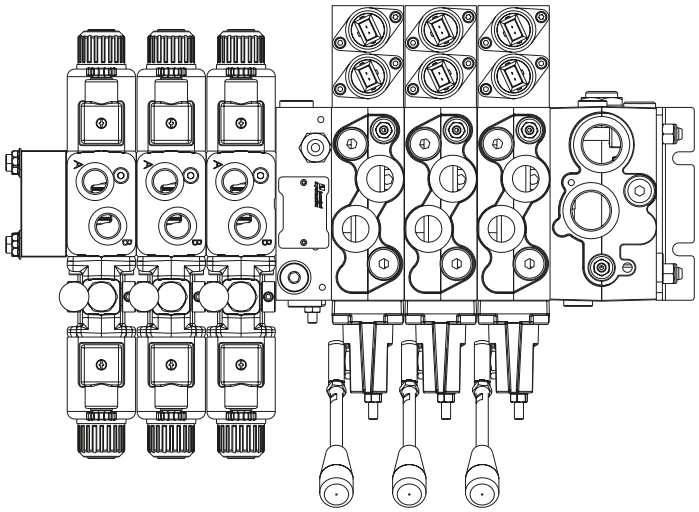


LV Variant
(CXDH3 / CDH3)

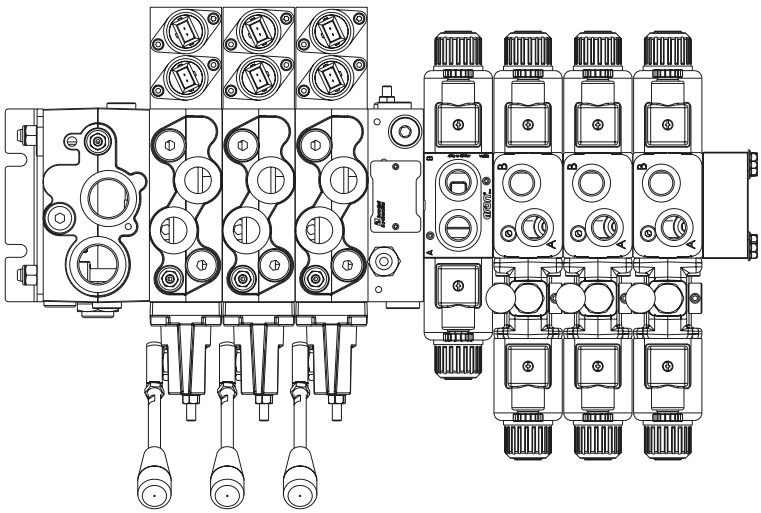


USE OF HSIF INTERFACE WITH MODULAR VALVES CXDH3/CDH3, WITH EMERGENCY LEVER

Distributor HPV41 right (DX, standard)
- Order modular valves CXDH3/CDH3 variant LV, with emergency lever on the side B

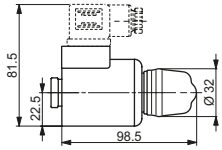


Distributor HPV41 left (SX)
- Order modular valves CXDH3/CDH3 variants LF / LR, with emergency lever on side A
- In this case it is not possible to mount the modular valve CXDH3/CDH3 variant LF / LR as the first element after HSIF interface.

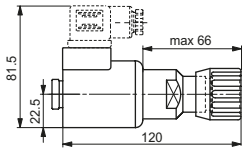


OTHER VARIANTS

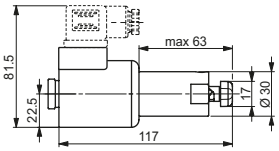
"ES"
Manual emergency



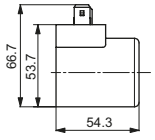
"P2"
Rotary emergency



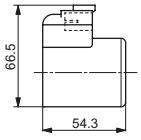
"R5"
Rotary emergency 180°



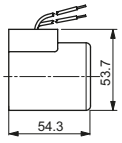
"AJ" AMP Junior
"AD" AMP Junior + Diode



"CZ"
Deutsch DT04-2P



"SL"
Flying leads



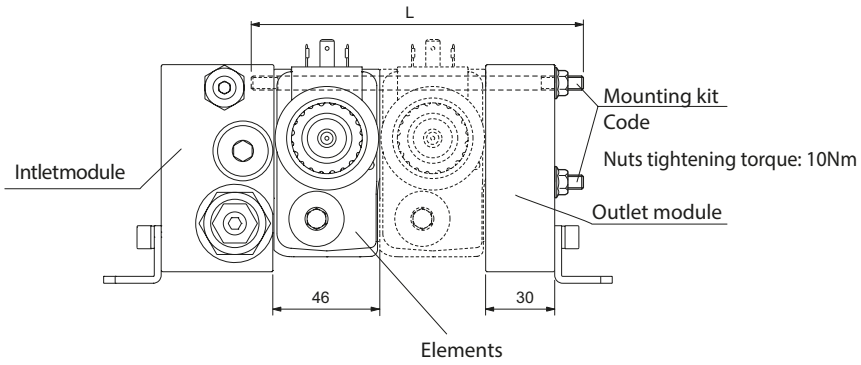
Emergency P2 and P5, tightening torque max. 6÷9 Nm (CH n. 22)

Mounting kit

SIZE 6
Pre and post compensated valves

KitcomposedbyNo.4rodsandNo. 4 stud nuts

For more combinations or with intermediate element, contact our customer service.



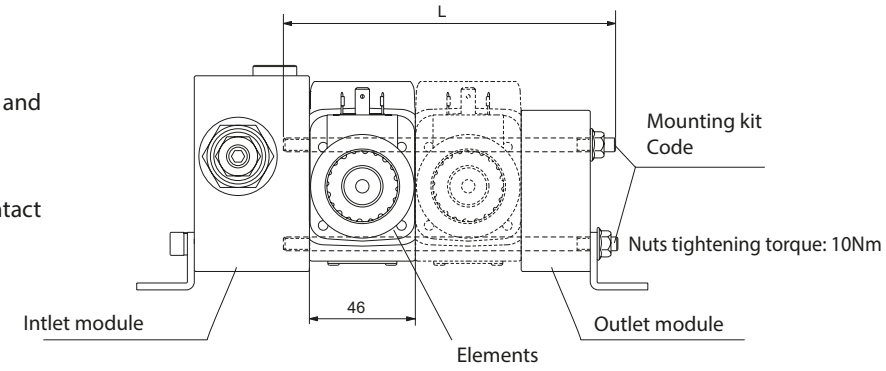
Intlet module		FEH30PQ / FEH30LS FEH30PQ / FEH35PQ/ HSIF	
Outlet module		FUH (B=30 mm)	
		Code	L (mm)
Elements *	1	V89B50001	100
	2	V89B50002	145
	3	V89B50003	190
	4	V89B50004	240
	5	V89B50005	285
	6	V89B50006	330
	7	V89B50007	380
	8	V89B50008	430

* only valves with LS line: CDC3/CD3 body "L-M" ; CX3 body "L"

SIZE 10
ON/OFF valves

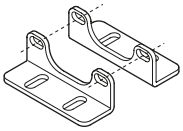
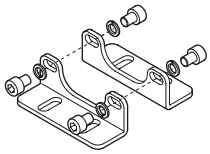
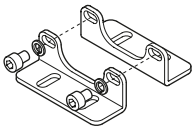
Kit composed by No. 4 rods and No. 4 stud nuts

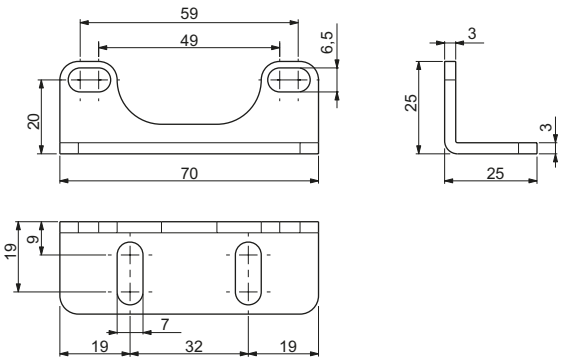
For more combinations contact our customer service.



Intlet module		FE5 / FE305	
Outlet module		FU5 (B=30 mm)	
		Code	L (mm)
Elements *	1	V89B50002	100
	2	V89B50003	145
	3	V89B50004	190
	4	V89B50005	240
	5	V89B50006	285
	6	V89B50008	330

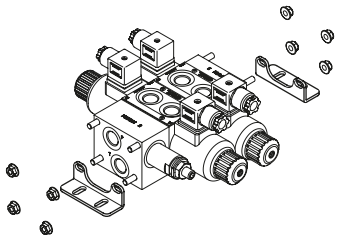
Fixing feet

Code	Type	
V89980000		SIZE 6 - ON/OFF and proportional valves Kit supplied with the valves, composed by: - No. 2 feet
V89B60000 (*)	 Screw tightening torque: 10Nm	SIZE 6 - Pre and post compensated valves Kit supplied on request (**) composed by: - No. 2 feet - No. 4 screws - No. 4 washers
V89B60001 (*)	 Screw tightening torque: 10Nm	SIZE 10 - ON/OFF valves Kit supplied on request (**) composed by: - No. 2 feet - No. 2 screws - No. 2 washers

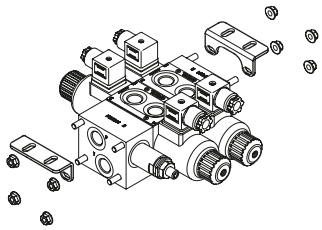


* Fixing feet can not be used with HSIF interface module unit.
** If the kit is not required, the valve can be fixed by the fixing holes on the bottom faces of the inlet and outlet modules (see drawing on page 57 and 82).

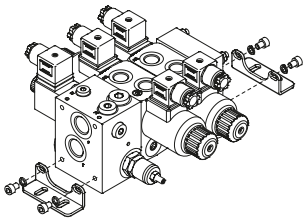
Feet mounting example



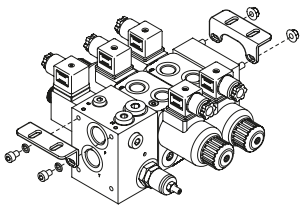
Intel module FE10, outlet module FU, mounting on BOTTOM position (standard mounting)



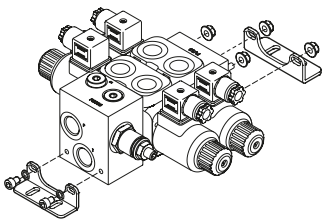
Intel module FE10, outlet module FU, mounting on TOP position (to be specify)



Intel module FEH30PQ, outlet module FUH, mounting on BOTTOM position (standard mounting)



Intel module FEH30PQ, outlet module FUH, mounting on TOP position (to be specify)

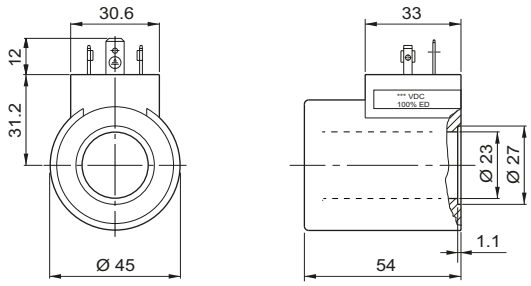


Intel module FE305, outlet module FU5, mounting on BOTTOM position (standard mounting)

D15P COILS - (FOR PROPORTIONAL VALVES)

Type of protection	IP 66
Number of cycle	18000/h
Supply tolerance	±10%
Ambient temperature	-30°C ÷ 60°C

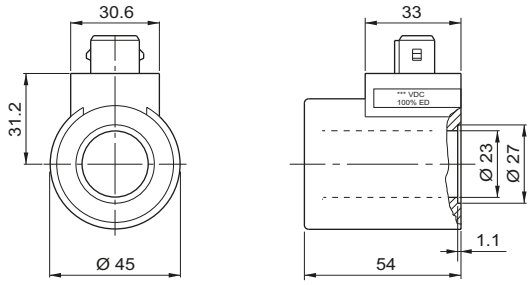
Duty cycle	100% ED
Insulation class wire	H
Weight	0.354 kg



STANDARD Hirschmann ISO 4400 DIN43650

Coil		Max winding temperature (1)	Current	Resistance ±7% (2)	Spare code
Code	Voltage				
E	9 VDC	125 °C	2.35 A	2.25 Ω	M14230101
F	12 VDC	125 °C	1.76 A	4 Ω	M14230102
G	24 VDC	125 °C	0.88 A	16 Ω	M14230103

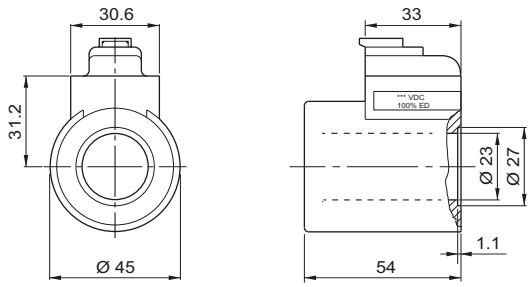
(1) Ambient temperature 25 °C - (2) Ambient temperature 20 °C



AMP Junior (AJ variant)

Coil		Max winding temperature (1)	Current	Resistance ±7% (2)	Spare code
Code	Voltage				
E	9 VDC	125 °C	2.35 A	2.25 Ω	M14770001
F	12 VDC	125 °C	1.76 A	4 Ω	M14770002
G	24 VDC	125 °C	0.88 A	16 Ω	M14770003

(1) Ambient temperature 25 °C - (2) Ambient temperature 20 °C



DEUTSCH DT04-2P (CZ variant)

Coil		Max winding temperature (1)	Current	Resistance ±7% (2)	Spare code
Code	Voltage				
E	9 VDC	125 °C	2.35 A	2.25 Ω	M14590001
F	12 VDC	125 °C	1.76 A	4 Ω	M14590002
G	24 VDC	125 °C	0.88 A	16 Ω	M14590004

(1) Ambient temperature 25 °C - (2) Ambient temperature 20 °C