



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

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TOGNELLAGROUP





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HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

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HYDRAULIC NEUMATIC COMPONENTS



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



SO WE MAY BE BETTER KNOWN

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



It was in 1957 when Vittorino and Dorino Tognella decide to set up the “F.lli Tognella S.d.f.”, after years of experience acquired in a well-known local firm which operated in the aeronautics field. In creating this new company they invested their skills in the most sophisticated mechanical concepts, their knowledge of the variegated problematics of the economic and productive field, their entrepreneurial spirit, will power, determination, technique and great technical experience. They started mainly as sub-suppliers to firm operating in the pneumatics field. Then they gradually made a place for themselves in the hydraulic fields which became, through a winning choice, the predominant sector of their activity.

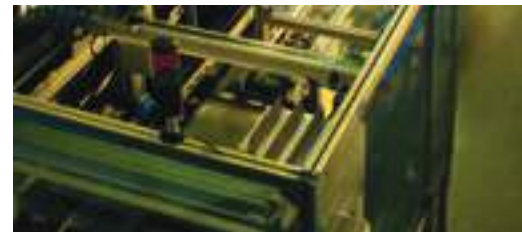
**"TECHNOLOGY IS FIRMLY
ROOTED IN THE PAST,
DOMINATES THE PRESENT
AND IS PROJECTED TOWARDS
THE FUTURE"**

"To offer quality products at the right price": it was not an easy-to win challenge, the one "Tognella" wanted to try.

But even in the competition with international colossuses, their precision, firmness, well-balanced administration and a complete reinvestment of the returns rapidly transformed this firm into a protagonist of the market.

Never much influenced by the rapid changes this sector has usually undergone, being always able instead to forward the requirements of its clientele, day after day the firm grew and in the Seventies it gained widespread consensus all over the world.

The circulation of "Tognella" products has by now reached a world-wide scale, being present in over 35 countries and in various industrial, commercial and service sectors: from the field of mechanics to that of machine tools, earth-work, agriculture, plastics, marble working, material handling, wood working and many else... The success achieved does not however represent for the company a final point, but it is rather considered as an element of endless evolution that leads to new ways and ideas, new products and projects in harmony with the most advanced technologies.



HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

WHOLE PAGE

PRINT

ESC





HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



NOT JUST A CATALOGUE

It is a modern-style publication which we consider more than a simple catalogue. Therein are described specific data of each product, as well as the technical data necessary for a correct choice of the various components depending on the different applications that they are intended for. It is composed of various chapters according to the different valve types and the initial index allows rapid consultation. The intention was to provide the catalogue with a dual purpose: technical and advertising so as to be a valid means of consultation as much for the technical offices, as for the users and the distributors who will find satisfaction to their obviously different requirements. We would be sincerely grateful to all those who would kindly like to pass on to us any criticism, suggestions, advice or whatever else might be useful to the improvement of this publication with the aim of making it apt to find the appreciation of our clientele.

BIG ENOUGH TO DARE A CHALLENGE
WORLDWIDE; FAIRLY LITTLE TO SATISFY
OUR CUSTOMERS' REQUESTS AT THE
RIGHT TIME.



The **TOGNELLA Spa**, conscious of the difficulty of remaining competitive on the market with just one product, in order to widen its offers and proposals and convinced of the necessity of satisfying its clientele with products and services, has created a team which is able to comply with the ever more varied demands from a always growing market. This team includes, besides Tognella SpA, other five companies.

The **SPECIAL SERVICE SEPRIO S.r.l.**, a little-sized- but flexible company, which deals with the production of "special" components, made according to the customer's requirements, or modifying a standard-built item or producing ex-novo, starting from a design created by the customer or by the partner Technical Study **TECNOVI S.r.l.**

The technical study has been conceived according to the most modern technologies provided with CAD CAM stations and disposing of highly experienced professionals in the mechanical sector as well as in that of oleo-hydro-pneumatics. Besides a wide range of "external "customers, Tecnovi is concerned with all technical problems of the group and offers its support by choosing the most suitable solutions. The integration with Special Service Seprio allows the supply of "turnkey" solutions.



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

In 2002 pursuing its aim Tognella S.p.A. acquires the 50% of the share quota of **COSTANTE SESINO S.p.A.**, leader in the production of standard and special water-oil and air-oil heat exchangers.

The company begins its activity in 1919 with the production of car radiators for customers like FIAT and Autobianchi and, thanks to successful technological entrepreneurial choices its present production consists of exchangers. The recent difficulties of the market had caused a stagnation in the activity. But at the right time Tognella S.p.A. has decided to invest not only in the new building but also in new machines and equipment. It has also taken into consideration the commercial aspect and has tried to give a new image of itself by taking part to exhibitions and by increasing the range of its products. All this has contributed to better further on its image on the market.

NATIONAL SYSTEM S.r.l., is a quite new company which offers its advice in the field of instruments for non-distributive analyses by planning and realizing automatic test stations, systems or acoustic analyses for measuring, control, setting and data logging also on distributive systems.

Recently it has acquired **LAMETARS 2005 S.r.l.**, factory that produces plastic components for the electrical appliances industry and metallic ones for other sectors of industry.





The acquisition of this structure is a part of our “mission” whose aim is to satisfy our customer’s needs and this is possible thanks to our efficiency and dynamism. We are in a position to maintain that the clue of our policy is the diligence of the owners who have always reinvested the profits and have always believed in the capacities of the company, in the validity of the products and in the promotion of the image of the group.

**50 years, but it does not show its age.
50 years of efficiency, dynamism,
flexibility, courtesy offered
to our customers.**



For over 50 years we have been making valves, which have not gone unnoticed. That which has always characterised the Tognella has been its originality, essentiality, and reliability: in other words, the quality of its products. This has always proceeded hand-in-hand with an intense productive activity always keeping market requirements well in mind, continuously trying out new directions, developing products able to satisfy customer demands and expectations. Proof of all this is the additional contribution, which the second generation of the entrepreneurial Tognella family has provided to the development of the firm. The new company site has in fact been recently built on an area of over 3.700 sq.m. with practically total replacement of all machinery and with the introduction of automated systems and equipment, the most updated assembly and monitoring systems. These are all factors, which project the firm into the XXI century with all the requirements indispensable to achieve future business success and not to be carried along in the wake of events but to have the determination to direct them.

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

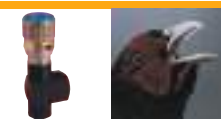
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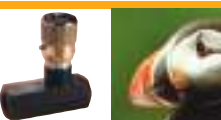
ESC



FT 257/2 p. 14
Double-acting control valves
In line



FT 258/2 p. 16
Double-acting control valves
90° angle



FT 257/5 p. 20
Single-acting control valves
In line



FT 257/6 p. 26
Check valves
In line (piston)



FT 260/6 p. 30
Check valves in line
(ball)



FT 257/7 p. 34
Check pilot operated
control valves



FT 257/8 p. 36
Pilot operated double control
valves



FT 257/9 p. 38
Single pilot operated control
valves



FT 277/2 p. 42
Double-port pressure compensa-
ted flow control valves (in line)



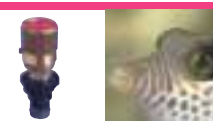
FT 277/5 p. 46
Single-acting pressure compensa-
ted flow control valves (in line)



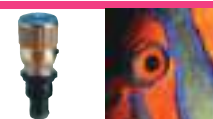
FT 270/2 p. 52
Double-port pressure
compensated control valves (in line)



FT 270/5 p. 54
Single-acting pressure
compensated double-port
control valves (in line)



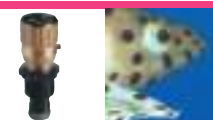
FT 247/2 p. 60
Cartridge mounted double-
acting microfine control valves



FT 264/2 p. 62
Cartridge mounted double-acting
control valves (cylindrical thread)



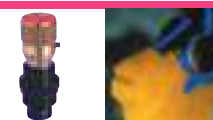
FT 267/2 p. 66
Cartridge mounted
double-acting control valves



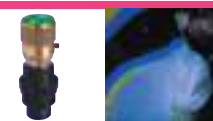
FT 267/5 p. 70
Cartridge mounted
single-acting control valves



FT 267/6 p. 80
Cartridge mounted
single-acting valves



FT 287/2 p. 82
Cartridge mounted pressure
compensated flow control valves



FT 297/2 p. 86
Cartridge mounted pressure
compensated microfine
flow control valves



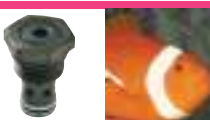
FT 265/2-UNF p. 90
High flow rate threaded
cartridge mounted
double-acting control valves



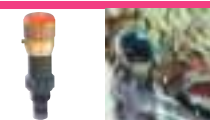
FT 266/2-UNF p. 92
Cartridge mounted
double-acting control valves



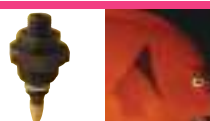
FT 266/5-UNF p. 94
Cartridge mounted
single-acting control valves



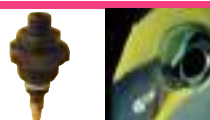
FT 266/6-UNF p. 96
Cartridge mounted
single-acting valves



FT 268/2-UNF p. 98
Two-way pressure compensated
control valves- low friction



FT 243/2 p. 102
Double-acting braking valves



FT 243/5 p. 106
Single-acting braking valves



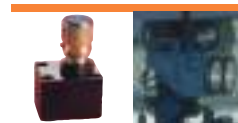
FT 243/5-S p. 110
Single-acting braking valves
with breather



FT3 FC p. 116
Modular valves CETOP 03
Single-acting flow control



FT3 FO p. 128
Modular valves CETOP 03
flow rate control



FT 280/2 p. 142
Double-acting plate control
valves



FT 290 p. 166
Gauge isolator needle-valves
in line



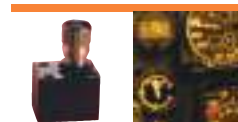
FT 221/1 p. 186
Two-way ball valves



FT3 FX p. 118
Modular valves CETOP 03
Single-acting flow control



FT3 RO p. 130
Stackable valves CETOP 03
Pressure reduction



FT 280/5 p. 146
Single-acting plate control
valves



FT 01-290 p. 168
Gauge isolator needle-valves
In line with lateral 1/2 interface



FT 221/3 p. 188
Three-way ball valves



FT3 CO p. 120
Stackable valves CETOP 03
Single-acting controls



FT3 RP p. 132
Stackable valves CETOP 03
Pressure reduction



FT 280/6 p. 150
Single-acting plate valves



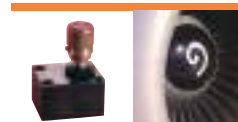
FT 291 p. 170
Gauge isolator needle-valves
90° angle



FT3 CP p. 122
Single-acting stackable valves CETOP
03 With hydraulic pilot system



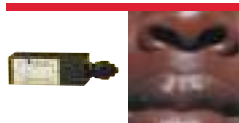
FT3 LSP3 p. 134
Stackable valves CETOP 03
Three-way pressure compensator



FT 281/2 p. 152
Microfine double-acting plate
control valves



FT 01-291 p. 172
Gauge isolator needle-valves 90°
angle with lateral 1/2 interface



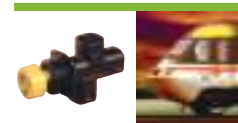
FT3 MO p. 124
Stackable valves CETOP 03
Max. pressure control



FT3 Q3P p. 136
Stackable valves CETOP 03
Single-acting compensated control



FT 281/5 p. 154
Microfine single-acting plate
control valves



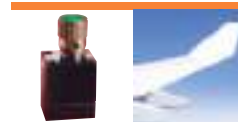
FT 292 p. 174
Gauge isolator push
button-valves interfaces



FT3 MP p. 126
Stackable valves CETOP 03
Max. pressure control



FT3 PC p. 138
Stackable valves CETOP 03
Two-way pressure compensator



FT 288/2 p. 156
Microfine pressure compensated
flow control valves (plate)



FT 293 p. 176
Gauge isolator push button-valves
plate interfaces



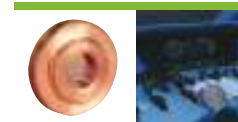
FT 288/5 p. 158
Single-acting microfine pressure com-
pensated flow control valves (plate)



FT 299 p. 180
Connectors



FT 289/2 p. 160
pressure compensated flow
control valves (plate)



FT 1201 p. 182
Copper paste



FT 289/5 p. 162
Single-acting pressure
compensated flow control valves

HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

WHOLE PAGE

PRINT

ESC



FT 1237/2 p. 192
Double-acting fine control valves



FT 1237/5 p. 194
Single-acting fine control valves



FT 1247/2 p. 196
Double-acting fine control valves
Threaded cartridge mounted



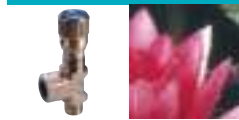
FT 1251/2-01 p. 200
Double-acting control valves
in line female/female



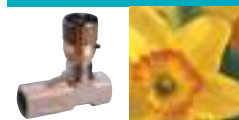
FT 1251/2-02 p. 204
Double-acting control valves
in line male/female



FT 1252/2-01 p. 208
Double-acting control valves
90° angle female-female



FT 1252/2-02 p. 212
Double-acting control valves
90° angle male-female



FT 1251/5-01 p. 216
Single-acting control valves
in line female-female



FT 1253/5-01 p. 220
Single-acting needle control
valves In line



FT 1254/5-01 p. 224
Single-acting needle control
valves 90° angle



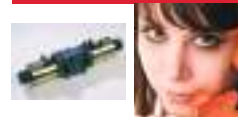
FT2 ES* p. 232
Directional control valves
solenoid operated - CETOP 02
type FT2 - ES - *



FT3 E2* p. 238
Directional control valves
solenoid operated - CETOP 02
type FT3 - E2 - *



FT3 ES* p. 244
Directional control valves
solenoid operated - CETOP 02
type FT3 - ES - *



FT5 ES* p. 250
Directional control valves
solenoid operated - CETOP 02
type FT5 - ES - *



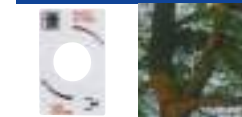
FT 202 p. 258
Ring nut K.M. for FT 257



FT 204 p. 258
Hexagonal steel ring nut
for FT 292



FT 205 p. 258
Hexagonal steel ring nut
for FT 290 - FT 291



FT 3206-3207 p. 259
Plate FT 3206 for FT 292
FT 3207 for FT 293



FT 1203 p. 259
Hexagonal ring nut
in OT 58 for FT 1250



FT MA p. 260
Handwheel for FT 257 - FT 1250
Equipped with plug and dowel



FT MP p. 260
Handwheel for FT 257 - FT 1250
Equipped with plug and dowel



FT CH p. 260
Handwheel with wrench



FT LC p. 260
Handwheel with padlock



FORMULE p. 262
Calculation formulas and charts

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

FT1251 / 2 - 02 - 18 - G-V-T-mp-ch-lc

VALVE CODE

FUNCTION CODE

CONNECTION CODE

SIZE CODE

OPTIONAL FITTING CODE

2 = Double - acting control

5 = Single - acting control

6 = Single - acting in line

7-8-9 = Pylot sistem

01 = Female/Female

02 = Male/Female

04 = Connection to rigid pipes DIN 2353

05 = Connection to flexible pipes DIN 3861

18 = 1/8" GAS

14 = 1/4" GAS

38 = 3/8" GAS

12 = 1/2" GAS

34 = 3/4" GAS

100 = 1" GAS

114 = 1 1/4" GAS

112 = 1 1/2" GAS

200 = 2" GAS

G = Panel ring nut

V = Viton seal

T = Plate

mp = Knob in ABS

ch = Wrench

lc = Padlock

NB For special order it is necessary to put the identification number (01, 02, 03....) before the valve code



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



FT 257/2



FT 258/2



FT 257/8



FT 257/5



FT 257/9



FT 257/6



FT 277/2



FT 260/6



FT 277/5



FT 257/7



FT 270/2



FT 270/5



SHUT-OFF, CHECK, ACTING IN LINE, PILOT OPERATED AND PRESSURE COMPENSATED VALVES

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

FT 257/2
Double-acting control valves in line
FT 258/2
Double-acting control valves 90° angle
FT 257/5
Single-acting control valves in line
FT 257/6
Check valves in line (piston)
FT 260/6
Check valves in line (ball)
FT 257/7
Check operated control valves
FT 257/8
Double pilot operated control valves
FT 257/9
Simple pilot operated control valves
FT 277/2
Double-port pressure compensated flow control valves (in line)
FT 277/5
Single-acting pressure compensated flow control valves (in line)
FT 270/2
Double-port pressure compensated control valves (in line)
FT 270/5
Single acting pressure compensated double-port control valves (in line)

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

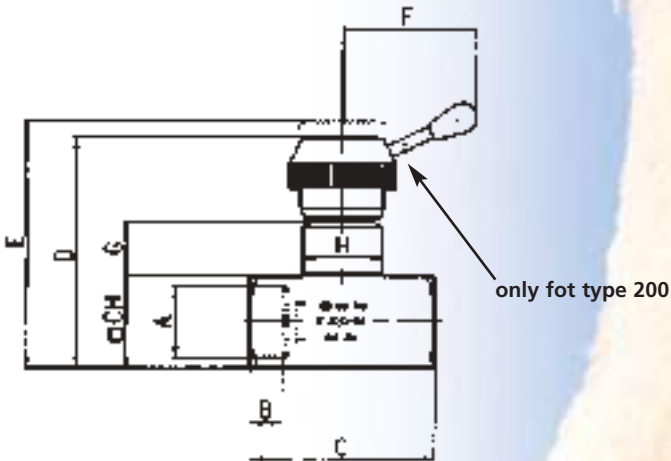
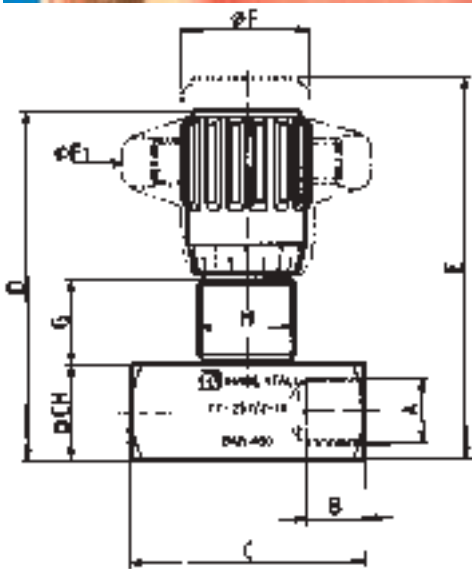
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PRINT

ESC



FT 257/2



DIMENSIONS

TYPE	A UNI 338	B	C	D	E	Ø F	Ø F1	G	H	CH	WEIGHT KG
1 8	1/8" G	8,5	38	59	64	22	40	13,5	M17x1	16	0,110
1 4	1/4" G	12,5	49	71	78	27	50	17	M20x1	20	0,200
3 8	3/8" G	12,5	59	84	93	33	70	19,5	M25x1,5	25	0,375
1 2	1/2" G	15,5	68	97	107	38	80	21	M30x1,5	30	0,600
3 4	3/4" G	17	86	120,5	132,5	47	100	26,5	M40x1,5	40	1,250
1 0 0	1" G	20	105	151,5	167,5	58	120	35	M50x1,5	50	2,550
1 1 4	1 1/4" G	22	120	156,5	172,5	58	120	35	M50x1,5	55	3,000
1 1 2	1 1/2" G	24	134	167	181	58	120	35	M55x2	65	4,217
2 0 0	2" G	27	150	188	202	108	/	44	M65x2	75	7,300

MATERIALS

BODY	9 S MN Pb 23 - UNI 5105
NEEDLE	1 C 40 - UNI 8373
O R	NITRILE
ANTIEXTRUSION RINGS	PTFE
KNOB	GD - AL SI 12 - UNI 5706
KNOB (MP)	ABS

EXAMPLE FOR ORDERING

	CODE	TYPE	PANNEL RING NUT	VITON SEAL	KNOB IN PLASTIC
STEEL	FT 257/2	18	G	V	MP
STAINLESS STEEL	FT 2257/2	38	G	-	MP

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

DOUBLE-ACTING SHUT-OFF

They allow flow control in both directions.
They are equipped with a needle so to obtain:

- metallic seal;
- flow linearity at the opening;
- accurate control for a wide range of flow rate.

A double reference system made up of a decimal scale on the handle and of a keyed metal ring with graduated fractional scale and divided into sectors allows the identification of flow conditions.

A locking screw in the handle ensures stable flow values preventing accidental adjustments or movements due to vibrations.

A ring nut (G) is used to carry out the panel mounting, on request.

On request

- Versions AISI 316 code FT 2257/2
- Viton seals (V)
- NPT Threads
- Equipped with ring nuts (G)
- Handlewheel in ABS (mp)



FT 257/2

TECHNICAL DATA

TYPE	FLOW SECTION CM²	WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	WORKING TEMPERATURE	FILTRATION GRADE µM
1 8	0,12	400	1600	-20°/+100°	25
1 4	0,19	400	1600	-20°/+100°	25
3 8	0,39	400	1600	-20°/+100°	25
1 2	0,68	400	1600	-20°/+100°	25
3 4	1,13	400	1600	-20°/+100°	25
1 0 0	2,09	320	1300	-20°/+100°	25
1 1 4	2,09	320	1300	-20°/+100°	25
1 1 2	3,14	320	1300	-20°/+100°	25
2 0 0	4,91	320	1300	-20°/+100°	25

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

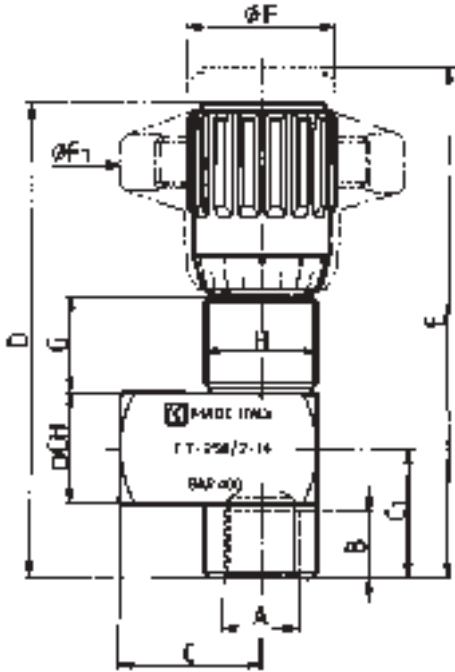


FT 258/2



MATERIALS	
BODY	9 S MN Pb 23 - UNI 5105
NEEDLE	1 C 40 - UNI 8373
O R	NITRILE
ANTIEXTRUSION RINGS	PTFE
KNOB	GD - AL SI 12 - UNI 5706
KNOB (MP)	ABS

EXAMPLE FOR ORDERING					
	CODE	TYPE	PANNEL RING NUT	VITON SEAL	KNOB IN PLASTIC
STEEL	FT 258/2		G	V	MP
STAINLESS STEEL	FT 2258/2	12	G	-	MP



DIMENSIONS												
TYPE	A UNI 338	B	C	C 1	D	E	Ø F	Ø F 1	G	H	C H	WEIGH T KG
1 8	1/8" G	8,5	19	20	71	76	22	40	14,5	M17x1	16	0,108
1 4	1/4" G	13,5	25	27	86,5	93,5	27	50	17	M20x1	20	0,200
3 8	3/8" G	12,5	29,5	31,5	101,5	110,5	33	70	19,5	M25x1,5	25	0,360
1 2	1/2" G	15,5	35	37	117	127	38	80	21	M30x1,5	30	0,580
3 4	3/4" G	17	42	46	142,5	154,5	47	100	26,5	M40x1,5	40	1,265
1 0 0	1" G	20	53	56	182,8	198,8	58	120	35	M50x1,5	50	2,500

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

90° ANGLE DOUBLE-ACTING SHUT-OFF CONTROL VALVES

They allow flow control in both directions.
They are equipped with a needle so to obtain:

- metallic seal;
- flow linearity at the opening;
- accurate control for a wide range of flow rate.

A double reference system made up of a decimal scale on the handle and of a keyed metal ring with graduated fractional scale and divided into sectors allows the identification of flow conditions. A locking screw in the handle ensure stable flow values preventing accidental adjustments or movements due to vibrations. A ring nut (G) is used to carry out the panel mounting, on request.

- On request
- Versions AISI 316 code FT 2258/2
 - Viton seals (V)
 - NPT threads
 - Equipped with ring nuts (G)
 - Handlewheel in ABS (mp)





FT 258/2

TECHNICAL DATA

TYPE	FLOW SECTION CM²	WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	WORKING TEMPERATURE	FILTRATION GRADE µM
1 8	0,12	400	1600	-20°/+100°	25
1 4	0,19	400	1600	-20°/+100°	25
3 8	0,39	400	1600	-20°/+100°	25
1 2	0,68	400	1600	-20°/+100°	25
3 4	1,13	400	1600	-20°/+100°	25
1 0 0	2,09	320	1300	-20°/+100°	25

HOME

PRESENTATION

VALVES INDEX

+

-

◀

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LAST SEEN

WHOLE PAGE

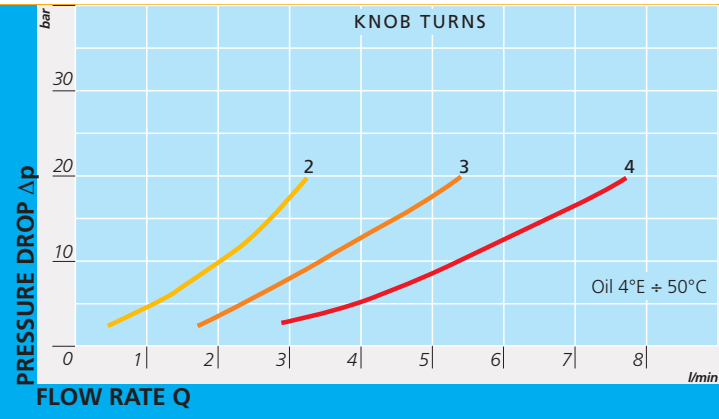
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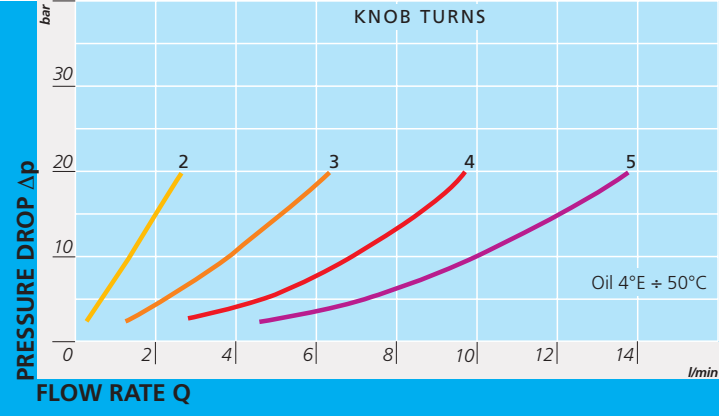


FT 257/2 - FT 258/2

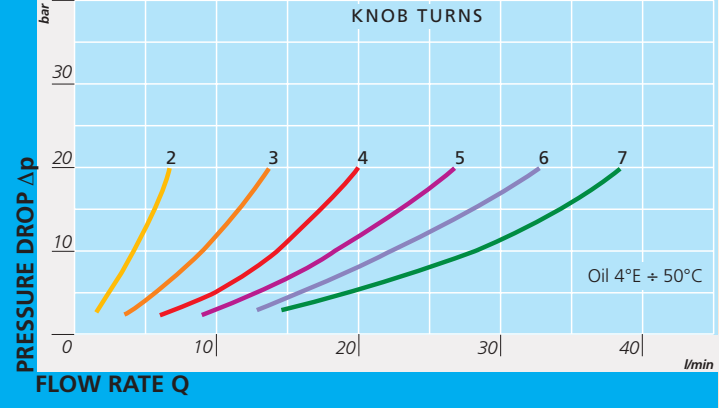
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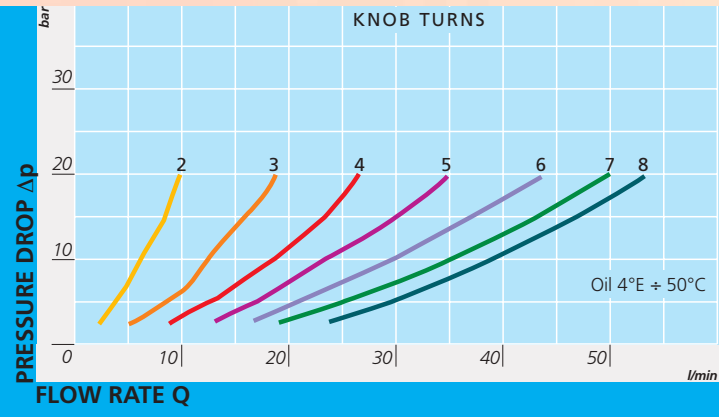
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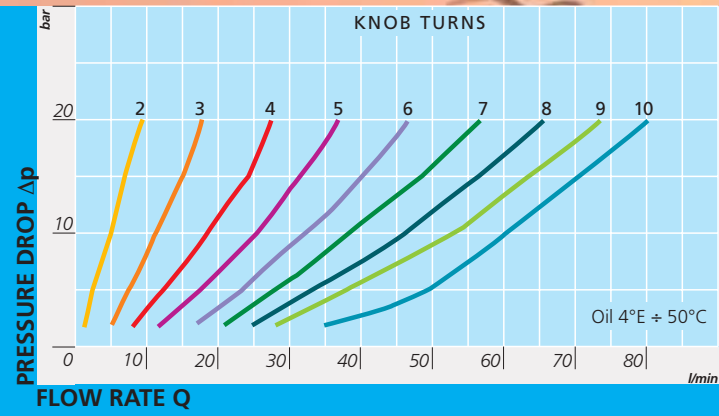
FT 257/2-FT 258/2 - 38



FT 257/2-FT 258/2 - 12



FT 257/2-FT 258/2 - 34



FLOW RATE CURVES



FT 257/2 - FT 258/2

HOME

PRESENTATION

VALVES INDEX

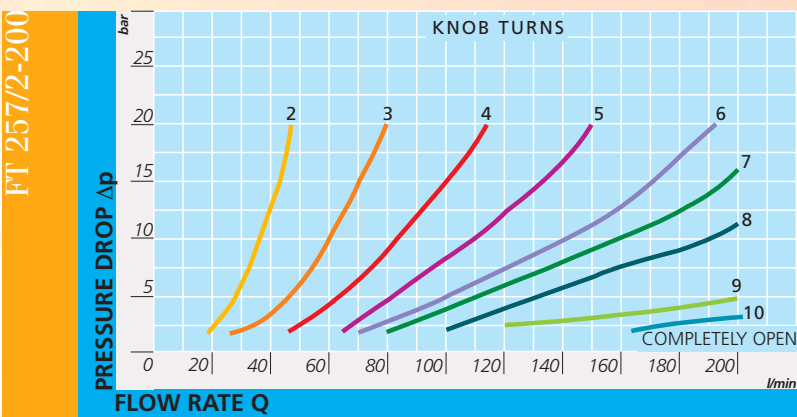
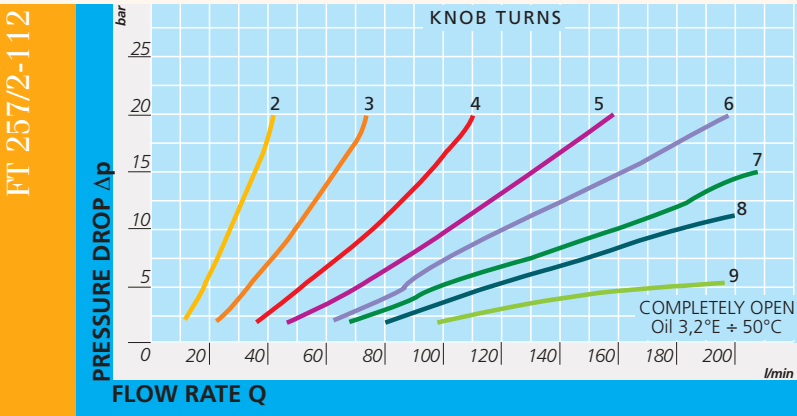
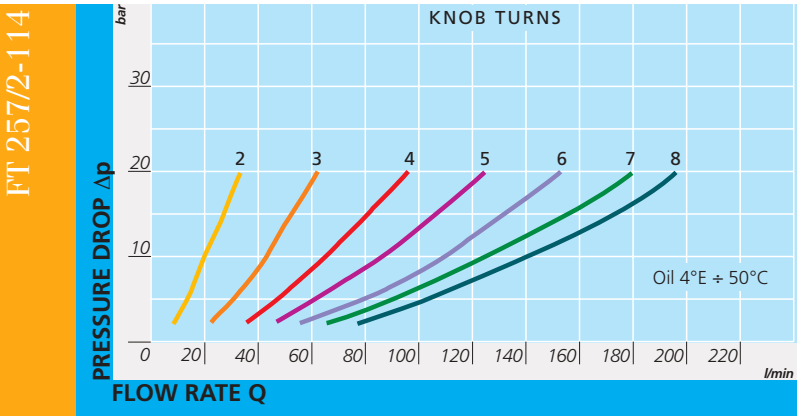
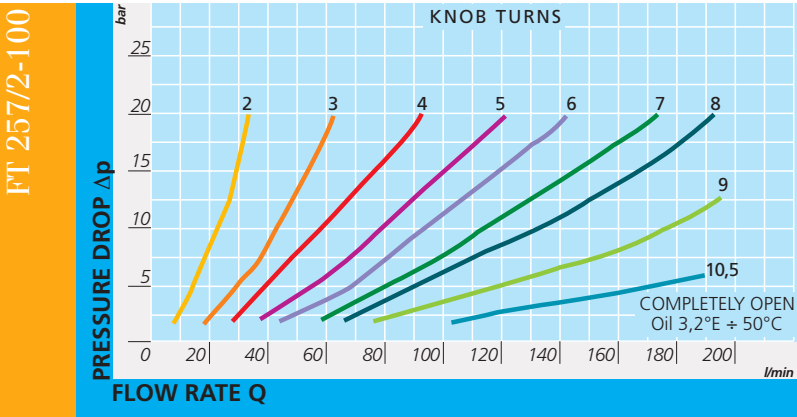


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WHOLE PAGE

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ESC



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

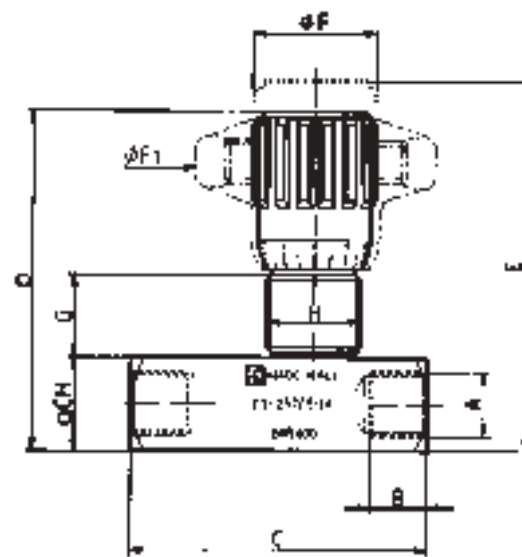
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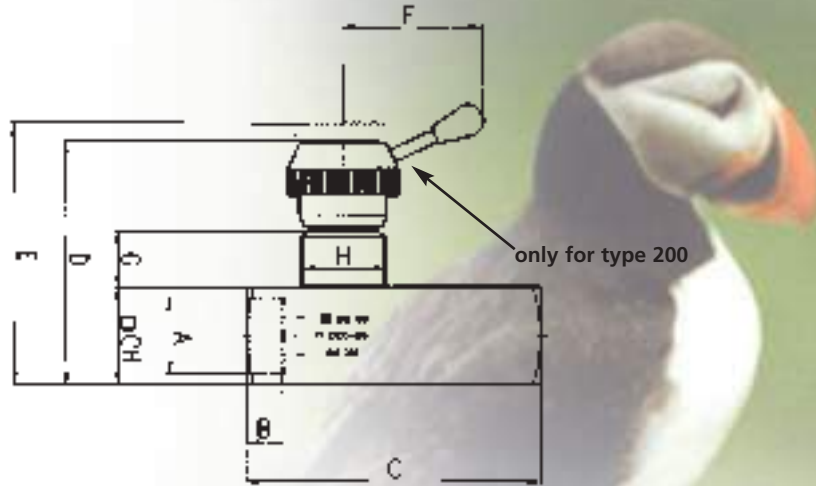
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FT 257/5



MATERIALS	
BODY	9 S MN Pb 23 - UNI 5105
NEEDLE	1 C 40 - UNI 8373
OR	NITRILE
ANTIEXTRUSION RINGS	PTFE
CHECK VALVES	38 Ni CR Mo 4 UNI - EN 10083
SPRING	C72 UNI 3545
THREADED FOUND	35 S MN Pb 10 - UNI 5105
KNOB	GD AL Si 12 - UNI 5706
KNOB (MP)	ABS



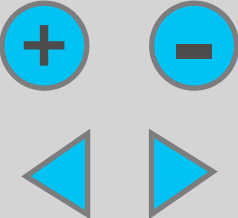
DIMENSIONS

TYPE	A UNI 338	B	C	D	E	Ø F	Ø F1	G	H	CH	WEIGHT KG
1 8	1/8" G	8,5	50	59	64	22	40	13,5	M17x1	16	0,130
1 4	1/4" G	12,5	66	71	78	27	50	17	M20x1	20	0,250
3 8	3/8" G	12,5	79	84	93	33	70	19,5	M25x1,5	25	0,500
1 2	1/2" G	15,5	94,5	97	107	38	80	21	M30x1,5	30	0,750
3 4	3/4" G	17	115	120,5	132,5	47	100	26,5	M40x1,5	40	1,600
1 0 0	1" G	20	138,5	151,5	167,5	58	120	35	M50x1,5	50	3,050
1 1 4	1 1/4" G	22	157	156,5	172,5	58	120	35	M50x1,5	55	3,750
1 1 2	1 1/2" G	24	190	167	181	58	120	35	M55x2	65	5,760
2 0 0	2" G	27	228	188	202	108	-	44	M65x2	75	10,000

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

IN LINE SINGLE-ACTING CONTROL VALVES

Their function is to control and, if necessary, to shut-off the flow in one direction, allowing a free return flow in the opposite direction. Appreciated for their aesthetic characteristics, they are a reliable solution.

The suitable dimensioning has made possible to obtain, in a little space, a great mechanic resistance of the components. The spring in high-resistance material is housed in such a way that it does not close as a pack during the opening of the single-acting conical valve poppet.

Like all the valves of the series FT 257 they ensure:

- metallic seal;
- flow linearity at the opening;
- accurate control for a wide range of flow rate, thanks to the double reference system
- wide range of the flow rate control;
- impossibility for the needle to leave its seat even in the max. opening position;
- stable positioning thanks to a dowel inside the knob;
- quickness in the assembling of the panel (the ring nuts (G) are supplied on request).

The check valve is calibrated at 0,5 bar.

- On request
- Versions AISI 316 code FT 2257/5
 - Viton seals (V)
 - NPT threads
 - Equipped with ring nuts (G)
 - Knob in ABS (mp)



FT 257/5

EXAMPLE FOR ORDERING

	CODE	TYPE	PANNEL RING NUT	VITON SEAL	KNOB IN PLASTIC
STEEL	FT 257/5	18	G	V	MP
STAINLESS STEEL	FT 2257/5	34	G	—	MP

TECHNICAL DATA

TYPE	FLOW SECTION CM²	WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	WORKING TEMPERATURE	FILTRATION GRADE µM
18	0,12	400	1600	-20°/+100°	25
14	0,19	400	1600	-20°/+100°	25
38	0,39	400	1600	-20°/+100°	25
12	0,68	400	1600	-20°/+100°	25
34	1,13	400	1600	-20°/+100°	25
100	2,09	320	1300	-20°/+100°	25
114	2,09	320	1300	-20°/+100°	25
112	3,14	320	1300	-20°/+100°	25
200	4,91	320	1300	-20°/+100°	25

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

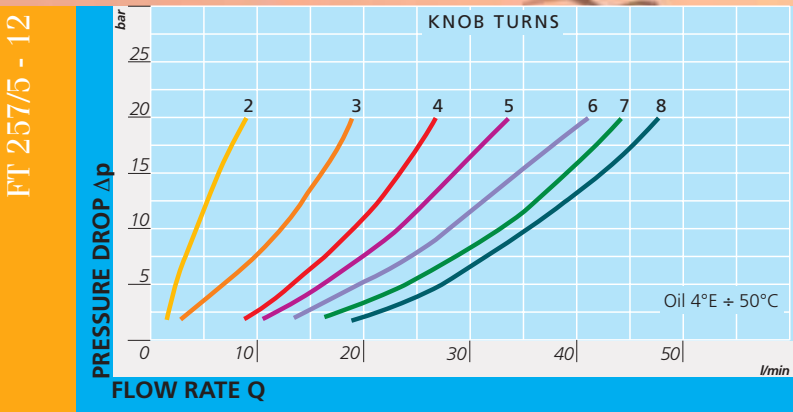
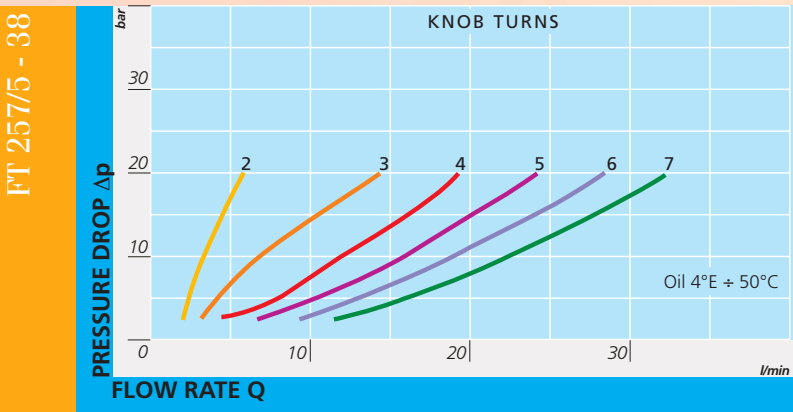
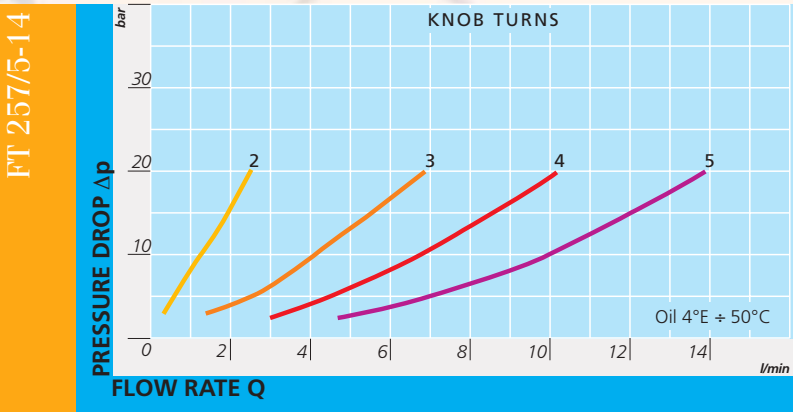
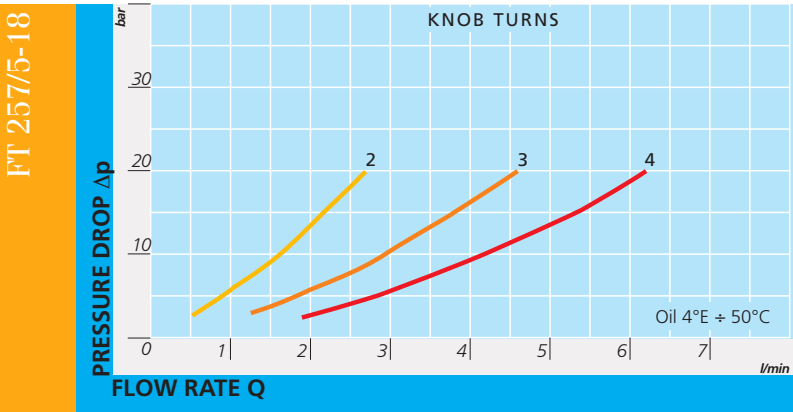
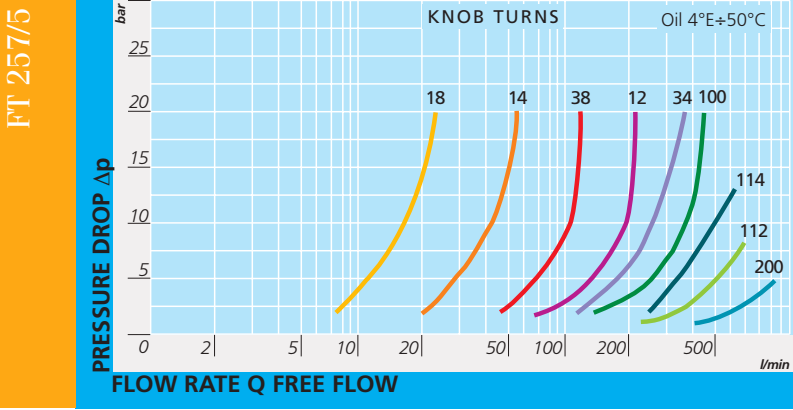
WHOLE PAGE

PRINT

ESC



FT 257/5



HOME

PRESENTATION

VALVES INDEX

+

-

◀

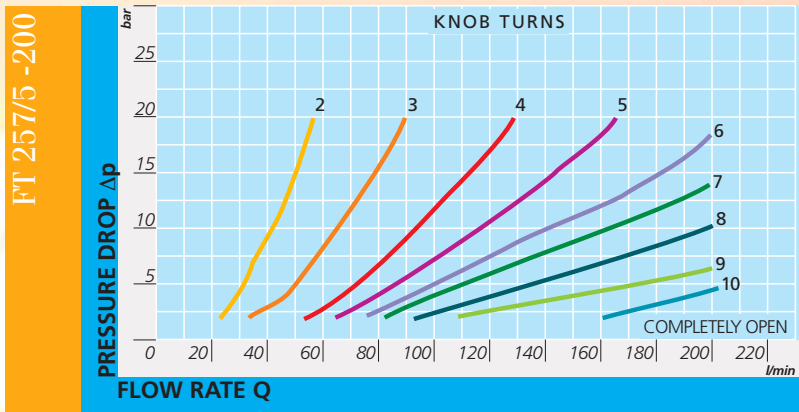
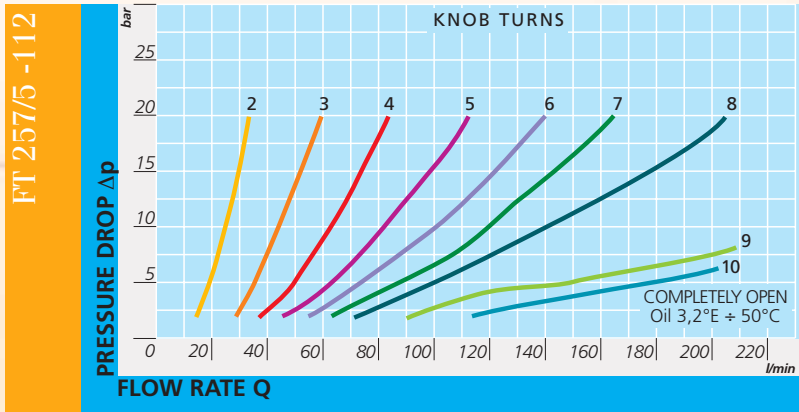
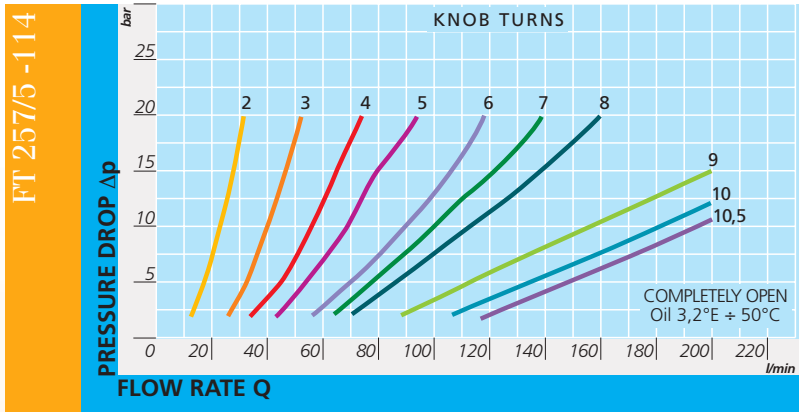
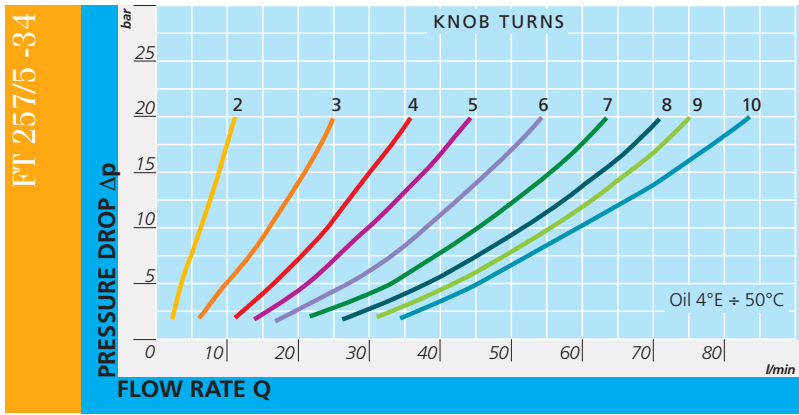
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LAST SEEN

WHOLE PAGE

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ESC



FLOW RATE CURVES



FT 257/5



SERIE FT 257 - FT 258

HOME

PRESENTATION

VALVES INDEX

+

-



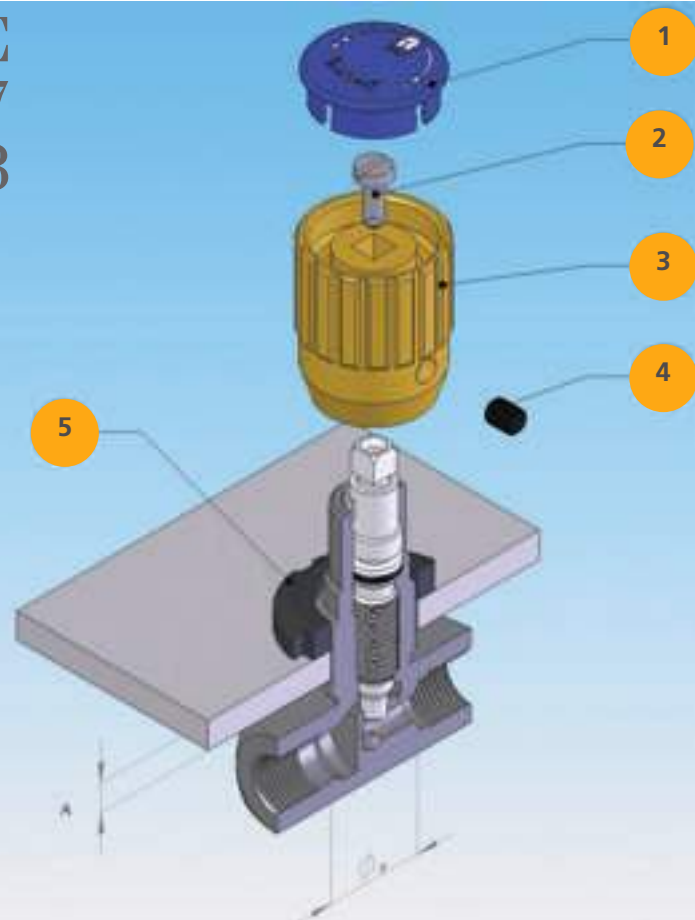
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WHOLE PAGE

PRINT

ESC

SERIE
FT 257
FT 258



PANEL MOUNTING INSTRUCTION

PANEL MOUNTING

1°	UNSCREW LOCK SCREW (4)
2°	REMOVE COVER PLATE (1)
3°	UNSCREW SCREW (2)
4°	PULL OFF HANDLE (3)
5°	INSERT RING NUT (5), ON REQUEST IT IS SUPPLIED WITH THE VALVE

TYPE VALVE	PANEL THICKNESS A MAX	BORE FOR PANEL MOUNTING ØB
1 8	6	18
1 4	8	21
3 8	10	26
1 2	10	31
3 4	10	41
1 0 0	10	51
1 1 4	10	51
1 1 2	12	56
2 0 0	12	66



SERIE FT 257 - FT 258

HOME

PRESENTATION

VALVES INDEX

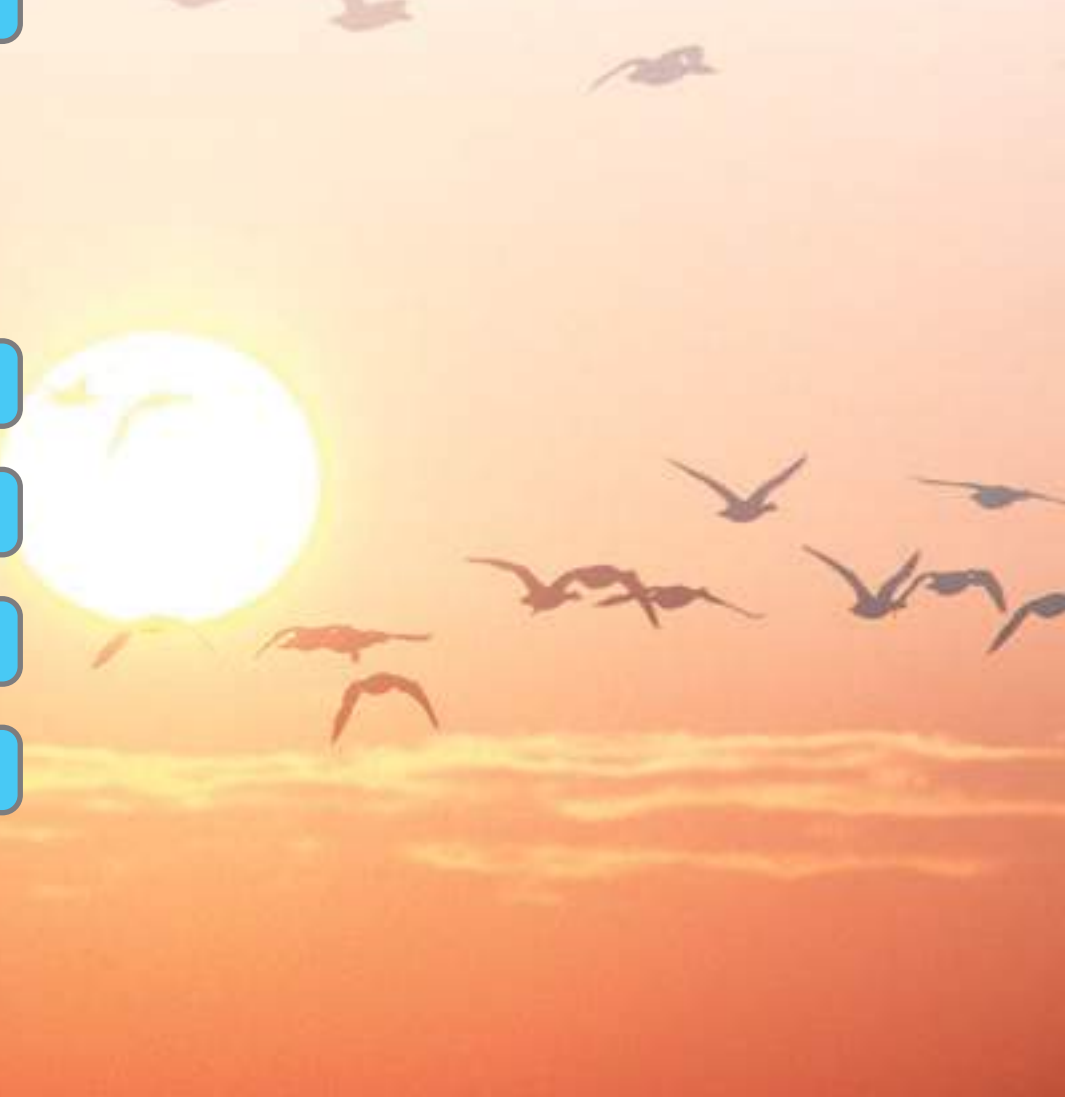


LAST SEEN

WHOLE PAGE

PRINT

ESC



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

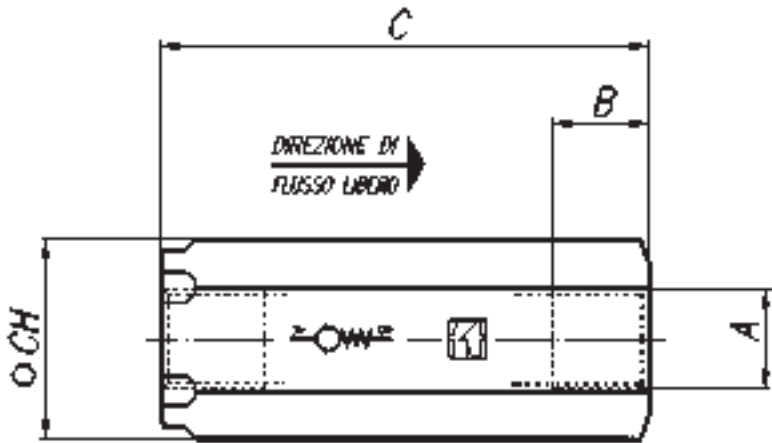
WHOLE PAGE

PRINT

ESC



FT 257/6



DIMENSIONS					
TYPE	A UNI 338	B	C	CH	WEIGHT KG
1 8	1/8" G	8,5	46	17	0,075
1 4	1/4" G	12,5	63	22	0,165
3 8	3/8" G	12,5	68	27	0,260
1 2	1/2" G	15,5	80,5	32	0,415
3 4	3/4" G	17	99,5	36	0,605
1 0 0	1" G	20	117	46	1,170
1 1 4	1 1/4" G	22	134,5	55	1,850
1 1 2	1 1/2" G	24	159	65	3,130
2 0 0	2" G	27	198	75	4,900

MATERIALS	
BODY	9S MN PB 23 - UNI 5105
CHECK VALVE	38 NI CR MO 4 - UNI - EN 10083
SPRING	C72 UNI 3545
THREADED FOUND.	35 S MN PB 10 - UNI 5105

EXAMPLE FOR ORDERING			
	CODE	TYPE	CALIBRATION
STEEL	FT 257/6	14	-
STAINLESS STEEL	FT 2257/6	12	-
STEEL	FT 257/6/B	34	8

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

CHECK VALVES (PISTON)

They are inserted in branches of the circuit where the free flow in one direction is allowed and the return flow in the opposite direction is not possible. A lasting and hermetic seal is ensured by the conical valve poppet, which is a reliable mechanical solution. The spring in high-resistance material is housed in such a way that it does not close as a pack during the opening phase. The external configuration of the body makes it easy to seize the piece during the assembling.
They are available with different calibrations of the load pressure (0,5 standard and 2-4-6-8-10 bars).

- On request
- Versions AISI 316 code FT 2257/6
 - NPT threads



FT 257/6

TECHNICAL DATA				
TYPE	WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	WORKING TEMPERATURE C°	FILTRATION GRADE µM
1 8	400	1 600	-20°/+100°	25
1 4	400	1 600	-20°/+100°	25
3 8	400	1 600	-20°/+100°	25
1 2	400	1 600	-20°/+100°	25
3 4	400	1 600	-20°/+100°	25
1 0 0	320	1 300	-20°/+100°	25
1 1 4	320	1 300	-20°/+100°	25
1 1 2	320	1 300	-20°/+100°	25
2 0 0	320	1 300	-20°/+100°	25

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

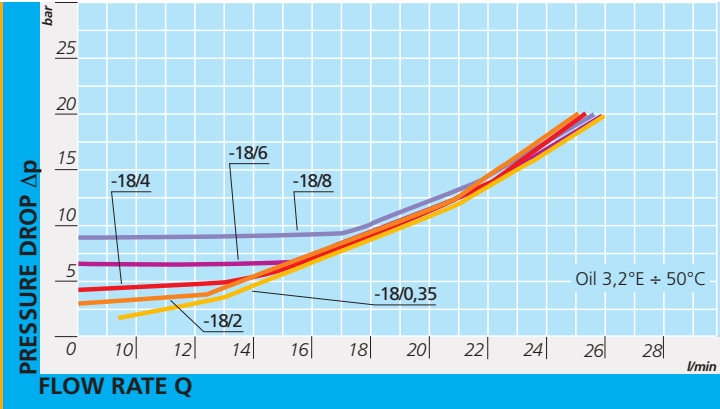
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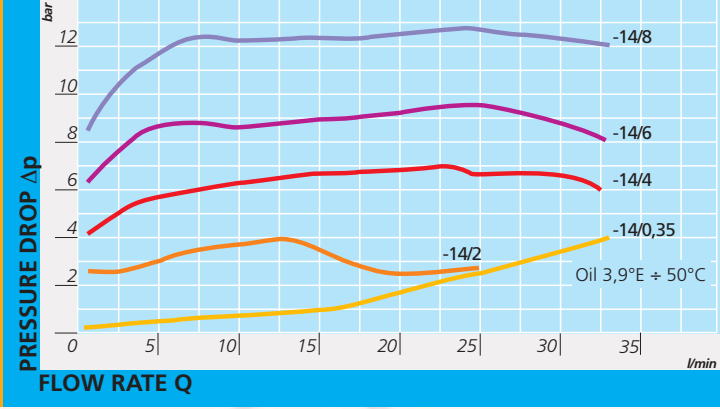


FT 257/6

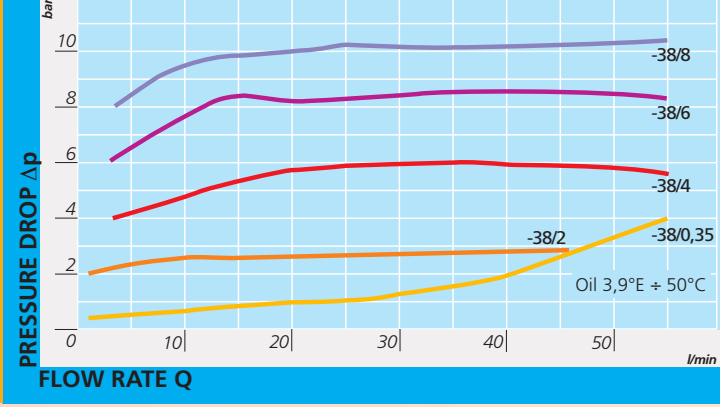
FT 257/6 - 18



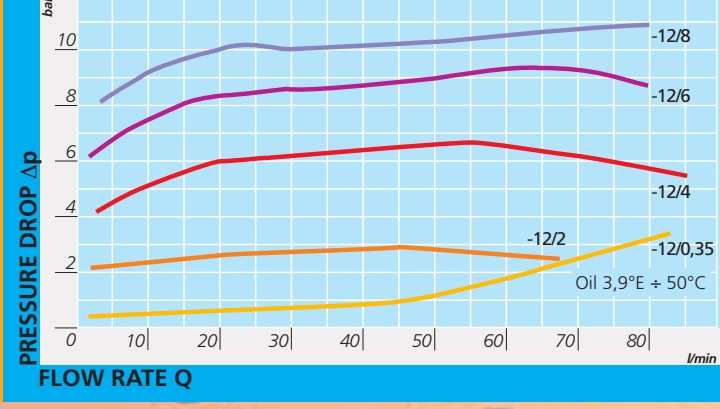
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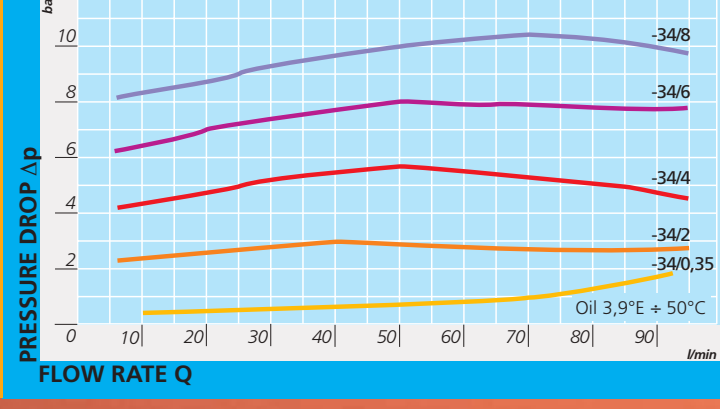
FT 257/6 - 38



FT 257/6 - 12



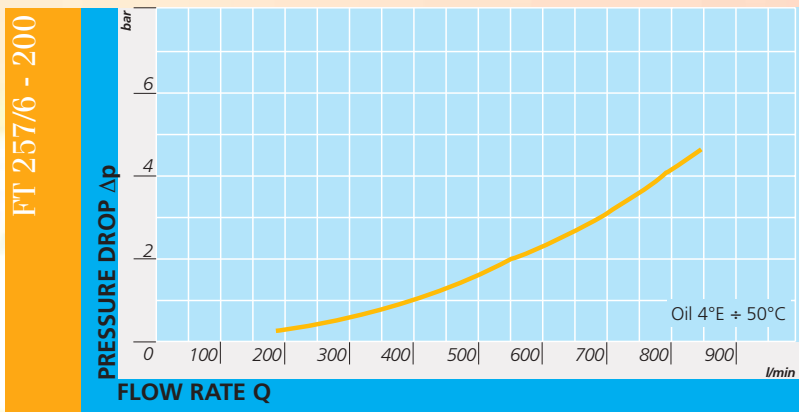
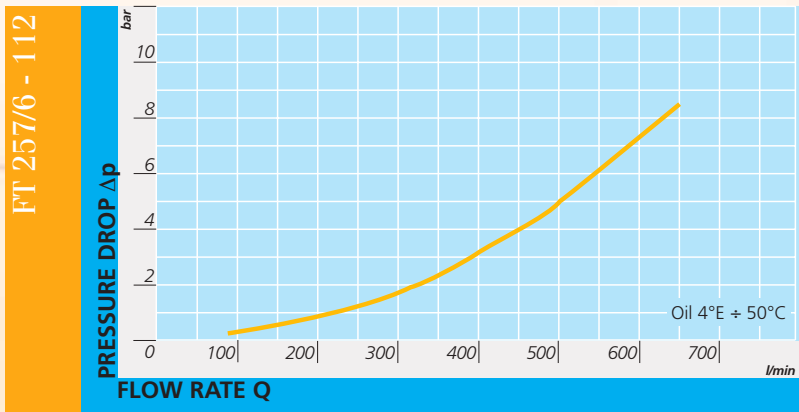
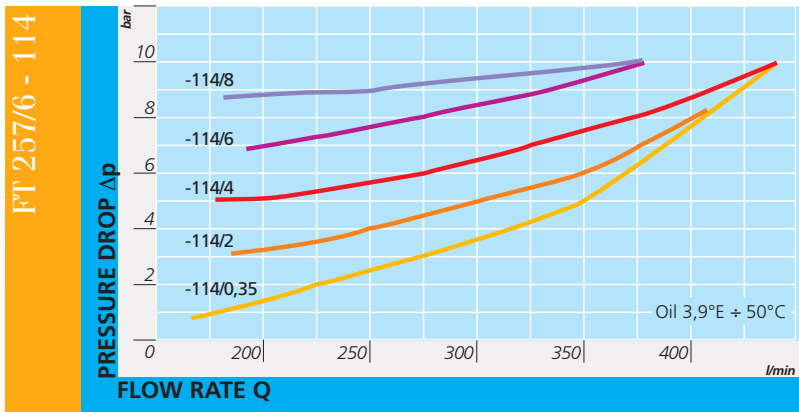
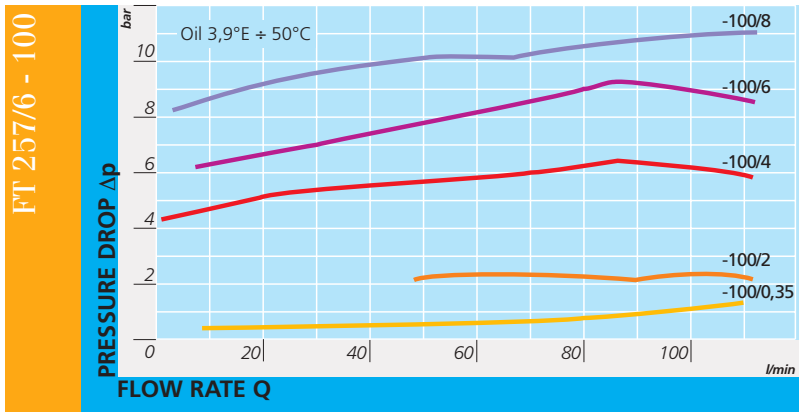
FT 257/6 - 34



FLOW RATE CURVES



FT 257/6



HOME

PRESENTATION

VALVES INDEX

+

-

LAST SEEN

WHOLE PAGE

PRINT

ESC

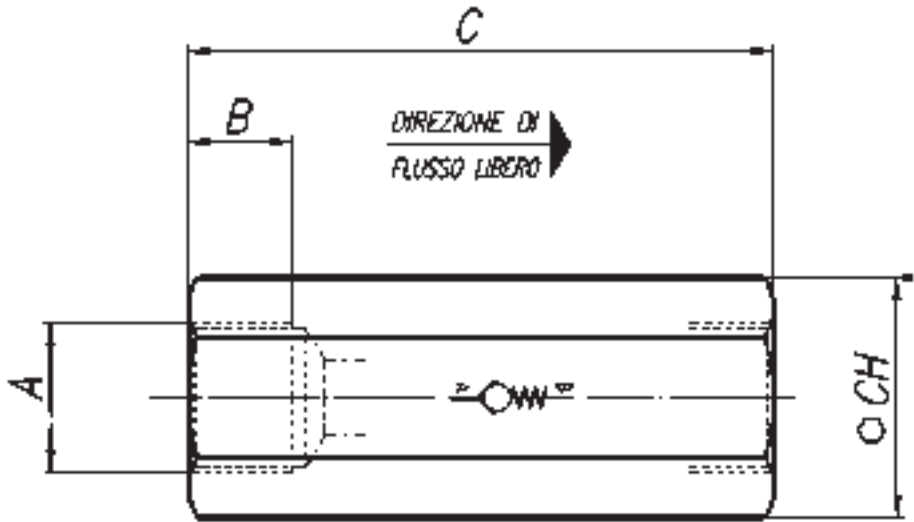


FT 260/6



MATERIALI	
BODY	9 S MN Pb 23 - UNI 5105
SPRING	AISI 302
BALL	UNI 100 C 6
BALL GUIDE	NYLON 66 + FIBRA CARBONIO

EXAMPLE FOR ORDERING		
	CODE	TYPE
STEEL	FT 260/6	14



DIMENSIONS					
TYPE	A UNI 338	B	C	CH	WEIGHT KG
18	1/8" G	8,5	41	16	0,054
14	1/4" G	12,5	54	19	0,089
38	3/8" G	13	65	24	0,175
12	1/2" G	16	77	30	0,310
34	3/4" G	20	88	36	0,450
100	1" G	23	108,5	46	0,965

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

IN LINE SINGLE-ACTING VALVES (BALL)

They are inserted in branches of the circuit where the free flow in one direction is allowed and the return flow in the opposite direction is not possible.

The single-acting valves (in line) are of ball type with alignment guide made of composite high resistance material which allows a total passage and a great breaking strength and wear resistance. All this has been confirmed by numerous tests.

They are available with two different calibrations of the opening pressure (0,35 standard e 4.5 bar).

- On request
- Version AISI 316 code FT 2260/6 **with seal**



FT 260/6

TECHNICAL DATA

TYPE	WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	WORKING TEMPERATURE C°	FILTRATION GRADE µM
1 8	400	1 600	-20°/+ 100°	25
1 4	400	1 600	-20°/+ 100°	25
3 8	400	1 600	-20°/+ 100°	25
1 2	400	1 600	-20°/+ 100°	25
3 4	400	1 600	-20°/+ 100°	25
1 0 0	320	1 300	-20°/+ 100°	25



FT 260/6

HOME

PRESENTATION

VALVES INDEX

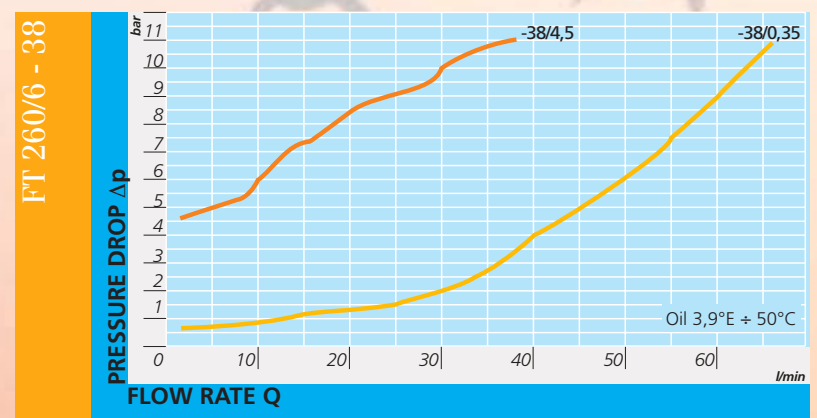
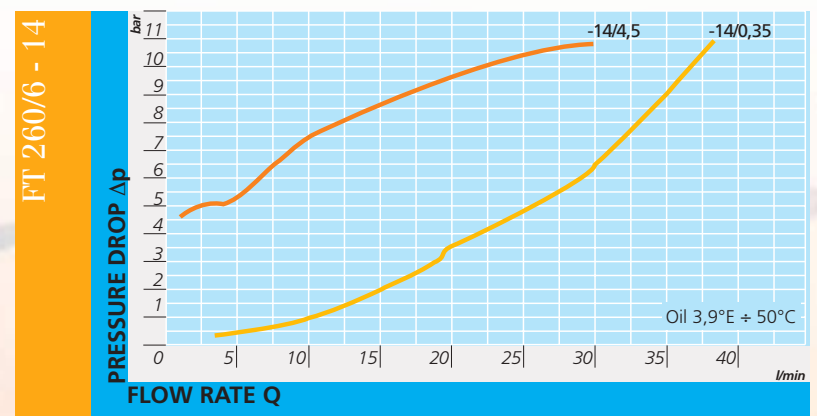
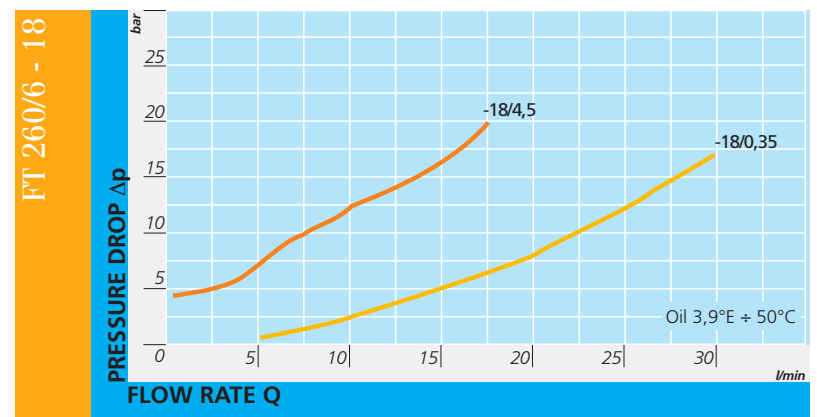


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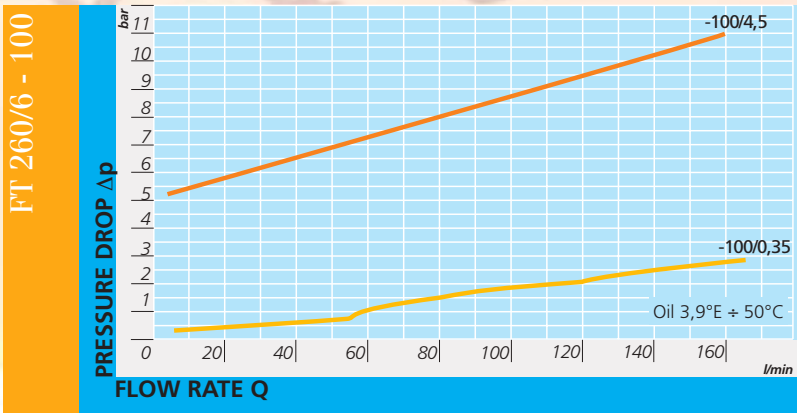
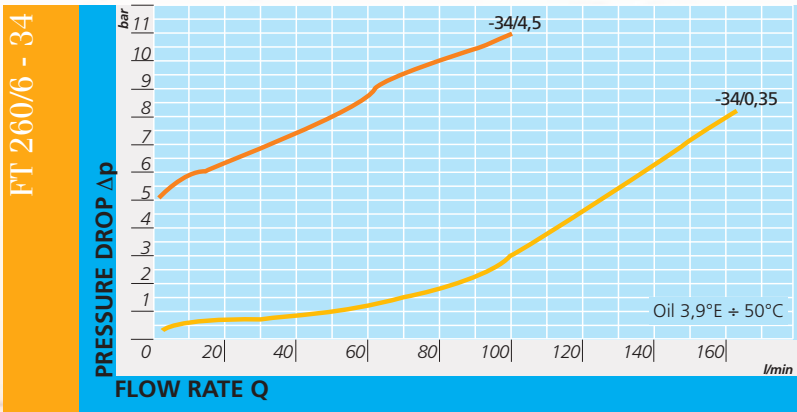
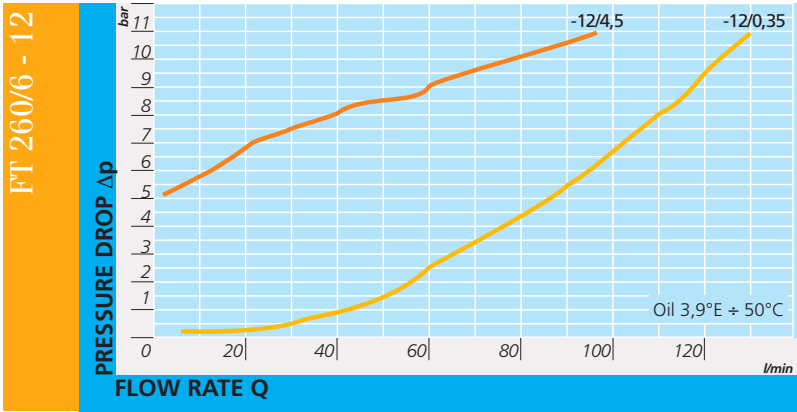
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FLOW RATE CURVES



FT 260/6



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

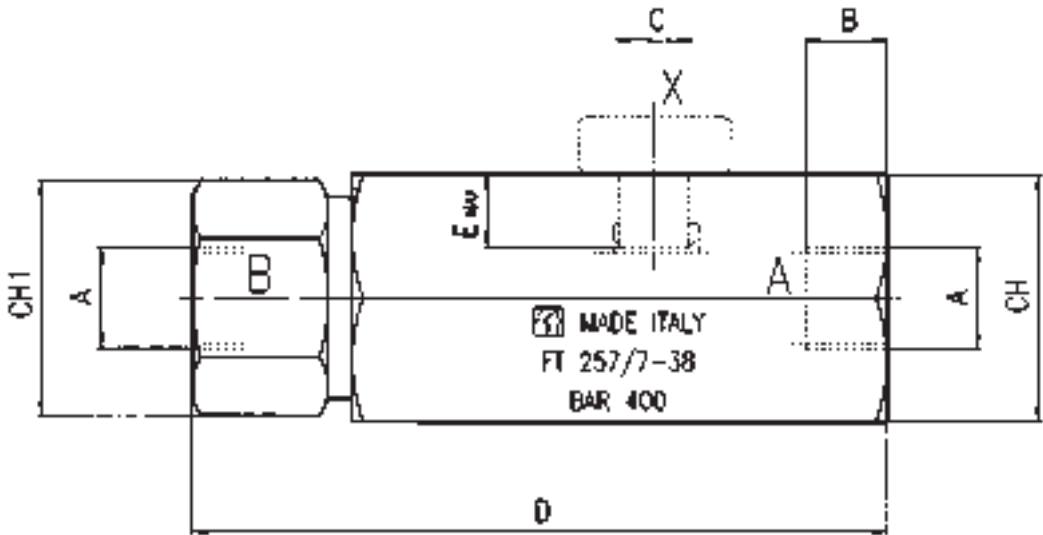
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MATERIALS	
BODY	PS MN PB 23 - UNI 5105
CHECK VALVE	38 NI CR MO 4 - UNI - EN 10083
SPRING	C72 UNI 3545

EXAMPLE FOR ORDERING		
	CODE	TYPE
STEEL	FT 257/7	14
STAINLESS STEEL	FT 2257/7	14



DIMENSIONS								
TYPE	A UNI 338	B	C UNI 338	D	E	CH	CH 1	WEIGHT KG
14	1/4"G	12,5	1/4"G	100	12	38	28	0,771
38	3/8"G	12,5	1/4"G	115	12	41	34	1,012
12	1/2"G	15,5	1/4"G	139	12	46	41	1,553
34	3/4"G	17	1/4"G	168	12	55	46	2,596
100	1"G	20	1/4"G	197	12	65	55	4,161

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

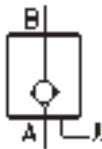


SINGLE PILOT CHECK VALVES

Belonging to the same range of the in line single-acting valves, but different in that they allow the valve to open in the direction that is normally closed thanks to a particular signal of pilot operated pressure. The high level of pilot ratio, realized in the design phase, enables rapid and complete opening for the whole duration of the desired cycle. The construction material used for the seal pistons, the hardened treatment that these are subjected to, as well as the finish-grinding guarantee a perfect seal even in particularly adverse working conditions.

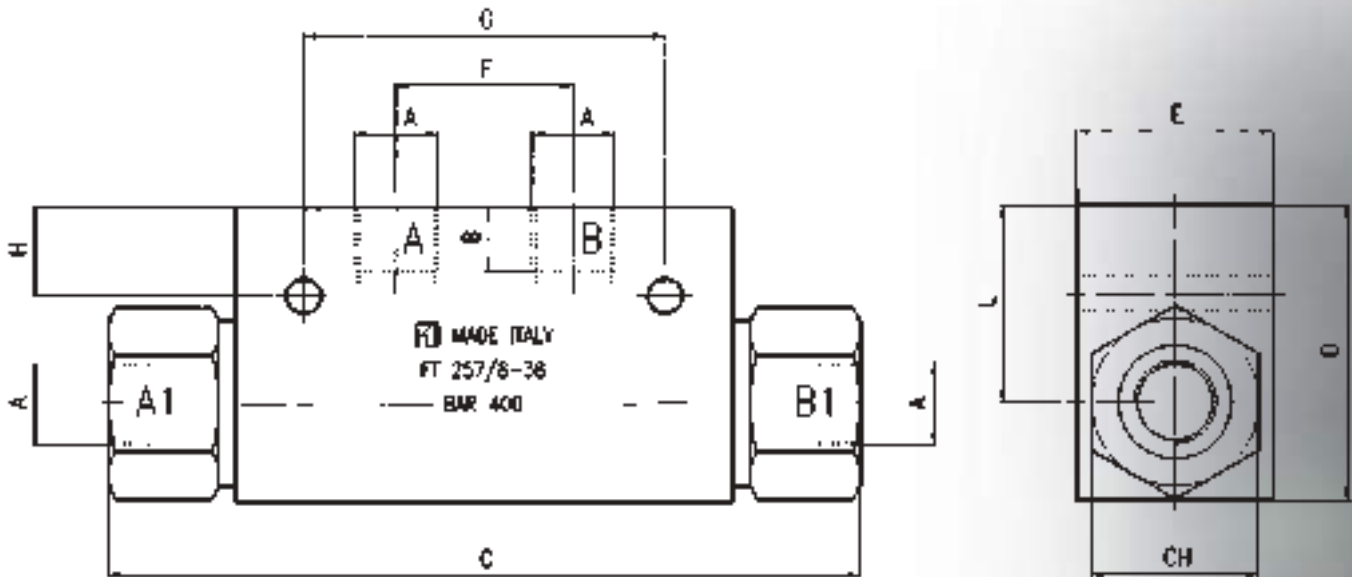
Uses
The above mentioned valves are generally used for blocking work circuits under pressure, such as guarding against falling loads in the event of pipe braking or against creeping movements for hydraulically blocks systems.

On request
Version AISI 316 code FT 2257/7.



FT 257/7

TECHNICAL DATA						
TYPE	WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	WORKING TEMPERATURE C°	FILTRATION GRADE µm	PILOTAGE RATIO	MIN. OPENING PRESSURE BAR
1 4	400	1 600	-20°/+ 100°	25	1-5.3	0,5
3 8	400	1 600	-20°/+ 100°	25	1-5	0,5
1 2	400	1 600	-20°/+ 100°	25	1-5.3	0,5
3 4	400	1 600	-20°/+ 100°	25	1-4.4	0,5
1 0 0	320	1 300	-20°/+ 100°	25	1-4.2	0,5



MATERIALS

BODY	PS MN PB 23 - UNI 5105
CHECK VALVE	38 NI CR MO 4 - UNI - EN 10083
SPRING	C72 UNI 3545

EXAMPLE FOR ORDERING

	CODE	TYPE
STEEL	FT 257/8	14
STAINLESS STEEL	FT 2257/8	14

DIMENSIONS

TYPE	A UNI338	B	C	D	E	F	G	H	L	CH	VITI	WEIGHT KG
14	1/4" G	12,5	126	45	35	27	60	10	29	28	M6X45	1,088
38	3/8" G	12,5	153	60	40	36	73,5	18	40	34	M6X50	1,360
12	1/2" G	15,5	193	65	50	46	94	15	40	41	M6X60	3,321

HOME

PRESENTATION

VALVES INDEX

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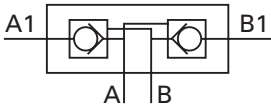
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DOUBLE PILOT CHECK VALVES

Belonging to the same range of the in line single-acting valves, but different in that they allow the valve to open in the direction that is normally allowed thanks to a particular signal of pilot operated pressure. The high level of pilot ratio, realized in the design phase, enables rapid and complete opening for the whole duration of the desired cycle. The construction material used for the seal pistons, the hardened treatment that these are subjected to, as well as the finish-grinding guarantee a perfect seal even in particularly adverse working conditions.

Uses
The above mentioned valves are generally used for blocking work circuits under pressure, such as guarding against falling loads in the event of pipe braking or against creeping movements for hydraulically blocks systems.

On request
Version AISI 316 code FT 2257/8.



TOGNETTA

FT 257/8

TECHNICAL DATA

TYPE	WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	WORKING TEMPERATURE C°	FILTRATION GRADE µM	PILOTAGE RATIO	MIN. OPENING PRESSURE BAR
1 4	400	1 600	-20°/+ 100°	25	1-7,6	0,5
3 8	400	1 600	-20°/+ 100°	25	1-7	0,5
1 2	400	1 600	-20°/+ 100°	25	1-7,4	0,5

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

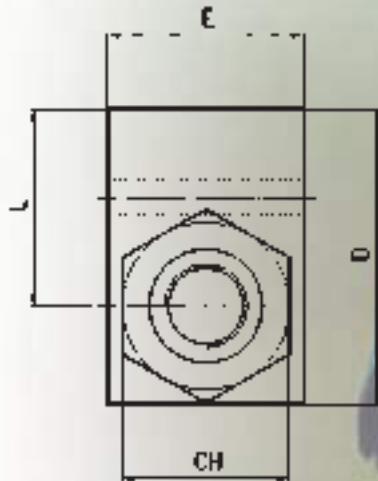
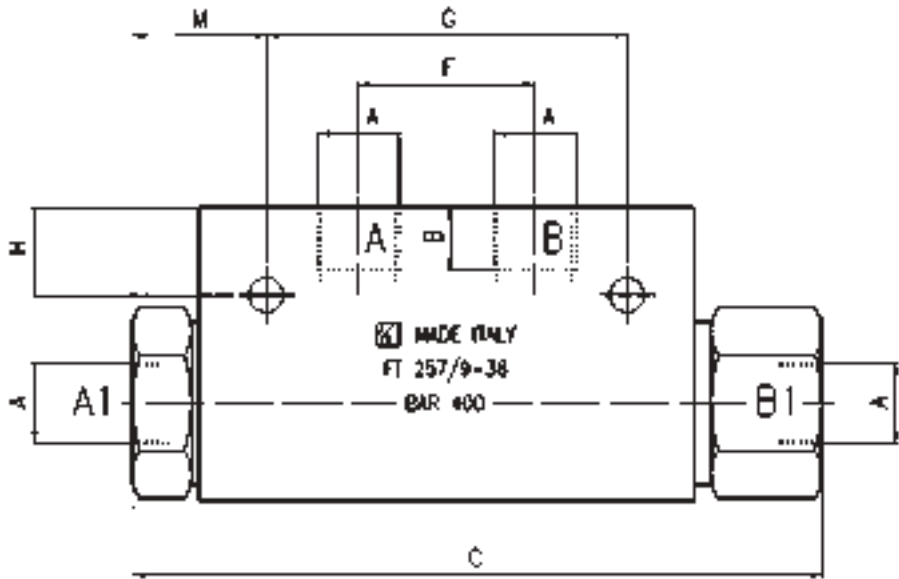
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FT 257/9



MATERIALS

BODY	PS MN PB 23 - UNI 5105
CHECK VALVE	38 NI CR MO 4 - UNI - EN 10083
SPRING	C72 UNI 3545

EXAMPLE FOR ORDERING

	CODE	TYPE
STEEL	FT 2257/9	14

DIMENSIONS

TYPE	A UNI338	B	C	D	E	F	G	H	L	M	CH	VITI	WEIGHT KG
14	1/4" G	12,5	115	45	35	27	60	10	29	22	28	M6X45	1,016
38	3/8" G	12,5	140,5	60	40	36	73,5	18	40	27,25	34	M6X50	1,860
12	1/2" G	15,5	173,5	65	50	46	94	15	40	30	41	M6X60	3,100

HOME

PRESENTATION

VALVES INDEX

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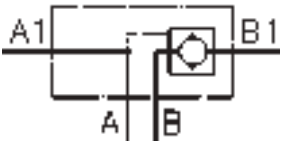
ESC

SINGLE PILOT CHECK VALVES

Belonging to the same range as the in-line check valves, but different in that they allow the valve to open in the direction that is normally allowed. The high level of pilot ratio, realized in the design phase, enables rapid and complete opening for the whole duration of the desired cycle. The construction material used for the seal pistons, the hardened treatment that these are subjected to, as well as the finish-grinding guarantee a perfect seal even in particularly adverse working conditions.

Uses
The above mentioned valves are generally used for blocking work circuits under pressure, such as guarding against falling loads in the event of pipe braking or against creeping movements for hydraulically blocks systems.

On request
Version in AISI 316 code FT 2257/9



FT 257/9

TECHNICAL DATA

TYPE	WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	WORKING TEMPERATURE C°	FILTRATION GRADE µm	PILOTAGE RATIO	MIN. OPENING PRESSURE BAR
1 4	400	1 600	-20°/+ 100°	25	1-7,6	0,5
3 8	400	1 600	-20°/+ 100°	25	1-7	0,5
1 2	400	1 600	-20°/+ 100°	25	1-7,4	0,5

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

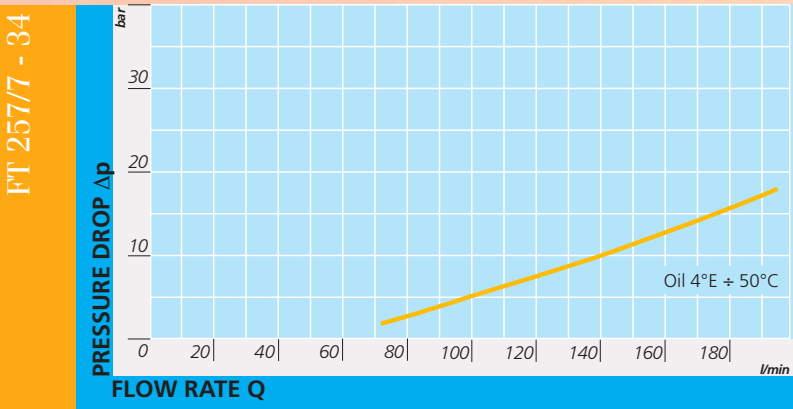
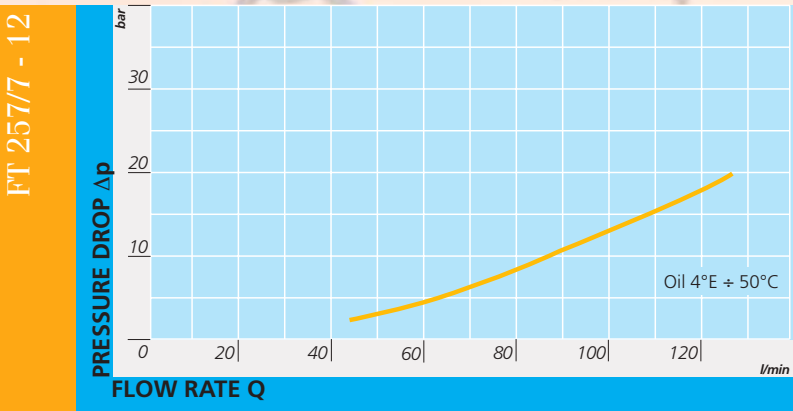
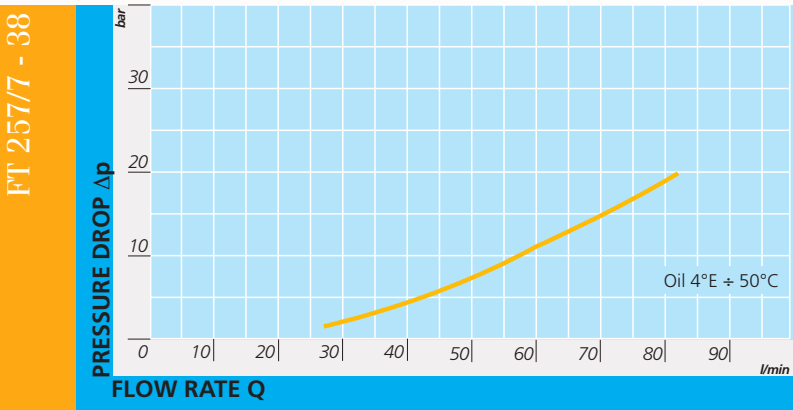
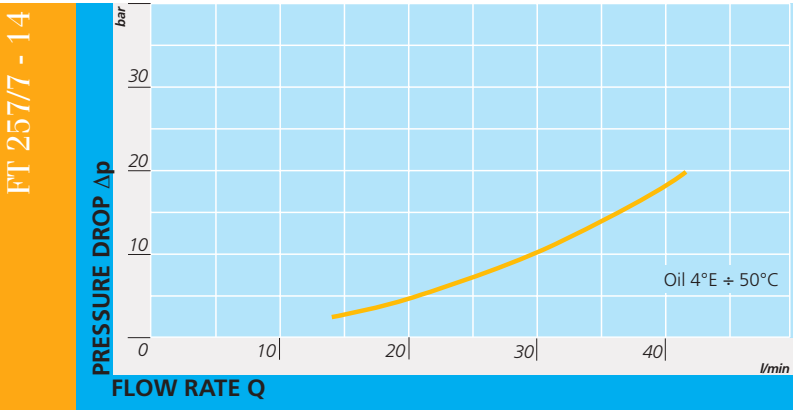
WHOLE PAGE

PRINT

ESC



FT 257/7 - 257/8 - 257/9



FLOW RATE CURVES



FT 257/7 - FT 257/8 - FT 257/9

HOME

PRESENTATION

VALVES INDEX

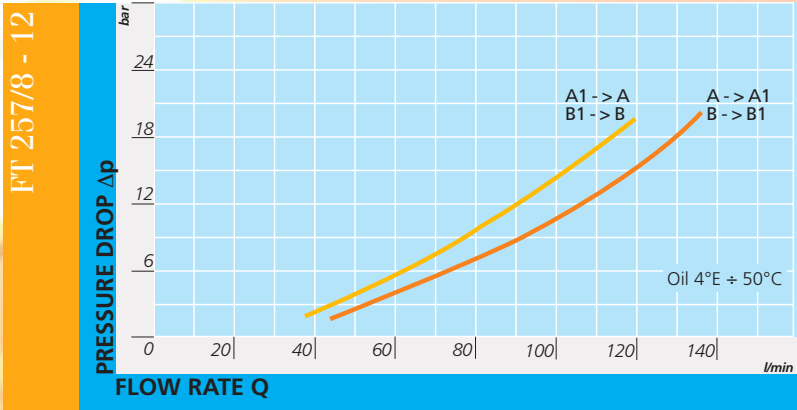
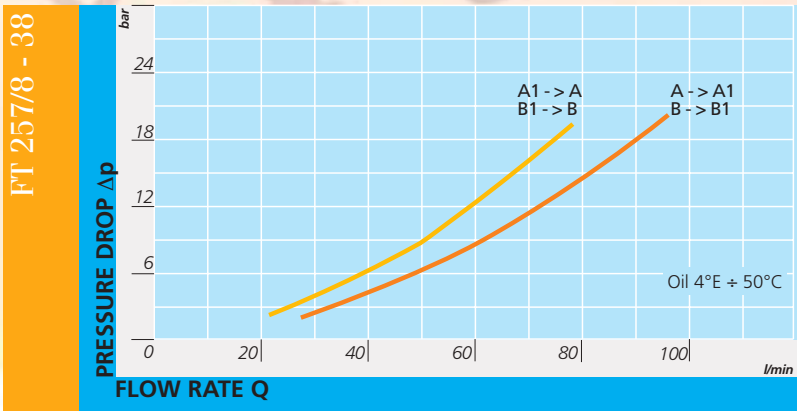
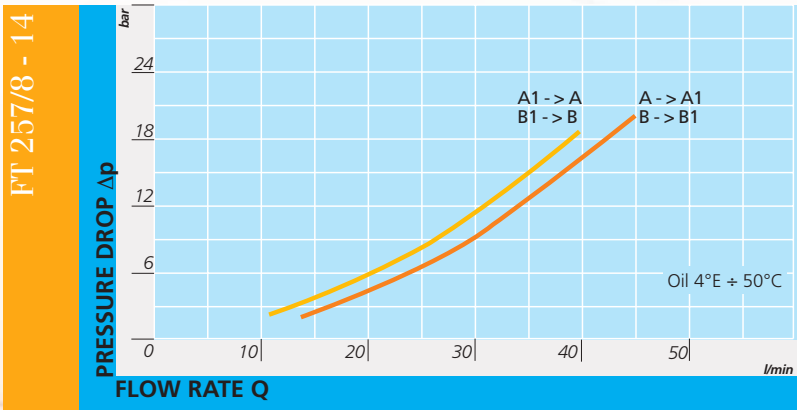
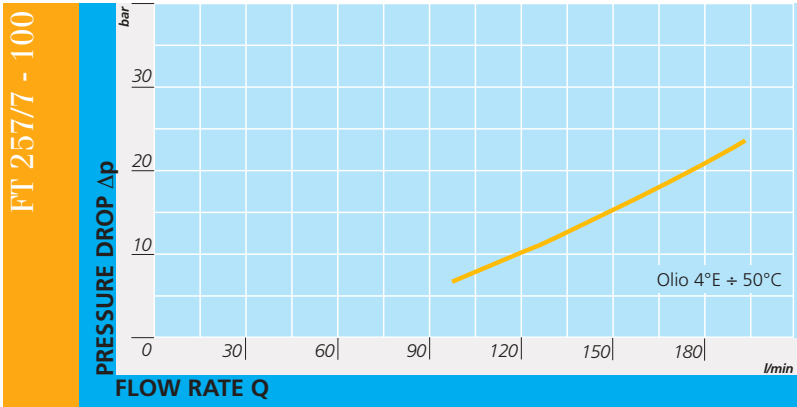


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ESC



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



FT 277/2

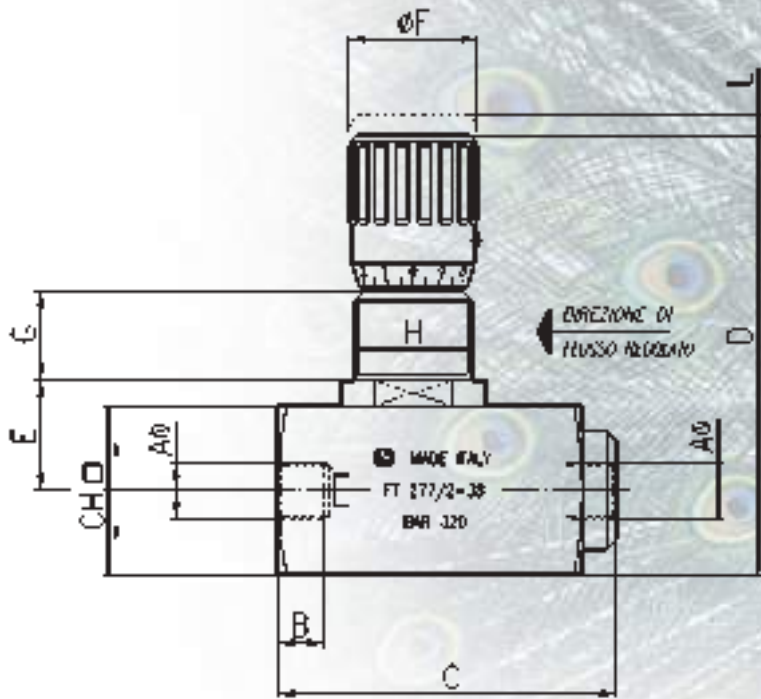


MATERIALS

BASE BODY	9 S MN Pb 23 - UNI 5105
CARTRIDGE BODY	35 S MN Pb 10 - UNI 5105
COMPENSATING UNIT	38 Ni CR MO 4 UNI - EN 10083
O R	NITRILE
ANTIEXTRUSION RING	PTFE
KNOB	GD - AL SI 12 - UNI 5706

EXAMPLE FOR ORDERING

ACCESSOIRES ON REQUEST			
CODE	TYPE	PANEL RING NUT	VITON SEAL
FT 277/2	34	G	V



DIMENSIONS

TYPE	A UNI 338	B	C	D	E	Ø F	G	H	L	CH	WEIGHT KG
1 4	1/4" G	12,5	81	107	28	33	17	M30x1,5	4,5	45	1,300
3 8	3/8" G	12,5	100	129.5	32	38	27	M35x1,5	6	50	2,000
1 2	1/2" G	15,5	119	150	38	47	28,5	M40x1,5	6,5	60	3,300
3 4	3/4" G	17	142	182.5	45	58	35	M50x1,5	7,5	70	6,700

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

DOUBLE-ACTING PRESSURE COMPENSATED
FLOW CONTROL VALVES

Double-port pressure compensated control valves
They include two necks in series:

- the first one with port section definable by an external control;
- the second one with automatically variable section in relation with counter pressure variations on use.

The choice of the adjustable neck situated upstream is that which best ensures the precision of the valve towards variations of the fluid temperature.
Regarding the structure of the valve, the following points must be underlined:

- the rigorous symmetry of the internal components such as to impede unforeseen perturbations of the static and dynamic balances;
- the optimisation of the arrangement of internal spring controlling the intervention of the automatic throttling, with variable preload with throttling fixed setting, useful to improve the behaviour at medium-high flow rates;
- the geometry of the passage across which the flow is automatically throttled, designed to minimize the effect of the flow hydromechanics forces on the total balance of the moving element;
- the accuracy of the machining which enabled to cancel any hysteresis effect of mechanical origin;
- the original aesthetic feature, underlined by the particular form of the control knob;
- the easiness to reset the flow value thanks to reference pointers.

Moreover we believe important to underline the choice of the constructive solution fitting to the concept of "double valence", according to which the central body, configured as a threaded cartridge and insertable in the two different bodies at the base or directly in standard modular units, brings about the three marketed versions:

- FT 277/2 two-way
- FT 277/5 two-way with single-acting valve
- FT 287/2 with threaded cartridge mounted.

This solution enables the user to request the single modular components to be assembled according to the application.

- On request
- equipped with ring nuts (G)
 - Viton seals (V)



FT 277/2

TECHNICAL DATA

TYPE	MAX WORKING PRESSURE BAR	MIN. ΔP WORKING BAR	WORKING TEMPERATURE °C	FILTRATION GRADE µM ABSOLUTE
14	320	7,5	-20°/+70°	25
38	320	10	-20°/+70°	25
12	320	12	-20°/+70°	25
34	320	15	-20°/+70°	25

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

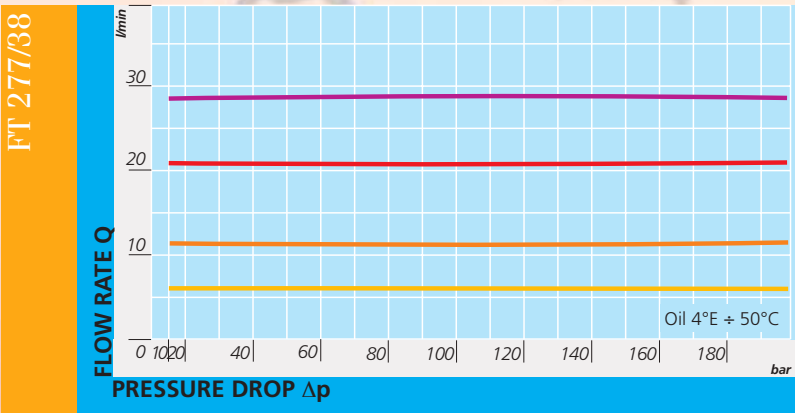
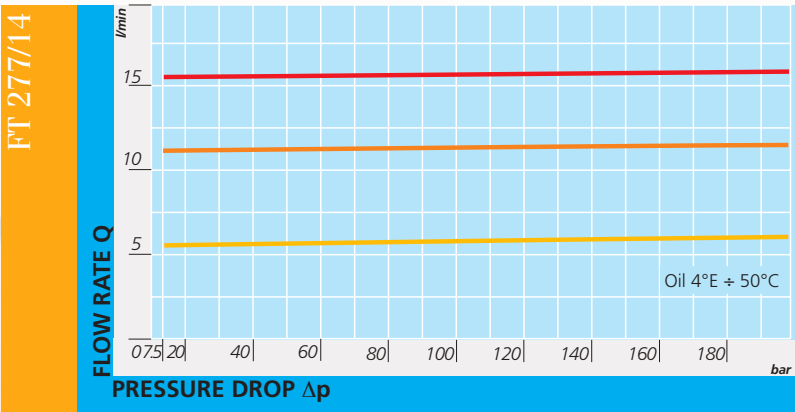
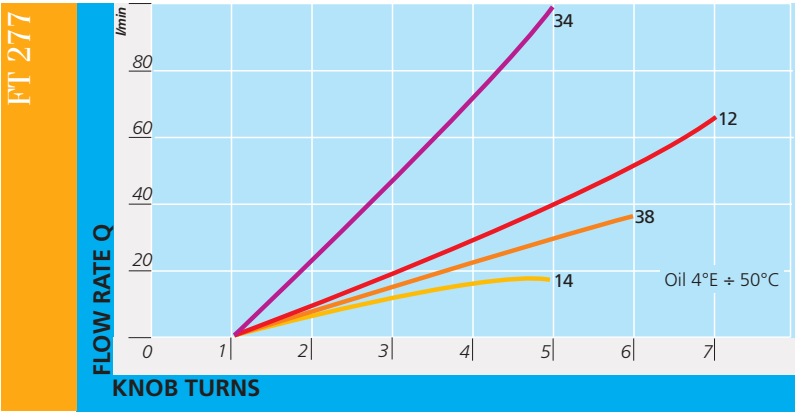
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ESC



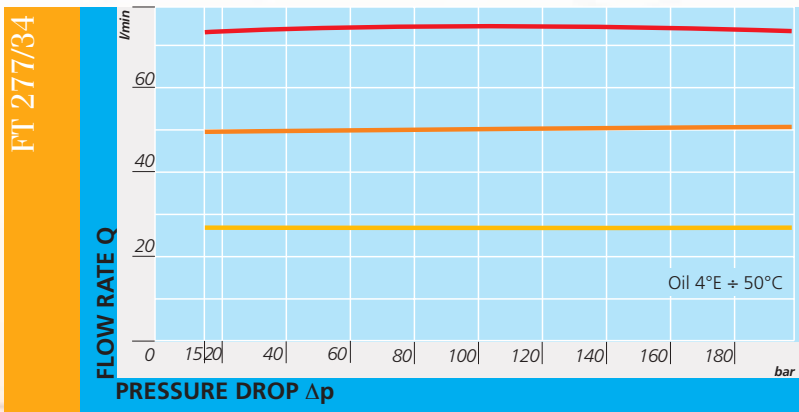
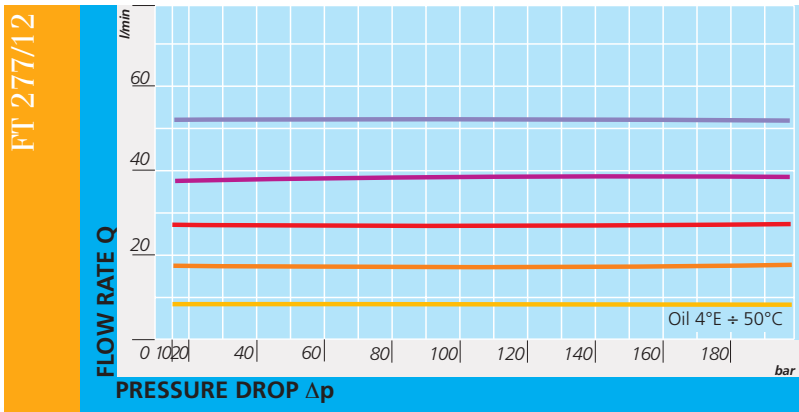
FT 277/2



FLOW RATE CURVES



FT 277/2



HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

WHOLE PAGE

PRINT

ESC



FT 277/5

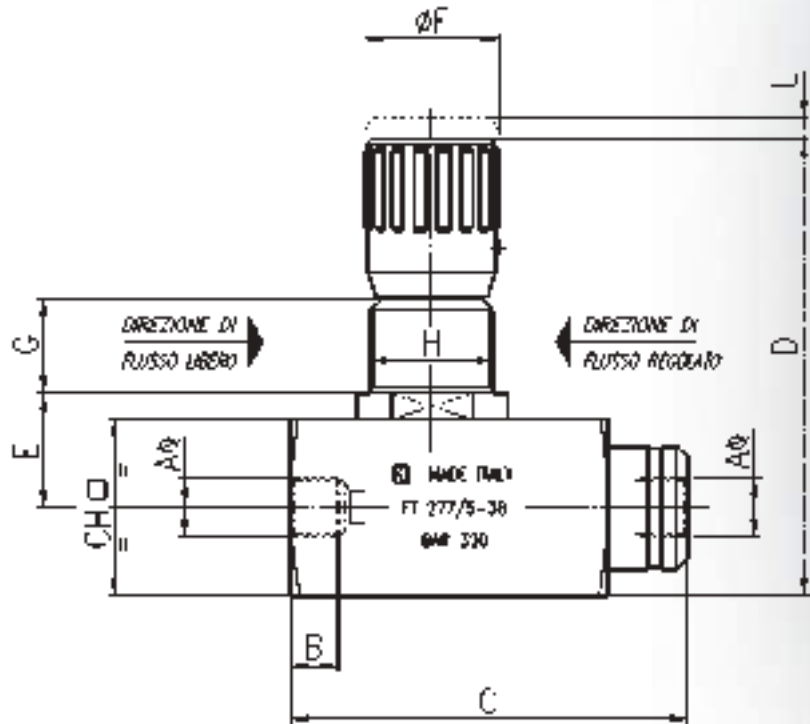


MATERIALS

BASE BODY	9 S MN PB 23 - UNI 5105
CARTRIDGE BODY	35 S MN PB 10 - UNI 5105
COMPENSATING UNIT	38 NI CR MO 4 UNI - EN 10083
O R	NITRILE
ANTIEXTRUSION RING	PTFE
KNOB	GD - AL SI 12 - UNI 5706

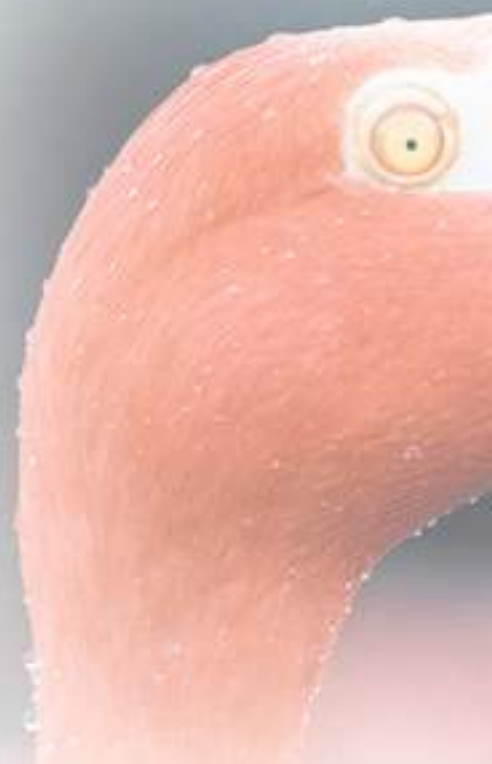
EXAMPLE FOR ORDERING

ACCESSOIRES ON REQUEST			
CODE	TYPE	PANEL RING NUT	VITON SEAL
FT 277/5	12	G	V



DIMENSIONS

TYPE	A UNI338	B	C	D	E	Ø F	G	H	L	CH	WEIGHT KG
1 4	1/4" G	12,5	93,5	107	28	33	17	M30x1,5	4,5	45	1,400
3 8	3/8" G	12,5	112,5	129,5	32	38	27	M35x1,5	6	50	2,000
1 2	1/2" G	15,5	136	150	38	47	28,5	M40x1,5	6,5	60	3,500
3 4	3/4" G	17	163	182,5	45	58	35	M50x1,5	7,5	70	7,000



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

SINGLE-ACTING PRESSURE COMPENSATED
FLOW CONTROL VALVES

The double-port control valves, pressure compensated and including high capacity single acting valve to allow the free flow in one direction. They include two necks in series:

- the first one with port section definable by an external control;
- the second one with automatically variable section in relation with counter pressure variations on use.

The choice of the adjustable neck situated upstream is that which best ensures the precision of the valve towards variations of the fluid temperature. Regarding the structure of the valve, the following points must be underlined:

- the rigorous symmetry of the internal components such as to impede unforeseen perturbations of the static and dynamic balances;
- the optimisation of the arrangement of internal spring controlling the intervention of the automatic throttling, with variable preload with throttling fixed setting, useful to improve the behaviour at medium-high flow rates;
- the geometry of the passage across which the flow is automatically throttled, designed to minimize the effect of the flow hydromechanics forces on the total balance of the moving element;
- the accuracy of the machining which enabled to cancel any hysteresis effect of mechanical origin;
- the original aesthetic feature, underlined by the particular form of the control knob;
- the easiness to reset the flow value thanks to reference pointers.

Moreover we believe important to underline the choice of the constructive solution fitting to the concept of "double valence", according to which the central body, configured as a threaded cartridge and insertable in the two different bodies at the base or directly in standard modular units, brings about the three marketed versions:

- FT 277/2 two-way
- FT 277/ 5 two-way with single-acting valve
- FT 287/2 with cartridge mounted.

This solution enables the user to request the single modular components to be assembled according to the application.

- On request
- equipped with ring nuts (G)
 - Viton seals (V)



FT 277/5

TECHNICAL DATA

TYPE	MAX WORKING PRESSURE BAR	MIN. ΔP WORKING BAR	WORKING TEMPERATURE C°	FILTRATION GRADE µM ABSOLUTE
14	320	7,5	-20°/+70°	25
38	320	10	-20°/+70°	25
12	320	12	-20°/+70°	25
34	320	15	-20°/+70°	25



FT 277/5

HOME

PRESENTATION

VALVES INDEX

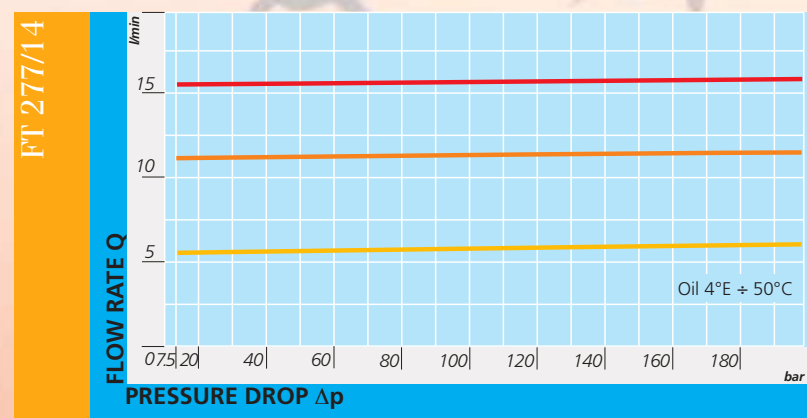
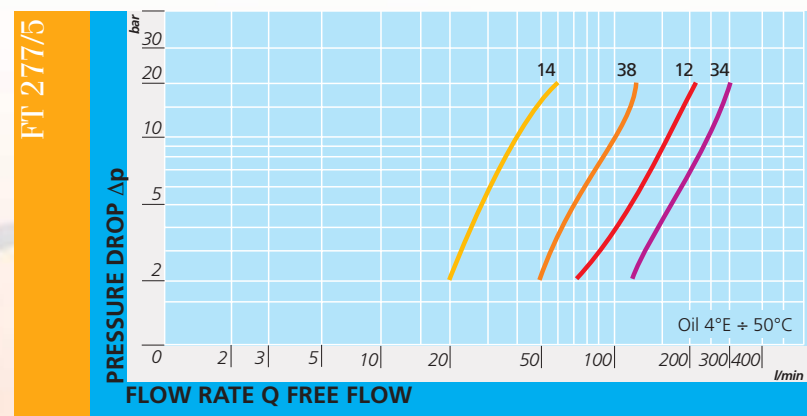
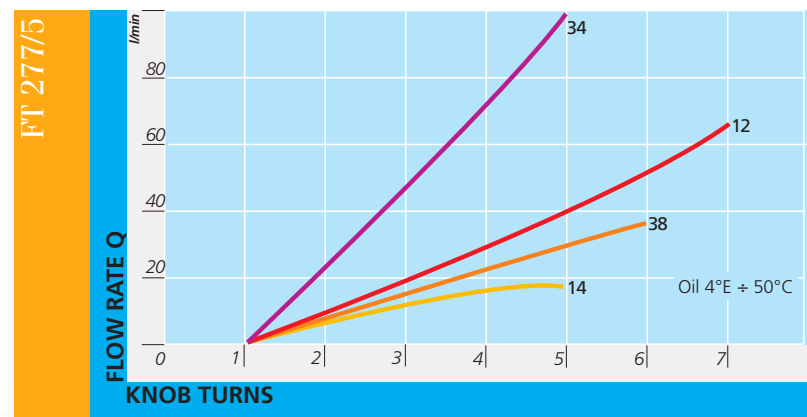


LAST SEEN

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PRINT

ESC



HOME

PRESENTATION

VALVES INDEX

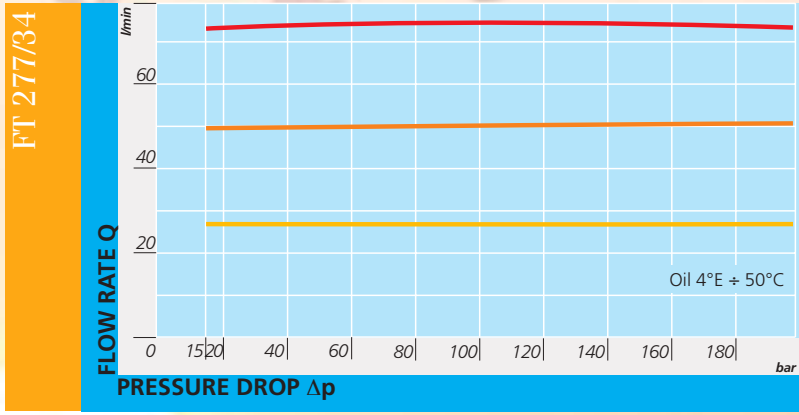
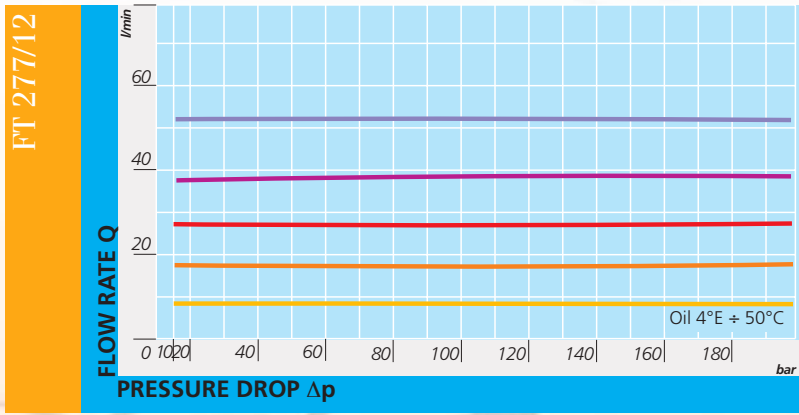
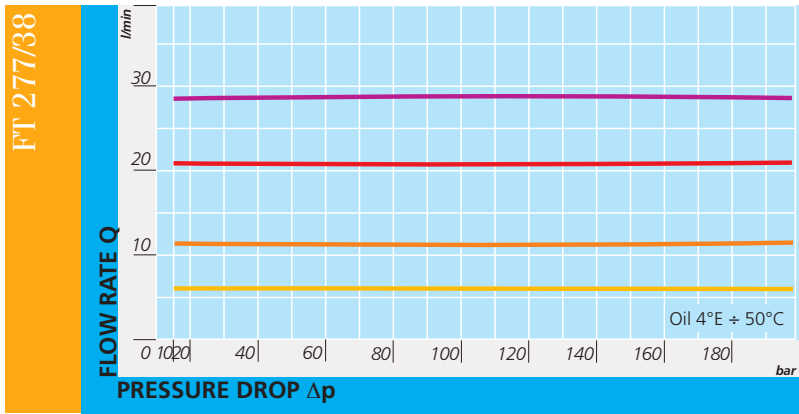


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ESC



FT 277/5



FT 277/2 - FT 277/5

HOME

PRESENTATION

VALVES INDEX

+

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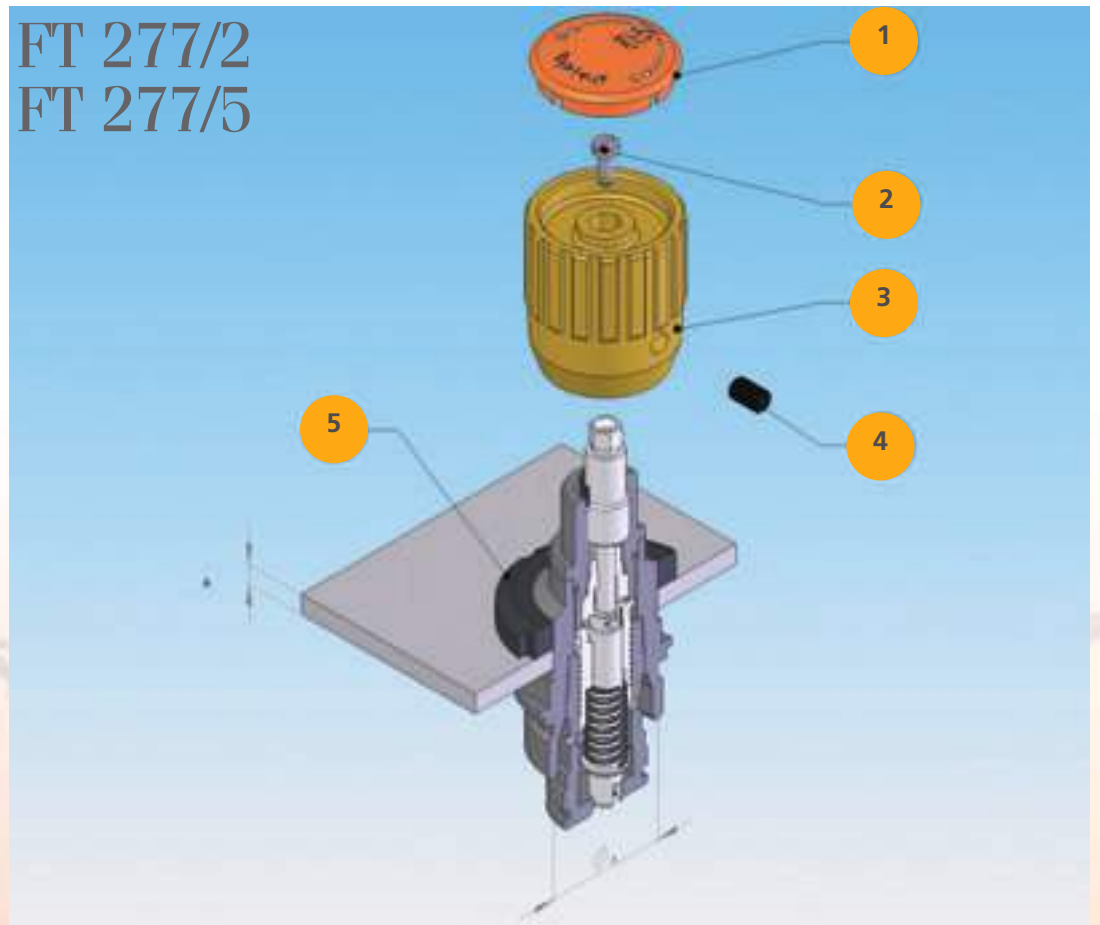
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WHOLE PAGE

PRINT

ESC

FT 277/2
FT 277/5



PANEL MOUNTING INSTRUCTION

PANEL MOUNTING

1°	UNSCREW LOCK SCREW (4)
2°	REMOVE COVER PLATE (1)
3°	UNSCREW SCREW (2)
4°	PULL OFF HANDLE (3)
5°	INSERT RING NUT (5), ON REQUEST IT IS SUPPLIED WITH THE VALVE

TYPE VALVE	PANEL THICKNESS A MAX	BORE FOR PANEL MOUNTING ØB
1 8	10	31
3 8	10	36
1 2	10	41
3 4	10	51



FT 277/2 - FT 277/5

HOME

PRESENTATION

VALVES INDEX

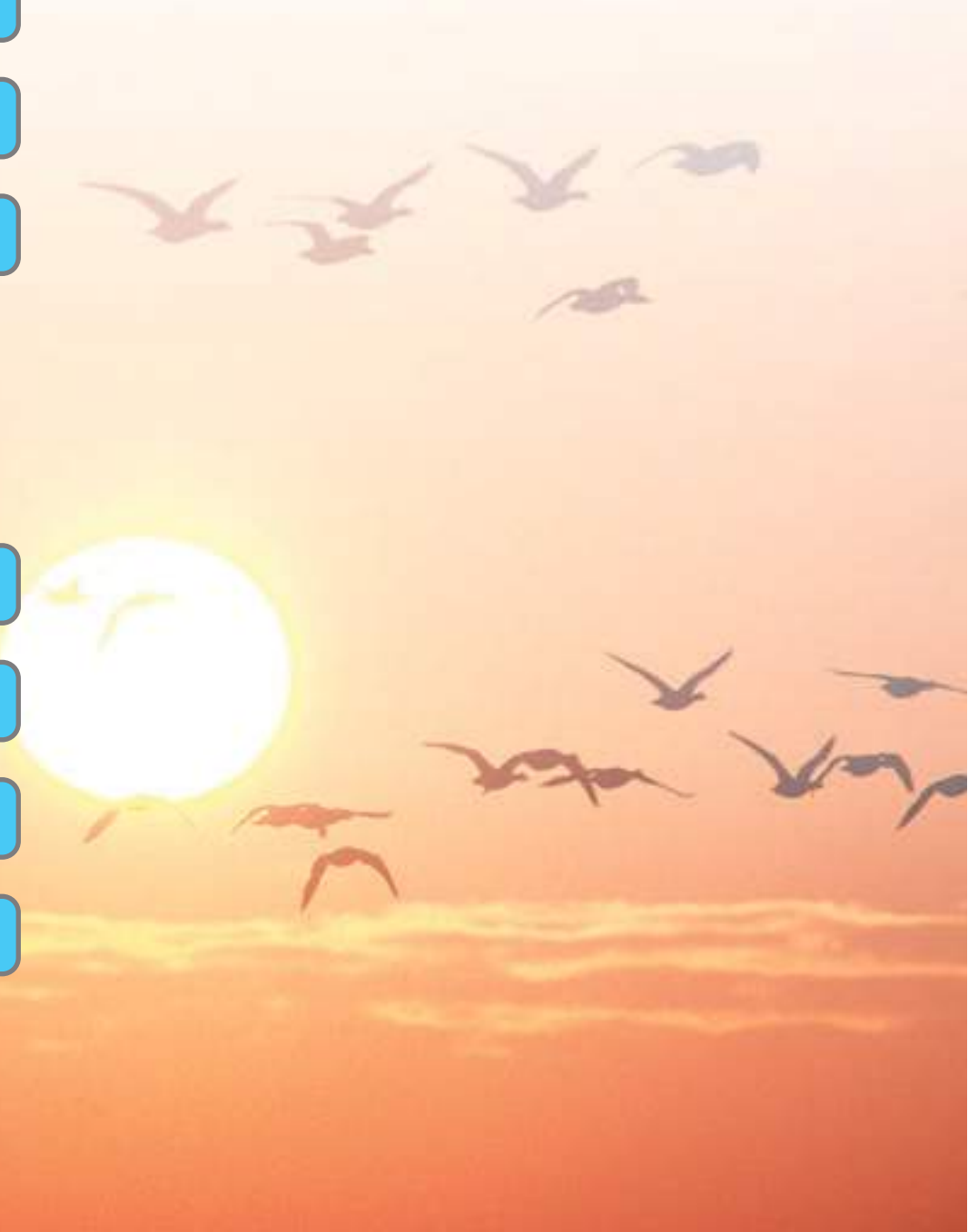


LAST SEEN

WHOLE PAGE

PRINT

ESC



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

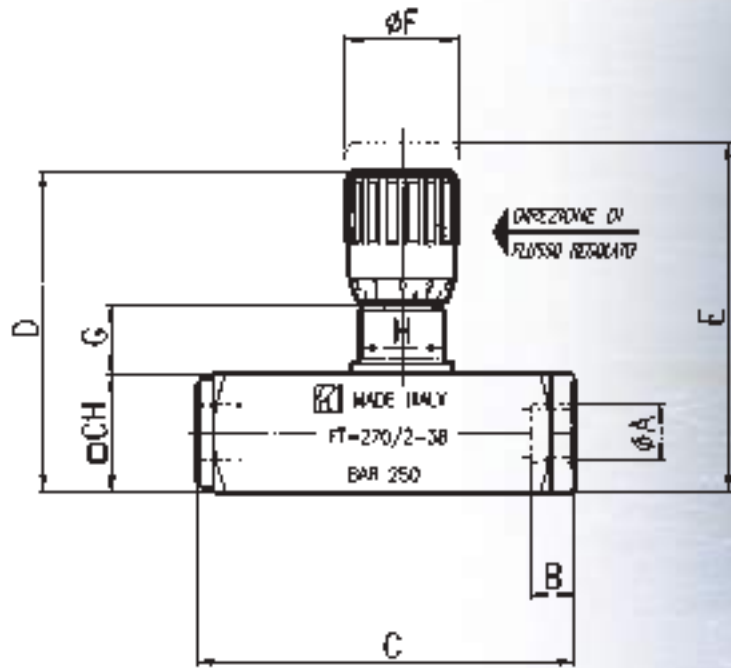
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ESC



FT 270/2



DIMENSIONS

TYPE	Ø A UNI 338	B	C	D	E	Ø F	G	H	CH	WEIGHT KG
1 4	1/4" G	12,5	94	81,5	88,5	27	15	M20x1	30	0,580
3 8	3/8" G	13	110,5	94,5	103	33	17	M25x1,5	35	0,940
1 2	1/2" G	15,5	137	112	122	38	18	M30x1,5	45	1,830
3 4	3/4" G	17	163	138	150	47	24	M40x1,5	55	3,350
1 0 0	1" G	21	214	175	192	58	32	M50x1,5	70	7,000

MATERIALS

BASE BODY	9 S MN Pb 28 - UNI 5105
CARTRIDGE BODY	38 Ni CR MO 4 UNI - EN 10083
COMPENSATING UNIT	NITRILE
O R	PTFE
ANTIEXTRUSION RING	GD - AL SI 12 - UNI 5706

EXAMPLE FOR ORDERING

		ACCESSOIRES ON REQUEST		
	CODE	TYPE	PANEL RING NUT	VITON SEAL
	FT 270/2	14	G	V
STAINLESS STEEL	FT 2270/2	14	G	V



HOME

PRESENTATION

VALVES INDEX

+

-

◀

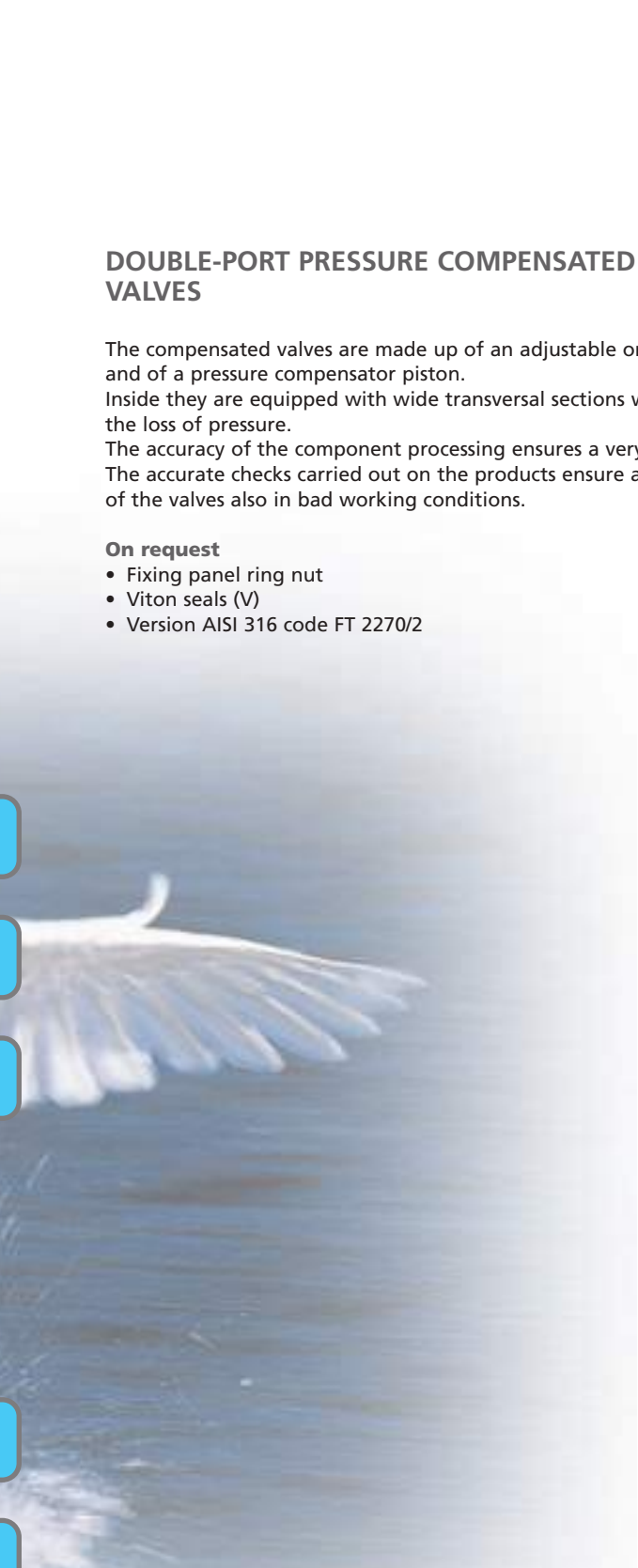
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LAST SEEN

WHOLE PAGE

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ESC



DOUBLE-PORT PRESSURE COMPENSATED CONTROL VALVES

The compensated valves are made up of an adjustable orifice and of a pressure compensator piston. Inside they are equipped with wide transversal sections which reduce the loss of pressure. The accuracy of the component processing ensures a very low hysteresis. The accurate checks carried out on the products ensure a good working of the valves also in bad working conditions.

- On request
- Fixing panel ring nut
 - Viton seals (V)
 - Version AISI 316 code FT 2270/2



TOGNELLA

FT 270/2

TECHNICAL DATA				
TYPE	MAX WORKING PRESSURE BAR	MIN. ΔP WORKING BAR	WORKING TEMPERATURE C°	FILTRATION GRADE μm ABSOLUTE
1 4	250	5	-20°/+70°	25
3 8	250	7	-20°/+70°	25
1 2	250	10	-20°/+70°	25
3 4	250	10	-20°/+70°	25
1 0 0	250	16	-20°/+70°	25

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

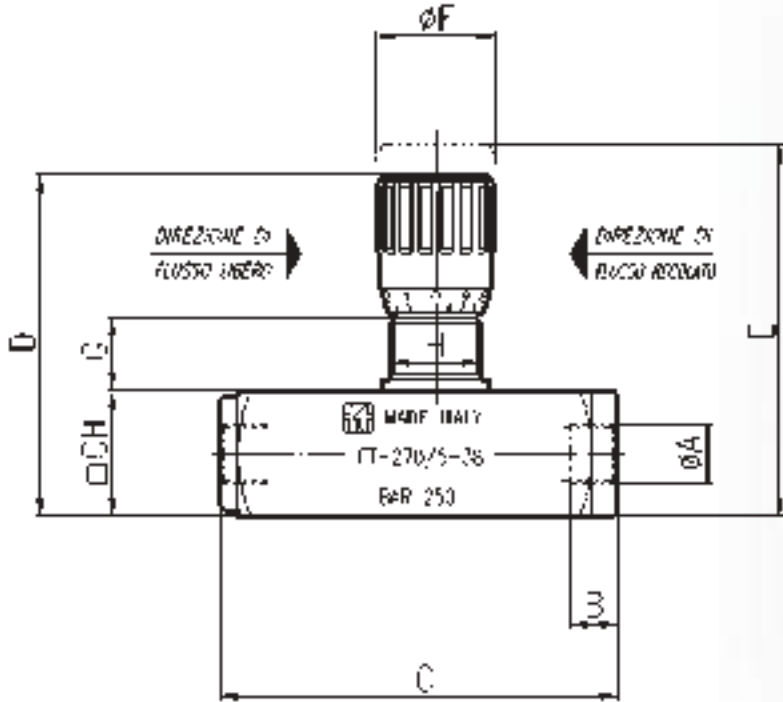
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PRINT

ESC



FT 270/5



DIMENSIONS

TYPE	Ø A UNI 338	B	C	D	E	Ø F	G	H	CH	WEIGHT KG
1 4	1/4" G	12,5	94	81,5	88,5	27	15	M20x1	30	0,580
3 8	3/8" G	13	110,5	94,5	103	33	17	M25x1,5	35	0,940
1 2	1/2" G	15,5	137	112	122	38	18	M30x1,5	45	1,830
3 4	3/4" G	17	163	138	150	47	24	M40x1,5	55	3,350
1 0 0	1" G	21	214	175	192	58	32	M50x1,5	70	7,000

MATERIALS

BASE BODY	9 S MN Pb 28 - UNI 5105
CARTRIDGE BODY	38 Ni CR MO 4 UNI - EN 10083
COMPENSATING UNIT	NITRILE
O R	PTFE
ANTIEXTRUSION RING	GD - AL SI 12 - UNI 5706

EXAMPLE FOR ORDERING

ACCESSORI A RICHIESTA				
	CODE	TYPE	PANEL RING NUT	VITON SEAL
	FT 270/5	14	G	V
STAINLESS STEEL	FT 2270/5	14	G	V

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

SINGLE-ACTING PRESSURE COMPENSATED
DOUBLE-PORT CONTROL VALVES

The pressure compensated valves are essentially composed of an adjustable orifice and of a pressure compensator. The check valves, realized through a valve poppet, reduce the number of the components in movement. Inside the base there are wide transverse sections which appreciably reduce the loss of pressure. The accuracy of the machining of the internal components ensures a very low hysteresis. The accurate checks carried out on the products ensure a good working of the valves also in bad working conditions.

- On request
- Complete with panel mounting ring nut
 - Viton (V) seals
 - Version AISI 316 code FT 2270/5



FT 270/5

TECHNICAL DATA				
TYPE	MAX WORKING PRESSURE BAR	MIN. ΔP WORKING BAR	WORKING TEMPERATURE °C	FILTRATION GRADE μm ABSOLUTE
1 4	250	5	-20°/+70°	25
3 8	250	7	-20°/+70°	25
1 2	250	10	-20°/+70°	25
3 4	250	10	-20°/+70°	25
1 0 0	250	16	-20°/+70°	25

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

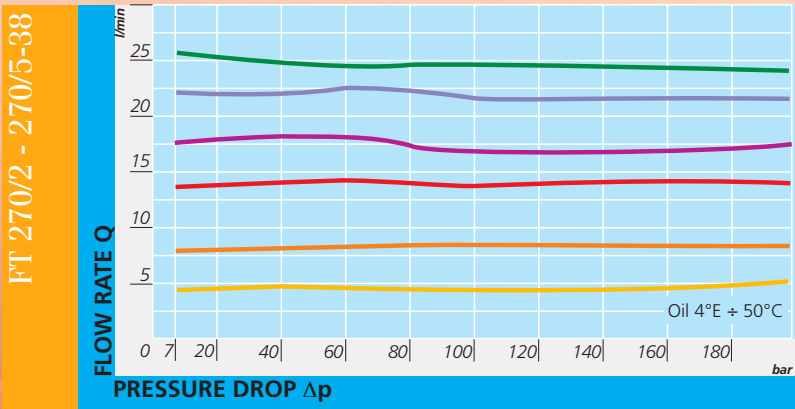
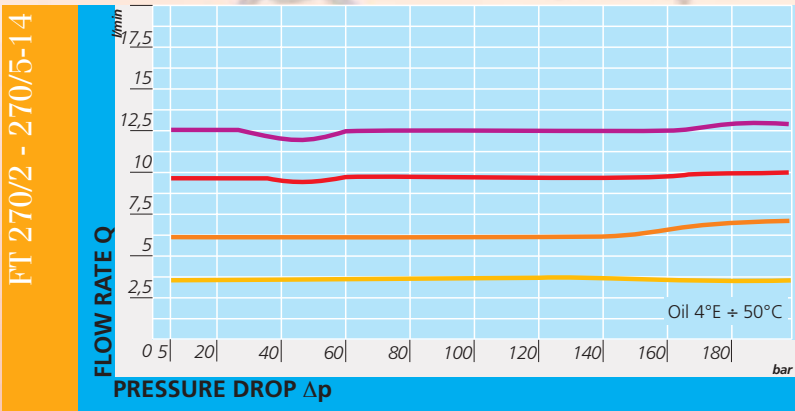
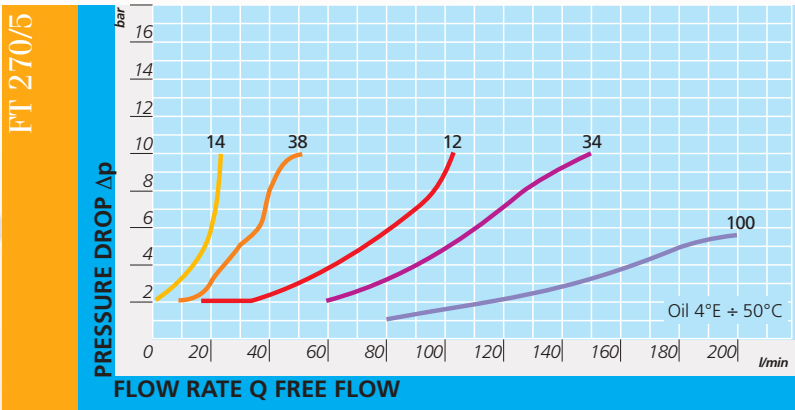
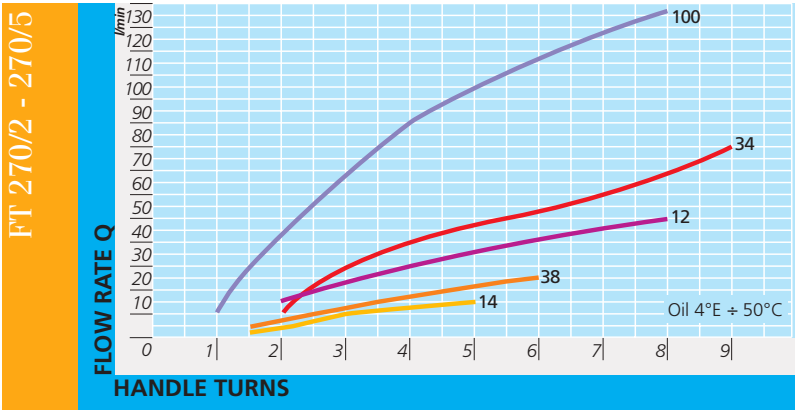
WHOLE PAGE

PRINT

ESC



FT 270/2 - 270/5



HOME

PRESENTATION

VALVES INDEX

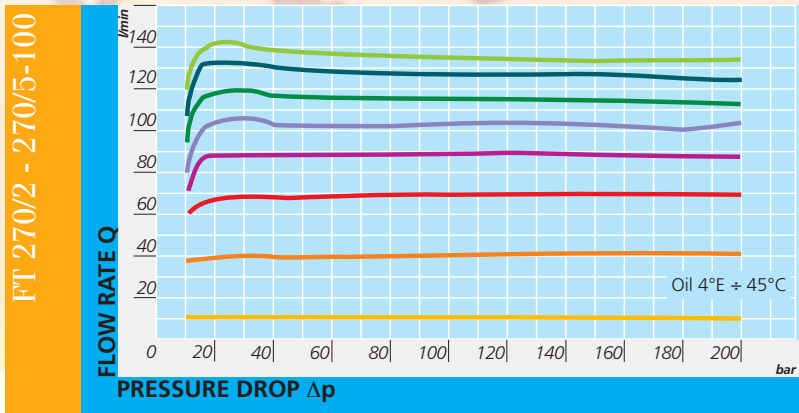
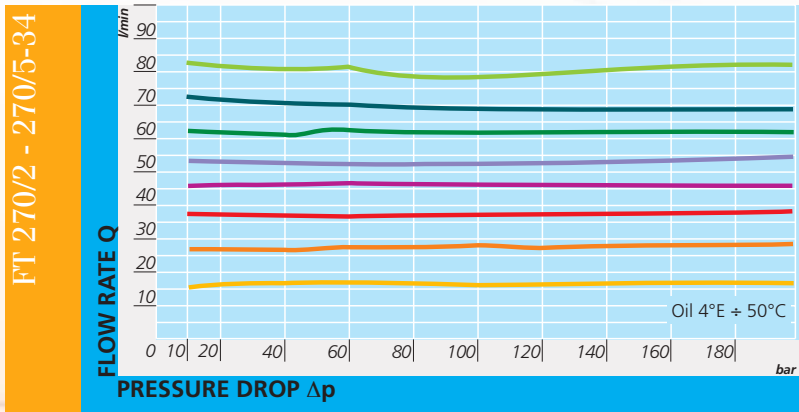
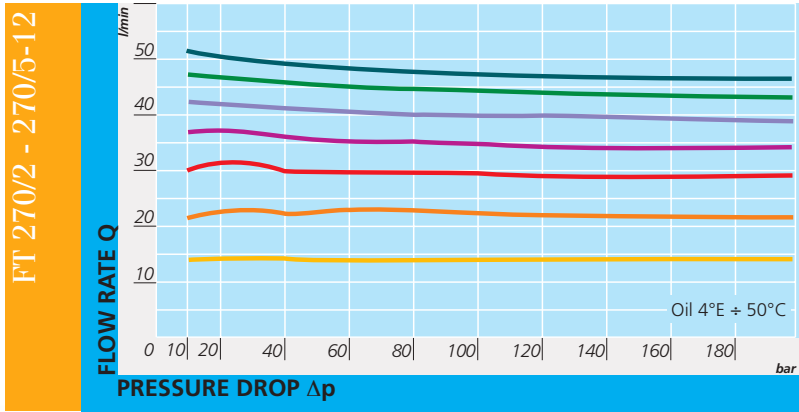


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ESC



FT 270/2 - 270/5



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



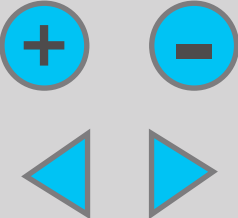


CARTRIDGE MOUNTED SINGLE-ACTING AND SHUT-OFF METRIC-UNF-CYLINDRICAL CONTROL VALVES

HOME

PRESENTATION

VALVES INDEX



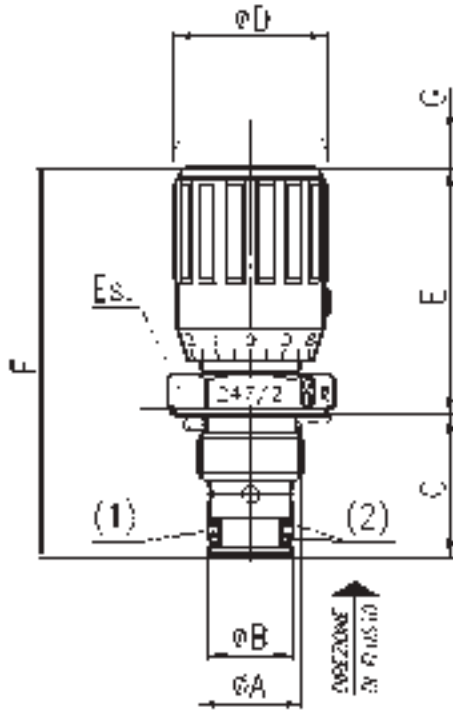
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ESC

FT 247/2
Cartridge mounted double-acting microfine control valves
FT 264/2
Cartridge mounted double-acting control valves (cylindrical thread)
FT 267/2
Cartridge mounted double-acting control valves
FT 267/5
Cartridge mounted single-acting control valves
FT 267/6
Cartridge mounted single-acting valves
FT 287/2
Cartridge mounted pressure compensated flow control valves
FT 297/2
Cartridge mounted pressure compensated microfine flow control valves
FT 265/2 UNF
High flow rate threaded cartridge mounted double-acting control valves
FT 266/2 UNF
Cartridge mounted double-acting control valves
FT 266/5 UNF
Cartridge mounted single-acting control valves
FT 266/6 UNF
Cartridge mounted single-acting valves
FT 268/2 UNF
Two-way pressure compensated control valves- low friction
FT 243/2
Double-acting braking valves
FT 243/5
Single-acting braking valves
FT 243/5-S
Single-acting braking valves with breather



DIMENSIONS

TYPE	ØA UNI 4534	Ø B	C	Ø D	E	F	G	Es.	WEIGHT KG
1 8	M15x1	12	20,5	22	34,5	55	8	22	0,069

MATERIALS

BODY	9 S MN Pb 28 - UNI 5105
NEEDLE	AISI 303
Ø R	NITRILE
ANTIEXTRUSION RING	PTFE
KNØB	GD AISI 12 - UNI 5706

EXAMPLE FOR ORDERING

	CODE	TYPE	VITON SEAL
	FT 247/2	18	V
STAINLESS STEEL	FT 2247/2	18	V

SEAL KIT ON THE SEATING

TYPE	1 (Ø R)	2 (BK)
18	108	NOT STANDARD 267/2.022.00.1-18

SEAL KIT ON THE NEEDLE

TYPE	Ø R	BK
18	2018	2018

HOME

PRESENTATION

VALVES INDEX

+

-

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▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

THREADED CARTRIDGE MOUNTED MICROFINE CONTROL VALVES

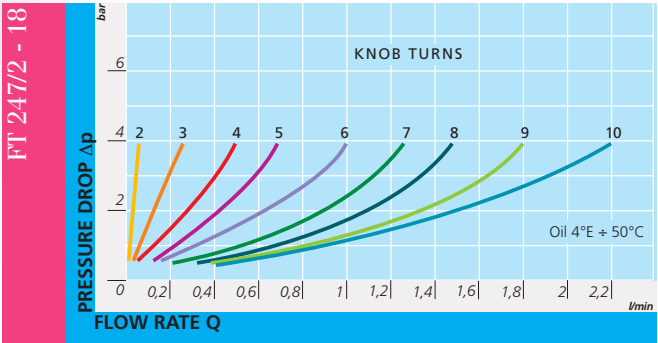
Appreciated for their little sizes, suitable for their placing in control blocks. They have maintained the other characteristics of the series FT 257; they ensure:

- efficient metallic sealing
- mechanical secure against accidental needle withdrawal

- On request
- Complete with Viton seals (V)
 - Version in AISI 316 code FT 2247/2
 - Knob in ABS (mp)

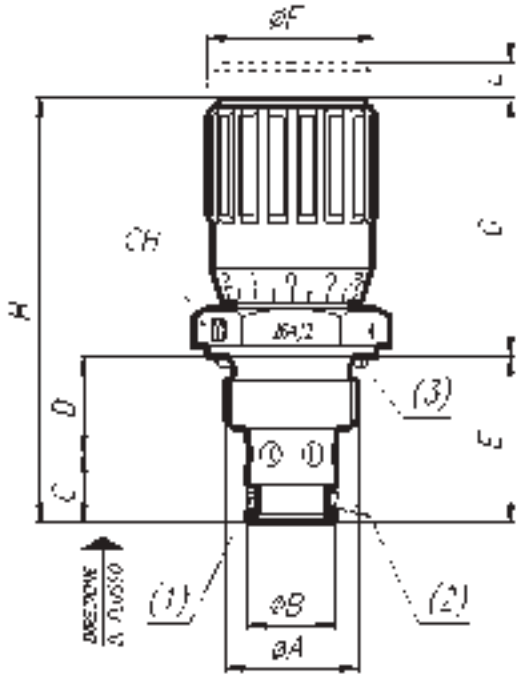


FT 247/2



TECHNICAL DATA

Tipo	MAX WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	FLOW SECTION CM²	WORKING TEMPERATURE °C	FILTRATION GRADE μM ABSOLUTE
18	320	1300	0,0314	-20°/+100°	25



DIMENSIONS

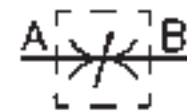
TYPE	ØA UNI 4534	ØB	C	D	E	ØF	G	H	L	CH	(3)
18	1/2" GAS	14	12,5	14	26,5	22	36,8	63,3	5,6	27	ORM 0180-25
14	1/2" GAS	14	11	15,5	26,5	27	40,8	67,3	4,9	27	ORM 0180-25
38	1/2" GAS	16	13	17,5	30,5	33	47	77,5	8,3	27	ORM 0180-25
12	3/4" GAS	19	15,5	24,5	40	38	54,6	94,6	9,9	32	ORM 0250-25
34	1" GAS	27	18	26	44	47	64,6	108,6	12	41	ORM 0300-30

MATERIALS

BODY	9 S MN Pb 28 - UNI 5105
NEEDLE	1 C 40 - UNI 8373
OR	NITRILE
ANTIEXTRUSION RING	PTFE
KNOB	GD AL Si 12 - UNI 5706
KNOB (MP)	ABS

EXAMPLE FOR ORDERING

	CODE	TYPE	VITON SEAL	PLASTIC KNOB
STEEL	FT 264/2	38	V	MP
STAINLESS STEEL	FT 2264/2	12	-	MP



THREADED CARTRIDGE MOUNTED DOUBLE-ACTING
 CONTROL VALVES

They allow for regulation of flow in both directions.

- On request
- Version AISI 316 Code FT 2264/2
 - Complete with Viton seals (V)
 - Knob in ABS (mp)



FT 264/2

TECHNICAL DATA

Tipo	Type flow section cm²	Max. working pressure bar	Min. bursting pressure bar	Working temperature °C	Filtration grade µm absolute
18	0,12	320	1300	-20°/+100°	25
14	0,19	320	1300	-20°/+100°	25
38	0,39	320	1300	-20°/+100°	25
12	0,68	320	1300	-20°/+100°	25
34	1,13	320	1300	-20°/+100°	25

SEAL KIT ON THE NEEDLE

Type	OR	BK
18	2018	2018
14	2021	2021
38	108	108
12	2043	2043
34	115	115

SEAL KIT ON THE SEATING

Type	(1) OR	(2) BK
18	2043	BK 14 (FT)
14	2043	BK 14 (FT)
38	2050	BK 38 (FT)
12	2062	BK 12 (FT)
34	130	BK 34 (FT)

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



FT 264/2

HOME

PRESENTATION

VALVES INDEX

+

-



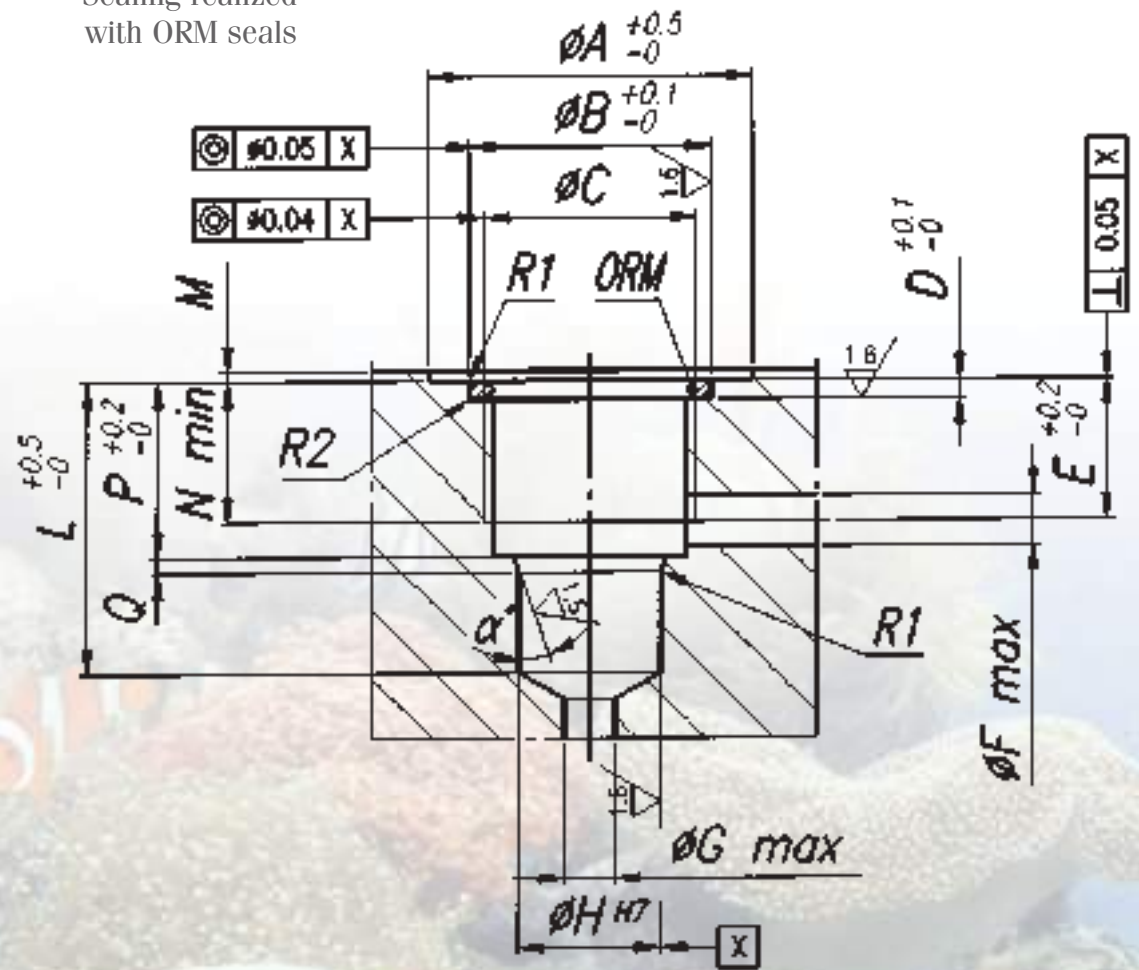
LAST SEEN

WHOLE PAGE

PRINT

ESC

Sealing realized
with ORM seals



General machining
General tolerance:

$\sqrt{3.2}$
linears $\pm 0,1$
angular $\pm 1^\circ$

SEATING MACHINING DRAWINGS FOR GAS THREADED VALVES



FT 264/2

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



TYPE	ORM	∅A	∅B	∅C	D	E	∅F	∅G	∅H	L	M	N	P	Q	R1	R2	α°
1 8	0180-25	32	24	1/2" GAS	1,9	14	5	5	14	29	1	14	17,5	1,5	0,1	0,75	70°
1 4	0180-25	32	24	1/2" GAS	1,9	14	5	5	14	29	1	14	17,5	1,5	0,1	0,75	70°
3 8	0180-25	32	24	1/2" GAS	1,9	16,5	8	8	16	33	1	14	20,5	1,5	0,1	0,75	70°
1 2	0250-25	37	30	3/4" GAS	1,9	24	10	10	19	42	1	21	29	1,5	0,1	0,75	70°
3 4	0300-30	47	36	1" GAS	2,4	24,5	12	12	27	46	1	21	30	1,5	0,1	0,75	70°

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

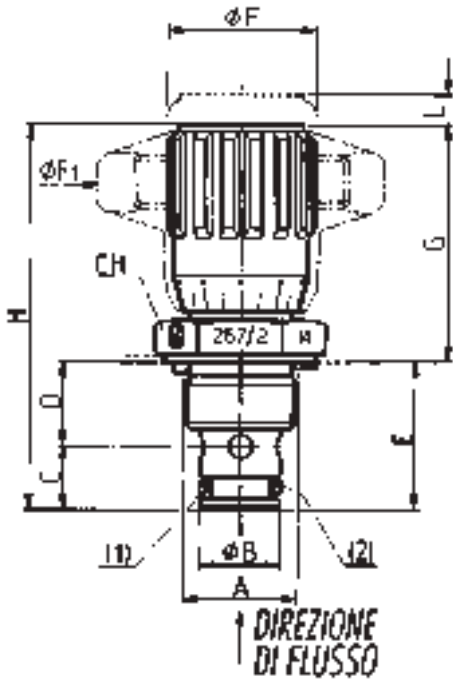
WHOLE PAGE

PRINT

ESC



FT 267/2



DIMENSIONS

TYPE	A UNI4534	ØB	C	D	E	ØF	ØF1	G	H	L	CH	WEIGHT KG
18	M15x1	12	9,3	11,2	20,5	22	40	35	55,5	5	22	0,064
14	M20x1,5	14	11	15,5	26,5	27	50	42,5	68,5	7	27	0,125
38	M20x1,5	16	13	17,5	30,5	33	70	48,5	78,5	9	27	0,180
12	M27x2	19	15,5	24,5	40	38	80	56	96	10,5	32	0,305
34	M33x2	27	18	26	44	47	100	63,5	109	13	41	0,580
100	M42x2	35	22	30,5	52,5	58	120	82	134,5	20	50	1,185

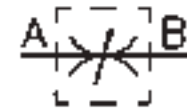
MATERIALS

BODY	9 S MN Pb 28 - UNI 5105
NEEDLE	1 C 40 - UNI 8373
OR	NITRILE
ANTIEXTRUSION RING	PTFE
KNOB	GD AL Si 12 - UNI 5706
KNOB (MP)	ABS

EXAMPLE FOR ORDERING

	CODE	TYPE	VITON SEAL	PLASTIC KNOB
STEEL	FT 267/2	38	V	MP
STAINLESS STEEL	FT 2267/2	12	-	MP





THREADED CARTRIDGE MOUNTED DOUBLE-ACTING
 CONTROL VALVES

They allow for regulation of flow in both directions.

- On request
- Version AISI 316 Code FT 2267/2
 - Complete with Viton seals (V)
 - Knob in ABS (mp)



FT 267/2

TECHNICAL DATA

Tipo	Type flow section cm²	Max. working pressure bar	Min. bursting pressure bar	Working temperature °C	Filtration grade µm absolute
18	0,12	320	1300	-20°/+100°	25
14	0,19	320	1300	-20°/+100°	25
38	0,39	320	1300	-20°/+100°	25
12	0,68	320	1300	-20°/+100°	25
34	1,13	320	1300	-20°/+100°	25
100	2,09	320	1300	-20°/+100°	25

SEAL KIT ON THE NEEDLE

Type	OR	BK
18	2018	2018
14	2021	2021
38	108	108
12	2043	2043
34	115	115
100	123	123

SEAL KIT ON THE SEATING

Type	1 (OR)	2 (BK)
18	108	267/2-022.00.1-18
14	2043	267/2-022.00.1-14
38	2050	267/2-022.00.1-38
12	2062	267/2-022.00.1-12
34	130	267/2-022.00.1-34
100	3118	267/5-022.00.1-34

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

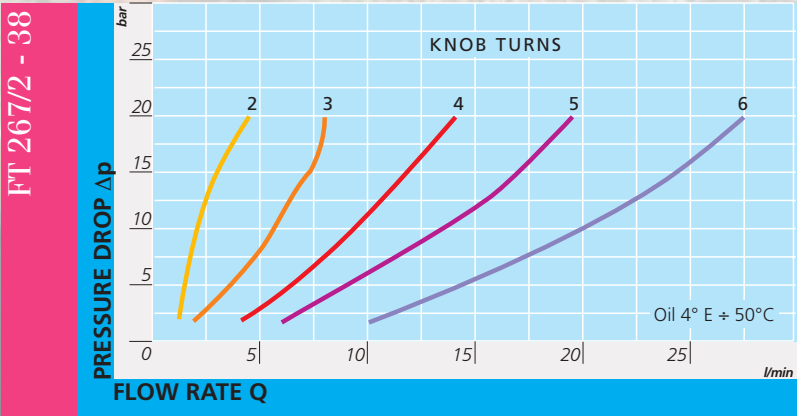
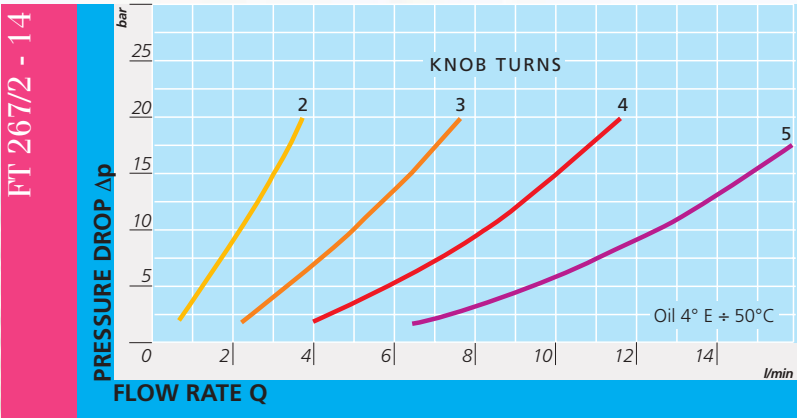
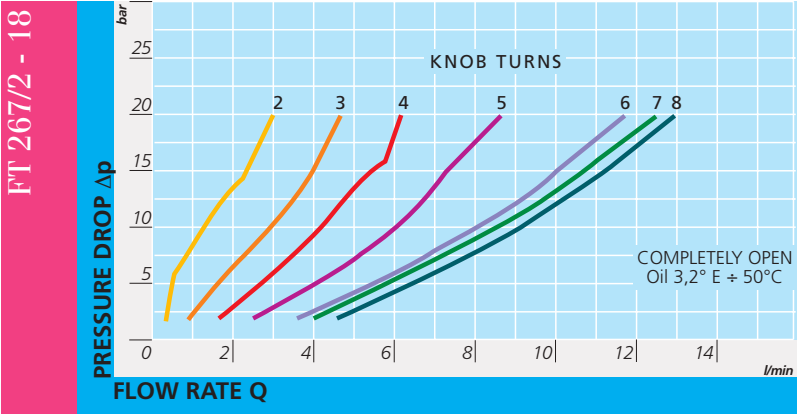
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PRINT

ESC



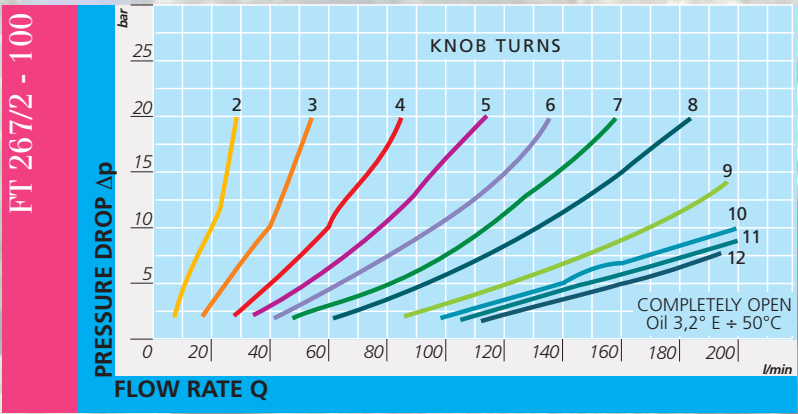
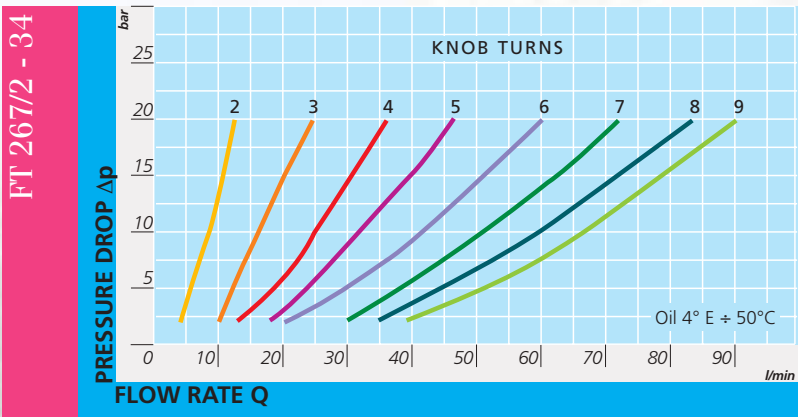
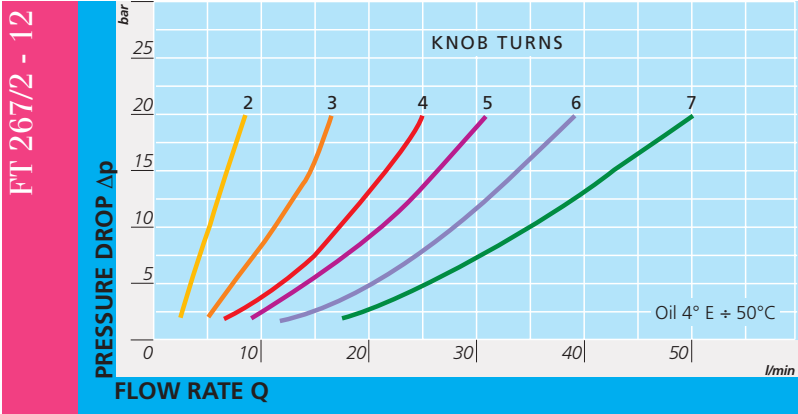
FT 267/2



FLOW RATE CURVES



FT 267/2



HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

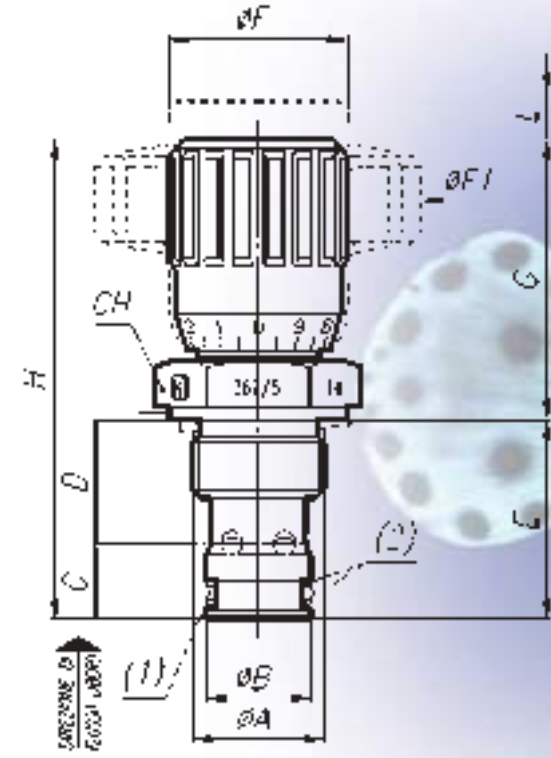
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PRINT

ESC



FT 267/5



DIMENSIONS

TYPE	Ø A UNI 4534	Ø B	C	D	E	Ø F	Ø F1	G	H	L	CH	WEIGHT KG
14	M20x1,5	16	11,5	19	30,5	27	50	43	73,5	4	27	0,130
38	M27x2	19	14	26	40	33	49	52,5	92,5	6	32	0,250
12	M33x2	27	17	27,5	44,5	38	60	60	104,5	7	41	0,340
34	M42x2	35	19,5	33	52,5	47	70	69,5	122	8	50	0,620
100	M52x2	45	22,5	42	64,5	58	120	85	149,5	12	60	1,632

MATERIALS

BODY	9 S MN PB 23 - UNI 5105
NEEDLE	38 NI CR MO4 - UNI EN 10083
OR	NITRILE
ANTIEXTRUSION RINGS	PTFE
CHECK VALVE	38 NI CR MO4 - UNI EN 10083
SPRING	C72 - UNI 3545
KNOB	GD AL SI 12 - UNI 5706
KNOB (MP)	ABS

EXAMPLE FOR ORDERING

	CODE	TYPE	VITON SEAL	PLASTIC KNOB
STEEL	FT 267/5	38	V	MP
STAINLESS STEEL	FT 2267/5	12	-	MP



HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

CARTRIDGE MOUNTED SINGLE-ACTING CONTROL VALVES

They control and, in case, shut-off the flow in one direction and allow the full free flow in the opposite direction.

- Check valve calibrated at 0,35 bar

- On request**
- Version in AISI 316 code FT 2267/5
 - Complete with Viton seals (V)
 - Knob in ABS (mp)



FT 267/5

TECHNICAL DATA

TYPE	TYPE FLOW SECTION CM²	MAX. WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE µM ABSOLUTE
14	0,07	320	1300	-20°/+100°	25
38	0,15	320	1300	-20°/+100°	25
12	0,37	320	1300	-20°/+100°	25
34	1,56	320	1300	-20°/+100°	25
100	3,80	320	1300	-20°/+100°	25

SEAL KIT ON THE NEEDLE

TYPE	OR	ANTIEXTRUSION RINGS
14	2021	200-801
38	2018	2018
12	106	106
34	108	108
100	112	112

SEAL KIT ON THE SEATING

TYPE	1 (OR)	(2) BK SPECIAL
14	2050	267/2.022.00.1-38
38	2062	267/2.022.00.1-12
12	130	267/2.022.00.1-34
34	3118	267/5.022.00.1-34
100	3156	3156



FT 267/5

HOME

PRESENTATION

VALVES INDEX

+

-



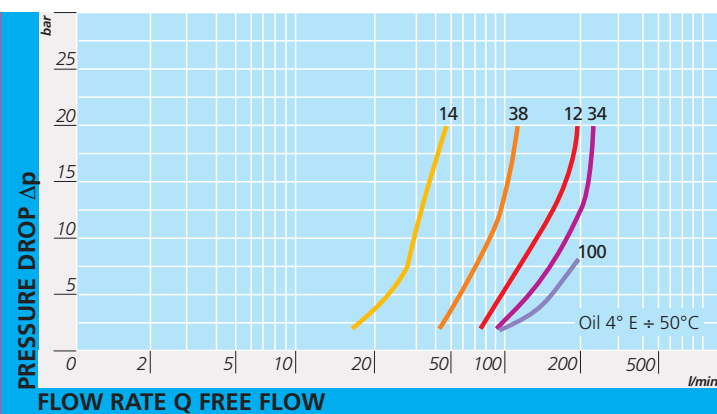
LAST SEEN

WHOLE PAGE

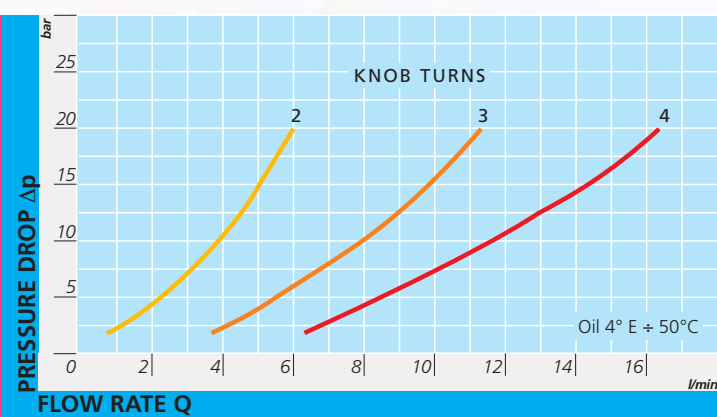
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ESC

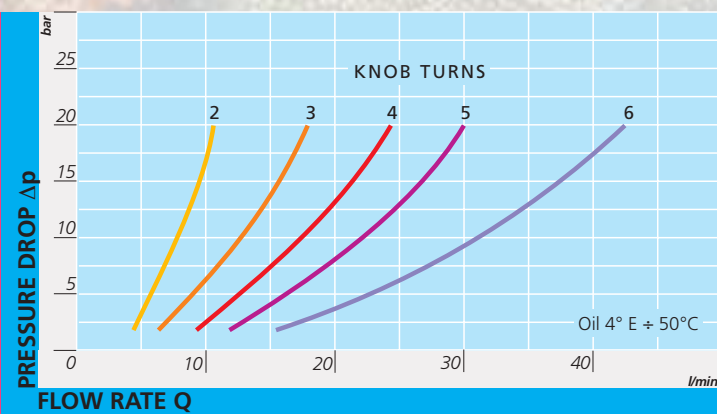
FT 267/5



FT 267/5 - 14



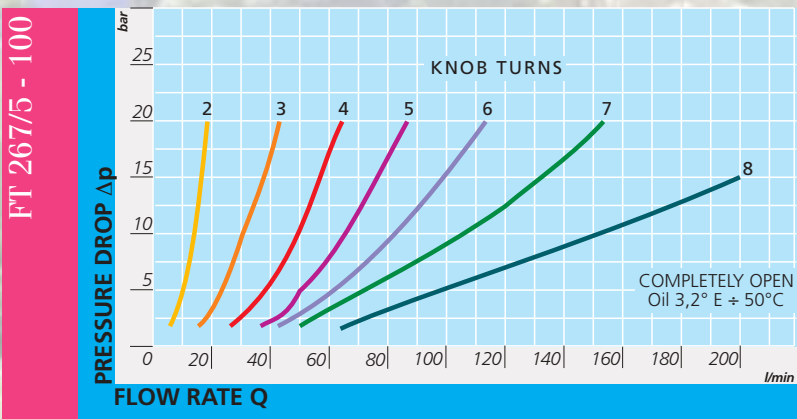
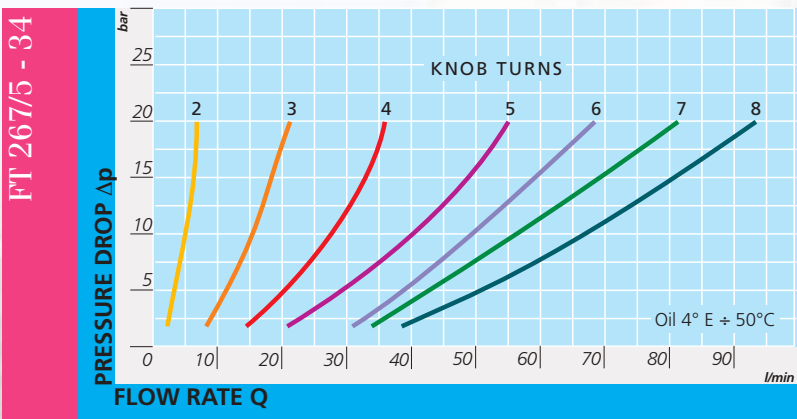
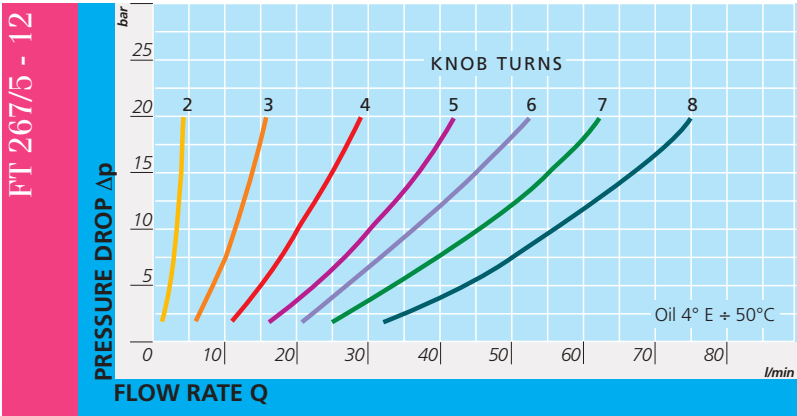
FT 267/5 - 38



FLOW RATE CURVES



FT 267/5



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

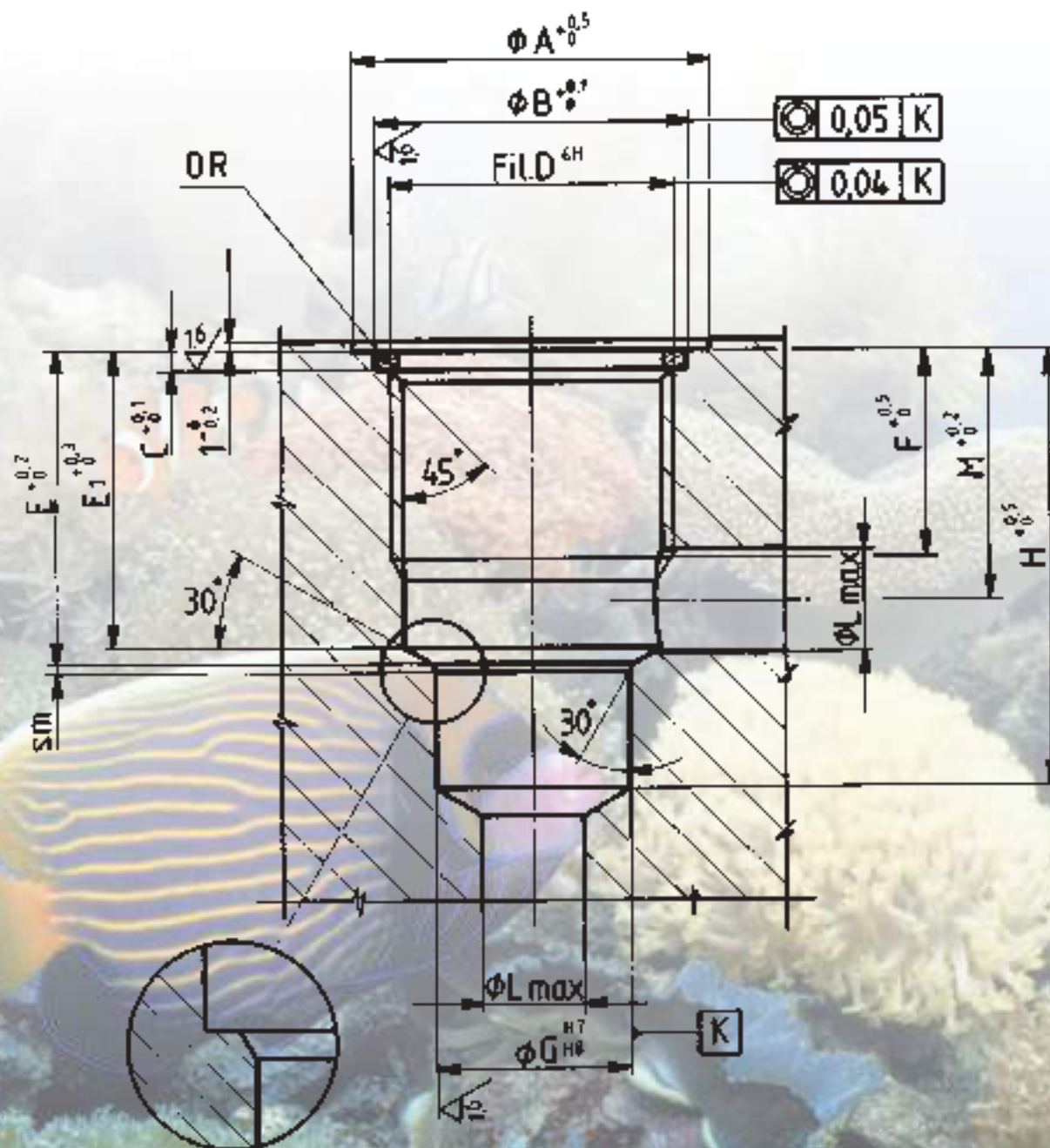
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ESC



FT 247/2 - FT 267/2 - FT 267/5

Sealing realized
with OR seals
on flat seating



HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

WHOLE PAGE

PRINT

ESC

SEATING MACHINING DRAWINGS FOR THREADED CARTRIDGE MOUNTED VALVES



FT 247/2 - FT 267/2 - FT 267/5

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

FLAT SEATING FOR OR - FT 247/2 - 267/2

TYPE	Ø A	Ø B	C	^D UNI 4534	E	E 1	F	Ø G	H	Ø L	M	S M	Ø R
1 8	23	19	2	M15x1	14	13	11	12	21,5	4	11,5	0,5	3056
1 4	28	24	2	M20x1,5	17,5	16,5	13,5	14	28,5	5	14,5	1	3075
3 8	28	24	2	M20x1,5	21	20,5	13,5	16	33,5	8	16,2	1,2	3075
1 2	34	30	2	M27x2	30	28,5	20	19	43	10	24	1,2	3100
3 4	43	36	2	M33x2	32,5	32	20	27	47,5	13	25	1,2	3125
1 0 0	60	45	2	M42x2	38,5	37	23,5	35	57	16	30,5	1,5	3162

FLAT SEATING FOR OR - FT 267/5

TYPE	Ø A	Ø B	C	^D UNI 4534	E	E 1	F	Ø G	H	Ø L	M	S M	Ø R
1 4	28	24	2	M20x1,5	21	20,5	13,5	16	33,5	8	16,2	1	3075
3 8	34	30	2	M27x2	30	28,5	20	19	43	10	24	1,2	3100
1 2	43	36	2	M33x2	32,5	32	20	27	47,5	12	25,5	1,2	3125
3 4	60	45	2	M42x2	38,5	37	23,5	35	57	16	30,5	1,5	3162
1 0 0	61	55	2,2	M52x2	46	45	27	45	67,5	20	34,5	1,5	3200



Sealing realized
with Bonded seal

FT 247/2 - FT 267/2 - FT 267/5

HOME

PRESENTATION

VALVES INDEX

+

-

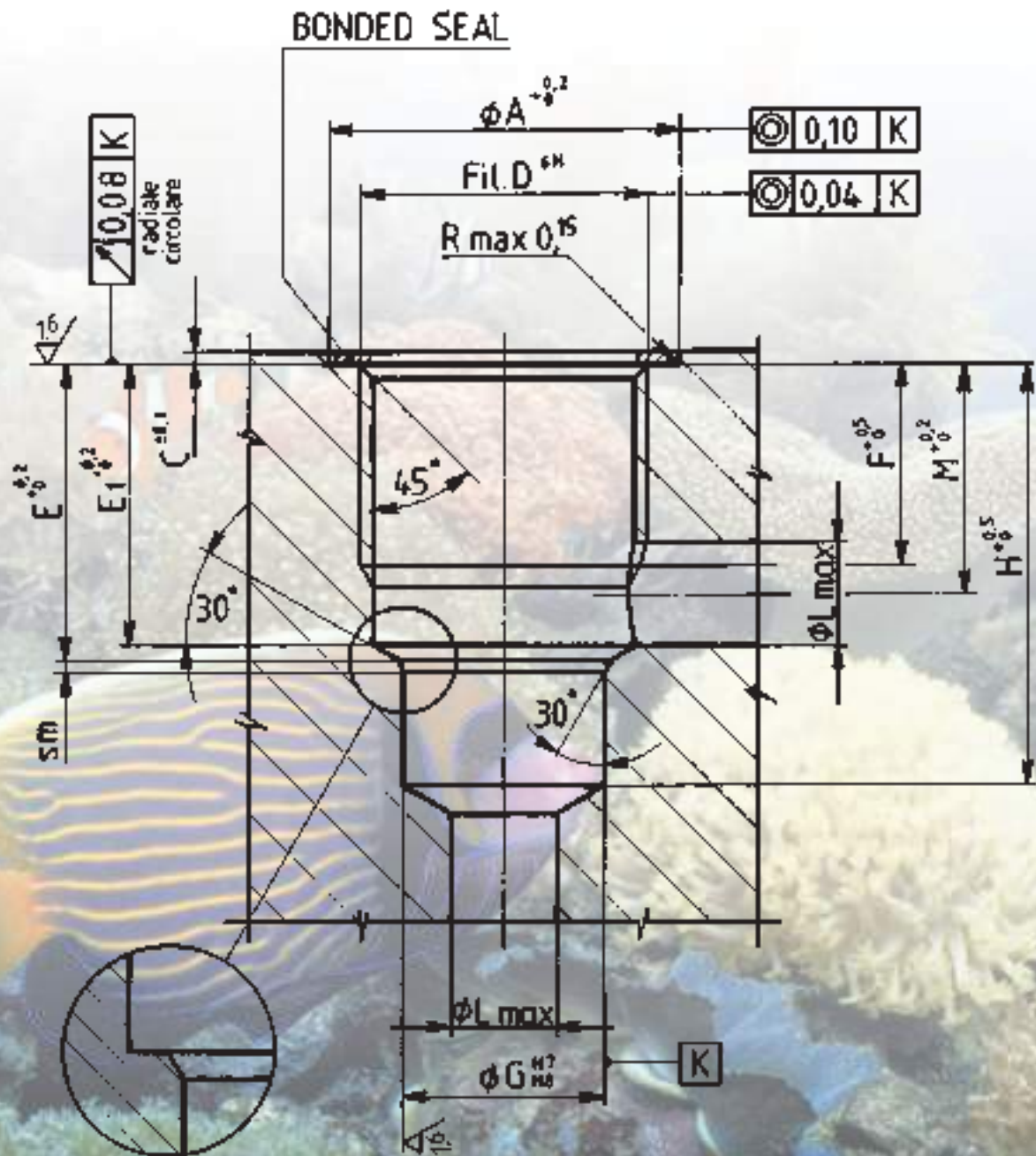


LAST SEEN

WHOLE PAGE

PRINT

ESC



SEATING MACHINING DRAWINGS FOR THREADED CARTRIDGE MOUNTED VALVES



FT 247/2 - FT 267/2 - FT 267/5

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

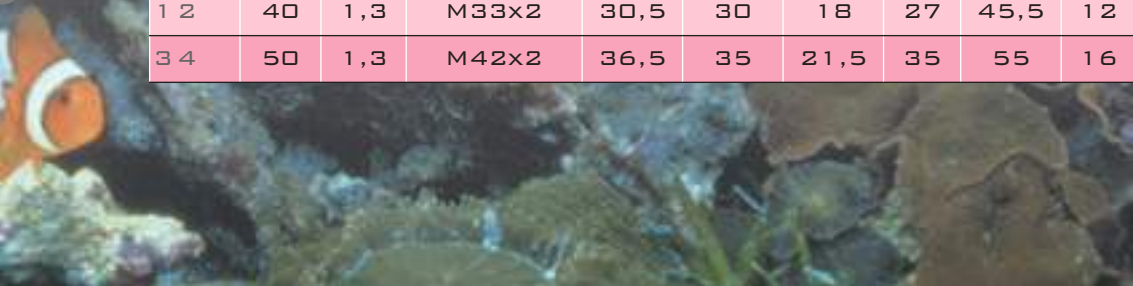


SEATING FOR BONDED SEAL - FT 247/2 - 267/2

TYPE	∅A	C	D UNI 4534	E	E 1	F	∅G	H	∅L	M	SM	BONDED SEAL
1 8	23	1	M15x1	13	12	9	12	20	4	10,3	0,5	400-512
1 4	27	1	M20x1,5	16,5	15,5	12	14	27	5	13,3	1	400-513
3 8	27	1	M20x1,5	20	19,5	12	16	32	8	15,2	1,2	400-513
1 2	33	1,3	M27x2	28	26,5	18	19	41	10	22	1,2	400-520
3 4	40	1,3	M33x2	30,5	30	18	27	45,5	13	23	1,2	400-515
1 0 0	50	1,3	M42x2	36,5	35	21,5	35	55	16	28,5	1,5	400-516

SEATING FOR BONDED SEAL - FT 267/5

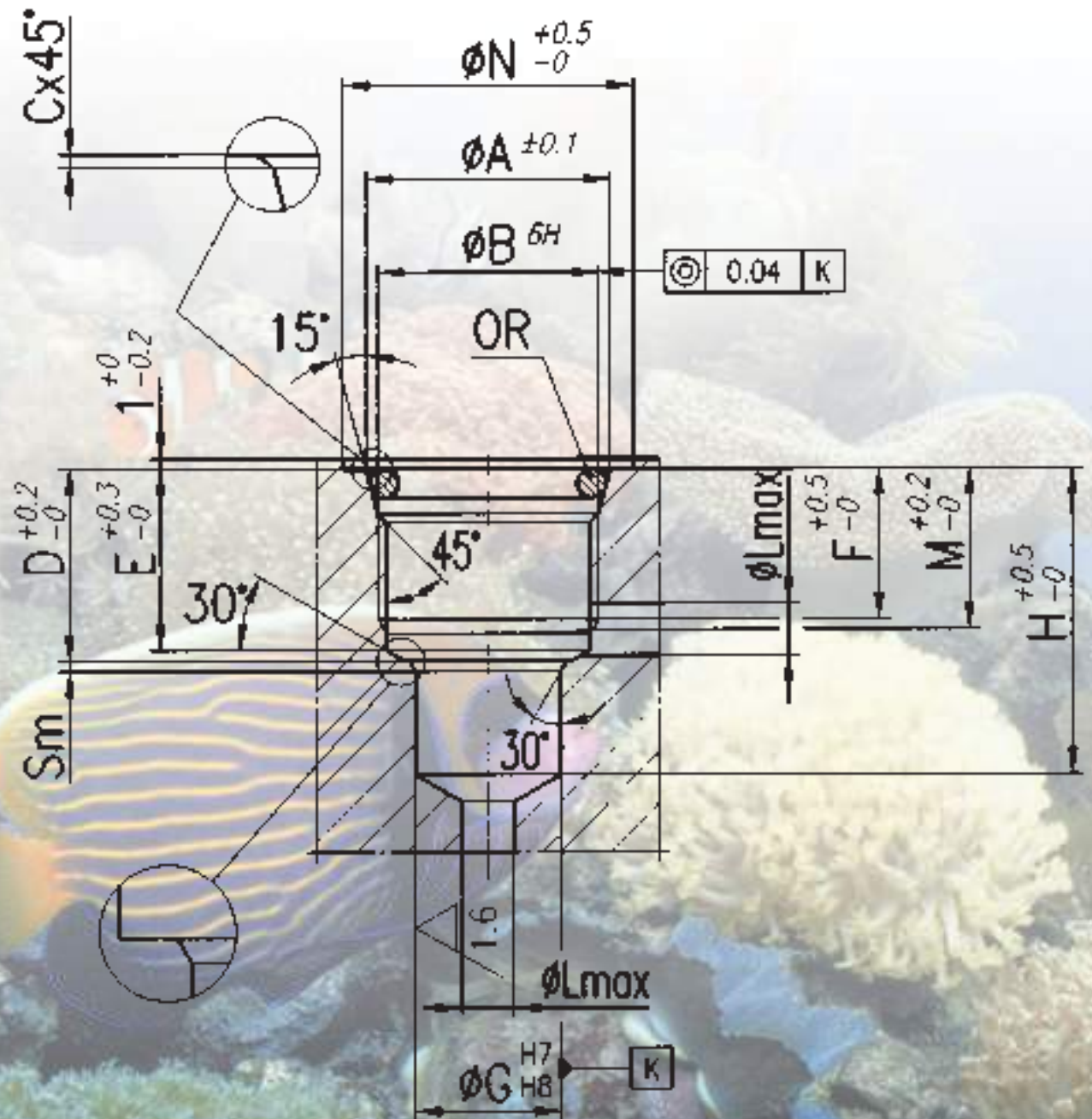
TYPE	∅A	C	D UNI 4534	E	E 1	F	∅G	H	∅L	M	SM	BONDED SEAL
1 4	27	1	M20x1,5	20	19,5	12	16	32	8	15,2	1	400-513
3 8	33	1,3	M27x2	28	26,5	18	19	41	10	22	1,2	400-520
1 2	40	1,3	M33x2	30,5	30	18	27	45,5	12	23	1,2	400-515
3 4	50	1,3	M42x2	36,5	35	21,5	35	55	16	28,5	1,5	400-516





FT 247/2 - FT 267/2 - FT 267/5

Sealing realized
with OR seals
on conical seating



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

SEATING MACHINING DRAWINGS FOR THREADED CARTRIDGE MOUNTED VALVES



FT 247/2 - FT 267/2 - FT 267/5

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

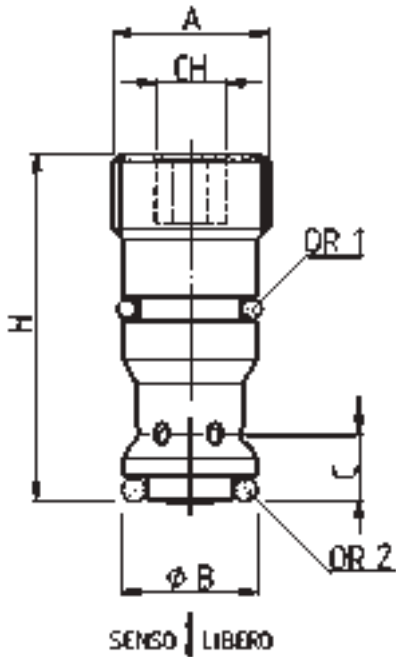


CONICAL SEATING FOR OR - FT 247/2 - FT 267/2

TYPE	∅ A	∅ B UNI 4534	C	D	E	F	∅ G	H	∅ L	M	∅ N	SM	OR
1 8	16,5	M15x1	0,25	14	13	11	12	21,5	4	11,5	23	0,5	2050
1 4	22,3	M20x1,5	0,25	17,5	16,5	13,5	14	28,5	5	14,5	28	1	3068
3 8	22,3	M20x1,5	0,25	21	20,5	13,5	16	33,5	8	16,2	28	1,2	3068
1 2	29,1	M27x2	0,3	30	28,5	20	19	43	10	24	34	1,2	132
3 4	36	M33x2	0,3	32,5	32	20	27	47,5	13	24	43	1,2	4112
1 0 0	45	M42x2	0,3	38,5	37	23,5	35	57	16	29	60	1,5	4150

CONICAL SEATING FOR OR - FT 267/5

TYPE	∅ A	∅ B UNI 4534	C	D	E	F	∅ G	H	∅ L	M	∅ N	SM	OR
1 4	22,3	M20x1,5	0,25	21	20,5	13,5	16	33,5	8	16,2	28	1,2	3068
3 8	29,1	M27x2	0,3	30	28,5	20	19	43	10	24	34	1,2	132
1 2	36	M33x2	0,3	32,5	32	20	27	47,5	13	25	43	1,2	4112
3 4	45	M42x2	0,3	38,5	37	23,5	35	57	16	29	60	1,5	4150
1 0 0	55	M52x2	0,3	46	45	27	45	67,5	20	34,5	61	1,5	4187



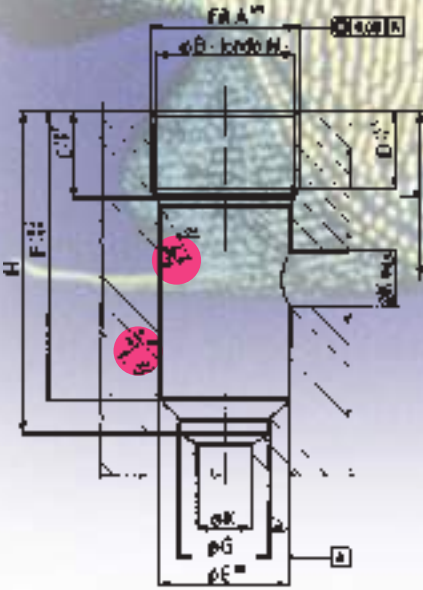
MATERIALS

BODY	9 S MN PB 23 - UNI 5105
CHECK VALVE	38 NI CR MO4 - UNI EN 10083
SPRING	C72 - UNI 3545
SCREW PLUG	9 S MN PB 23 - UNI 5105

EXAMPLE FOR ORDERING

	CODE	TYPE	SEAL VITON
STEEL	FT 267/6	14	V
STAINLESS STEEL	FT 2267/6	12	-

SEATING
MACHINING
DRAWING
FOR VALVE



DIMENSIONS

TYPE	A UNI4534	Ø B	C	H	CH	OR 1	OR 2	WEIGHT KG
1 4	M22x1,5	19	9,5	49	8	3056	1 15	0,80
3 8	M27x2	24	10,5	56	10	3075	3068	0,140
1 2	M33x2	29	13	67	10	3093	3087	0,265
3 4	M42x2	38	17	80,5	12	4125	4112	0,545

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

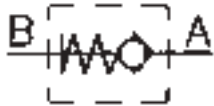
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THREADED CARTRIDGE MOUNTED SINGLE-ACTING VALVES

They allow free flow in one direction, shutting-off the return flow in the opposite direction. Release pression 0,35 bar.
On request calibration at 2, 4, 6, 8, 10 bar.

- On request
- Version in AISI 316 code FT 2267/6
 - Complete with Viton seals (V)



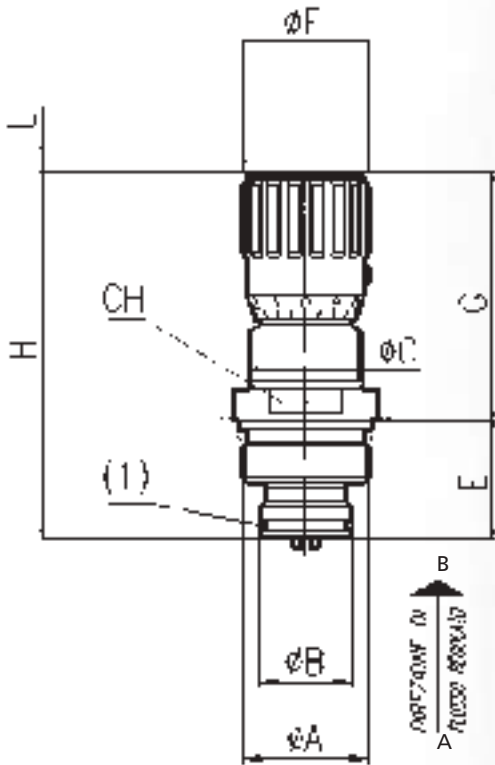
FT 267/6

VALVE SEATING SIZE TABLE

TYPE	A UNI 4534	Ø B	C	D	Ø E	F	Ø G	H	Ø K	MIN	L	MAX
1 4	M22x1,5	20,5	16,5	13,5	19	45,5	10	52	8	33,5		36
3 8	M27x2	25	18	16	24	52,5	15	59	10	36,5		40
1 2	M33x2	31	21	17	29	63,5	20	71	12	45		49
3 4	M42x2	40	25	20	38	76	26	85,5	15	52		59

TECHNICAL DATA

TYPE	MAX. WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE µM ABSOLUTE
1 4	320	1300	-20°/+100°	25
3 8	320	1300	-20°/+100°	25
1 2	320	1300	-20°/+100°	25
3 4	320	1300	-20°/+100°	25
1 0 0	320	1300	-20°/+100°	25



DIMENSIONS

TYPE	ØA UNI 4534	ØB	ØC	E	G	ØF	H	L	CH	(1) OR	WEIGHT KG
1 4	M33x1,5	24	M30x1,5	31	64,5	33	95,5	4,5	32	2081	0,350
3 8	M39x1,5	30	M35x1,5	34,5	82	38	116,5	6	38	2106	0,580
1 2	M48x2	35	M40x1,5	42	92,5	47	134,5	6,5	45	3118	0,960
3 4	M55x2	40	M50x1,5	49	115	58	164	7,5	55	3137	1,700

MATERIALS

BODY BASE	BODY BASE
COMPENSATION UNIT	COMPENSATION UNIT
OR	NITRILE
ANTIEXTRUSION RING	ANTIEXTRUSION RING
KNOB	KNOB

EXAMPLE FOR ORDERING

	CODE	TYPE	VITON SEAL
STEEL	FT 287/2	38	V

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

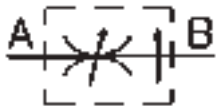
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CARTRIDGE PRESSURE COMPENSATED FLOW CONTROL VALVES

Pressure compensated flow control valves, to insert in modular units in line. They are essentially composed of the central body of valves series FT 277/2 which may be screwed in units preset by the user. The construction and functional characteristics reflect exactly those described for the two inlet valves. It is recommended to keep them in their protective wrapping until the mounting, in order to avoid possible drawbacks caused by eventual entry of particles into the delicate and essential parts for a good working. On page 88 is proposed a machining scheme for the embedding seat, which has to be observed to ensure the necessary accuracy of the valve. The constructive system allows the user, already provided with those versions, either to request the two inlet base bodies only, so as to allow their quick transformation, or to store the single standard components to assemble in the various types according to the need.

- On request
- Viton seals (V)
 - Knob in ABS (mp)




FT 287/2

TECHNICAL DATA

TYPE	MAX. WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE μM ABSOLUTE
1 4	320	7,5	-20°/+70°	25
3 8	320	10	-20°/+70°	25
1 2	320	12	-20°/+70°	25
3 4	320	15	-20°/+70°	25

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

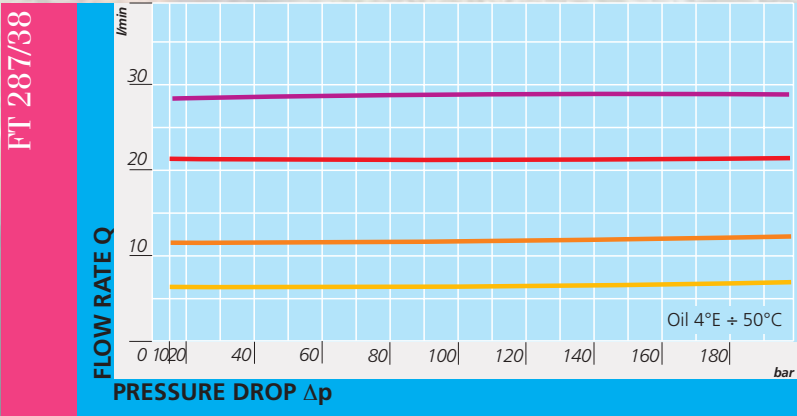
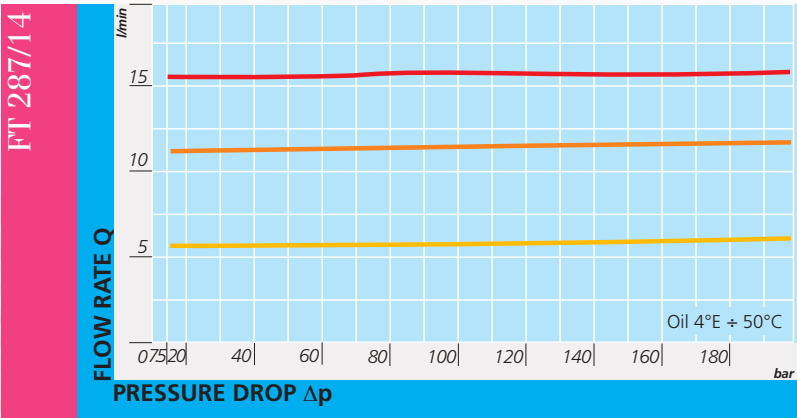
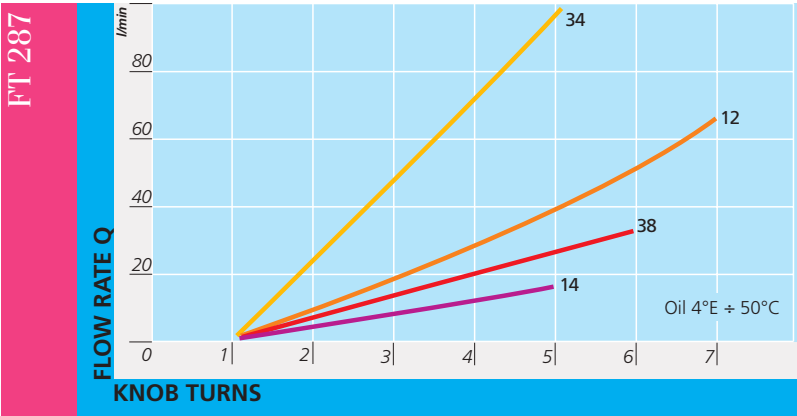
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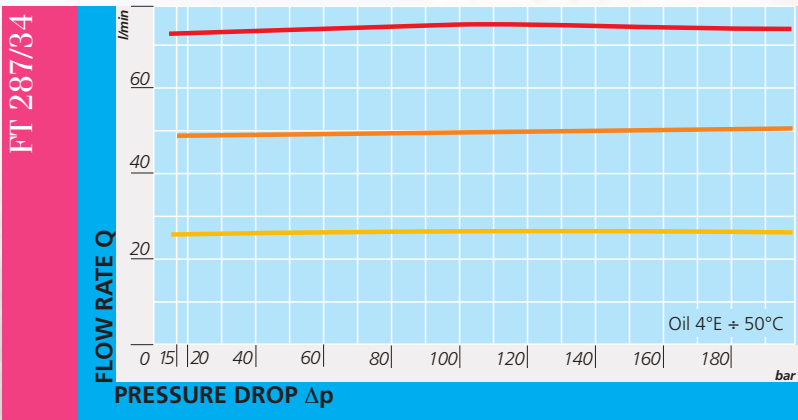
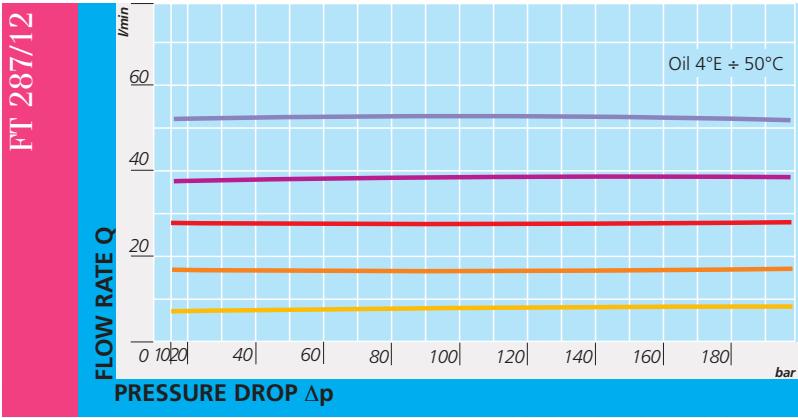
FT 287/2



FLOW RATE CURVES



FT 287/2



HOME

PRESENTATION

VALVES INDEX

+

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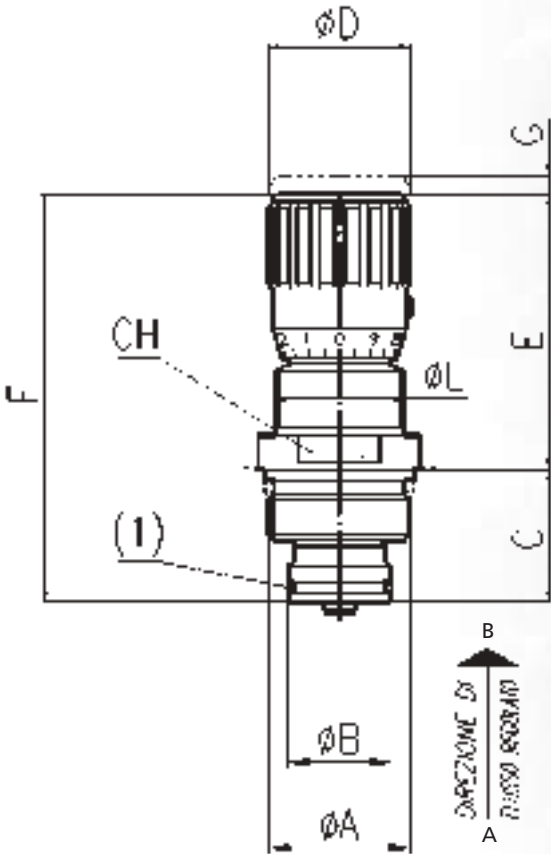


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DIMENSIONS

TYPE	Ø A UNI 4534	Ø B	C	Ø D	E	F	G	Ø L	CH	(1) OR	WEIGHT KG
1 4	M33x1,5	24	31	33	64,5	95,5	4,5	M30x1,5	32	2081	0,350

MATERIALS

BODY BASE	9 S MN PB 23 - UNI 5105
COMPENSATION UNIT	38 NI CR MO 4
OR	NITRILE
ANTIEXTRUSION RING	PTFE
KNOB	GD AL SI 12 - UNI 5706

EXAMPLE FOR ORDERING

	CODE	TYPE	VITON SEAL
STEEL	FT 297/2	14	V



HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

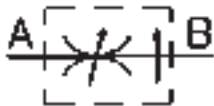
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ESC

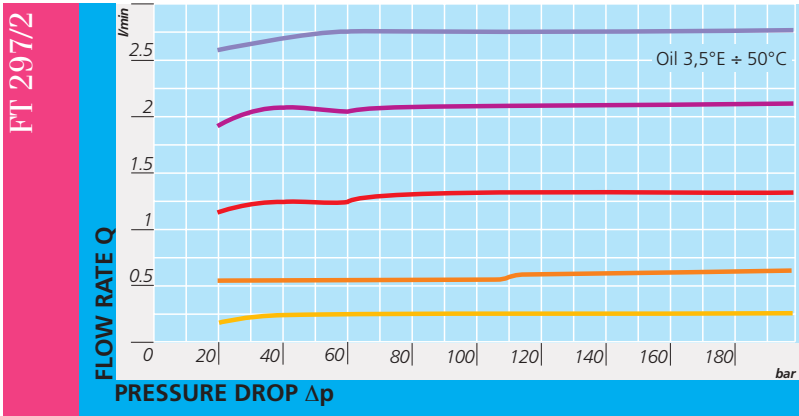
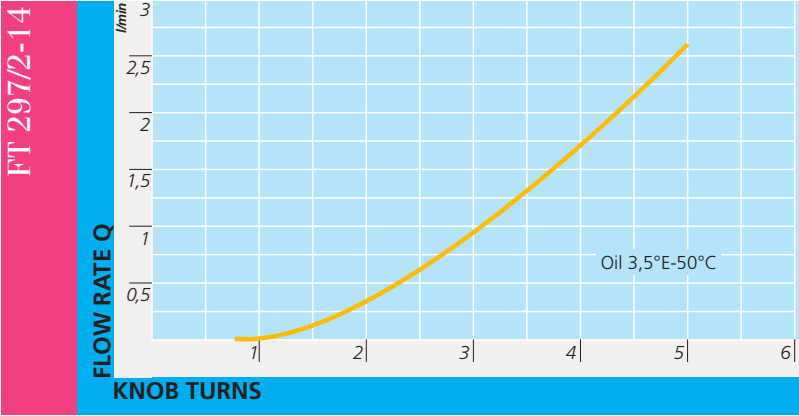
CARTRIDGE MOUNTED PRESSURE COMPENSATED
MICROFINE FLOW CONTROL VALVES

Pressure compensated flow control valves, to insert in modular units in line.
They are essentially composed of a central body which may be screwed
in units preset by the user.
The construction and functional characteristics reflect exactly those
of valves series FT 287.
It is recommended to keep them in their protective wrapping until
the mounting, in order to avoid possible drawbacks caused by eventual
entry of particles into the delicate and essential parts for a good working.

- On request
- Viton seals (V)
 - Knob in ABS (mp)



FT 297/2



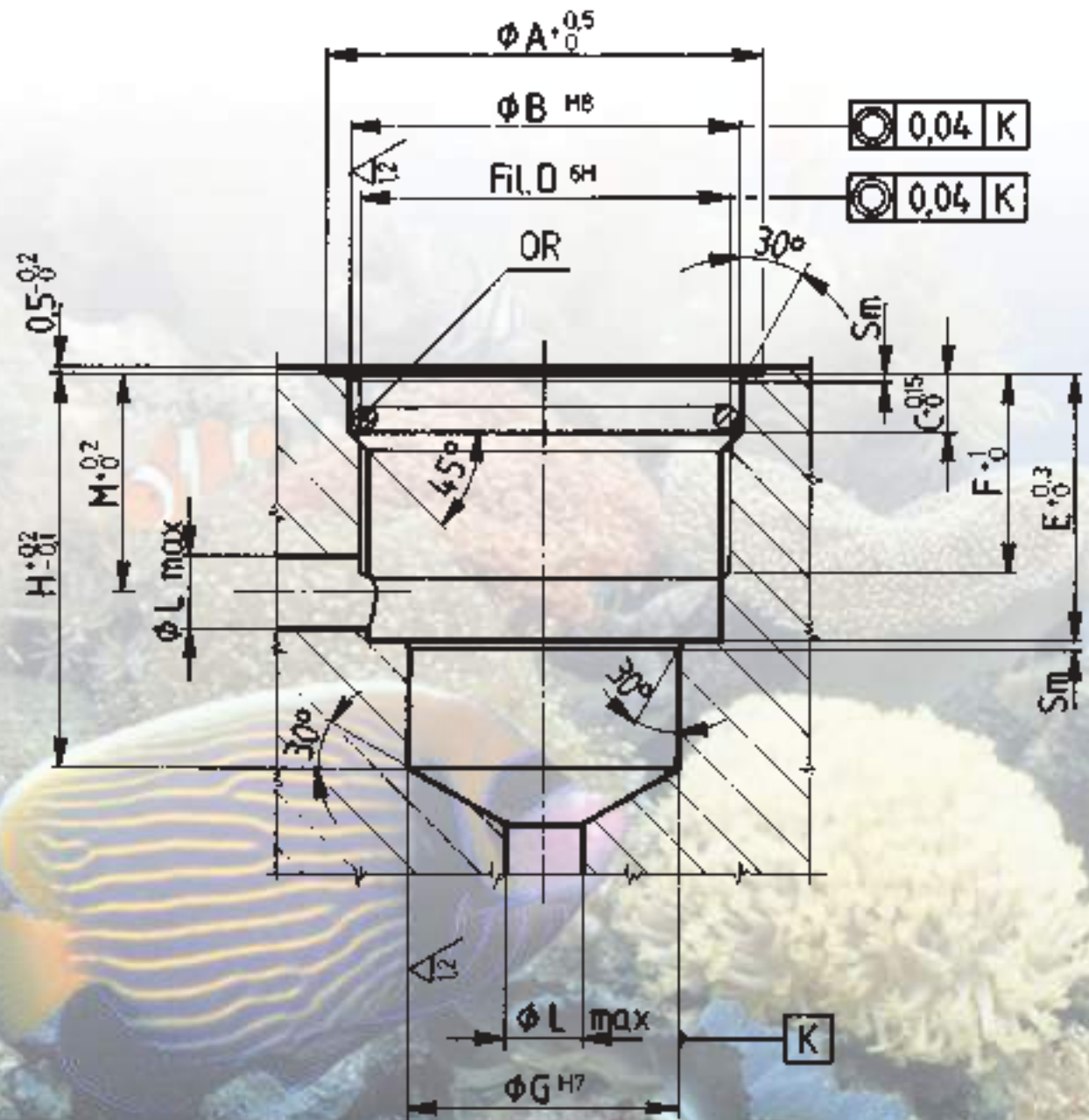
TECHNICAL DATA

TYPE	MAX. WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE μm ABSOLUTE
1 4	320	7,5	-20°/+70°	25



FT 287/2 - FT297/2

Sealing realized
with OR seals
on conical
seating



HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

WHOLE PAGE

PRINT

ESC

DRAWING OF CAVITY MACHINE FOR CARTRIDGE MOUNTED VALVES



FT 287/2 - FT 297/2

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

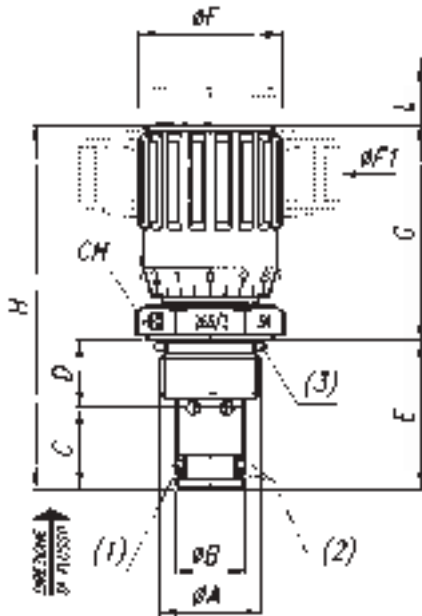
ESC



TYPE	∅ A	∅ B	C	D UNI4535	E	F	∅ G	H	∅ L	M	OR	SM
1 4	39	35	5,2	M33x1,5	24	18	24	35,2	6,5	20	31 18	0,8
3 8	44	40,5	5,2	M39x1,5	27,5	19	30	40	9	22,5	31 43	0,8
1 2	53	49	6,5	M48x2	33,5	23,5	35	49	11	27,5	31 75	0,8
3 4	63	58	7	M55x2	40	27	40	57	13,5	32,5	1 55	1



FT 265/2 - UNF



MATERIALS

BODY	9 S MN Pb 28 - UNI 5105
NEEDLE	1 C 40 - UNI 8373
OR	NITRILE
ANTIEXTRUSION RINGS	PTFE
KNOB	GD AL Si 12 - UNI 5706
KNOB (MP)	ABS

EXAMPLE FOR ORDERING

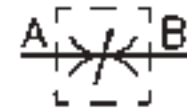
	CODE	TYPE	VITON SEAL	KNOB IN PLASTIC
STEEL	FT 265/2	34	V	MP

SEAL KIT ON THE SEATING

TYPE	1 (OR)	2 (BK)	(3)
34	2037	266/6.022.00.1-34	2068
78	2050	267/2.022.00.1-38	3075

DIMENSIONS

TYPE	$\varnothing A$ UNI 4534	$\varnothing B$	C	D	E	$\varnothing F$	$\varnothing F1$	G	H	L	CH	WEIGHT KG
34	3/4"-16 UNF	12,7	15,3	12,7	28	27	50	40,7	68,7	6	24	0,112
78	7/8"-14 UNF	15,9	17,5	15	32,5	33	70	46	78,5	8	27	0,115



HIGH FLOW RATE CARTRIDGE MOUNTED
DOUBLE-ACTING CONTROL VALVES MAX 350 BAR

They control a free flow in both directions.

- On request
- Complete with Viton seals (V)
 - Knob in ABS (mp)
 - Version in AISI 316 code FT 2265/2



FT 265/2 - UNF

HOME

PRESENTATION

VALVES INDEX

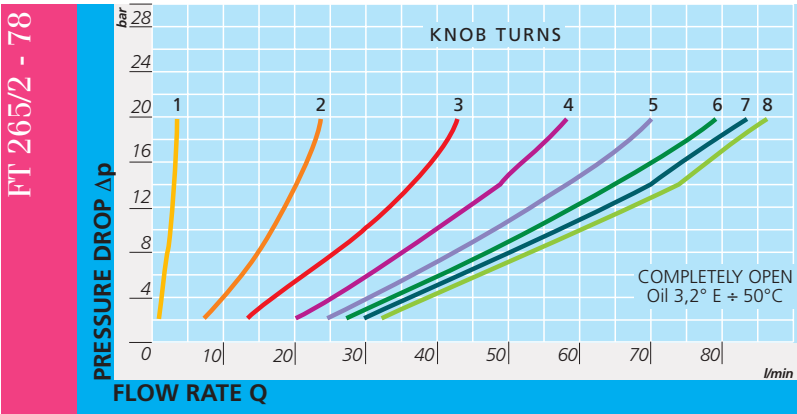
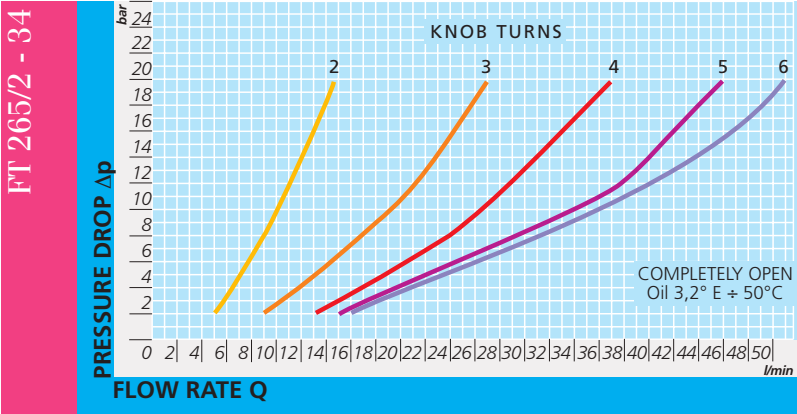


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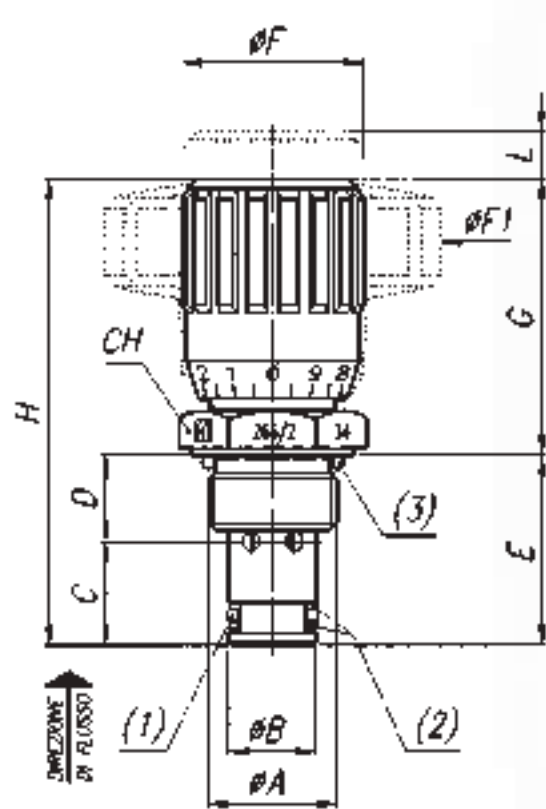
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TECHNICAL DATA

TYPE	FLOW SECTION CM ²	MAX. WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE μm ABSOLUTE
34	0,20	320	1300	-20°/+100°	25
78	0,50	320	1300	-20°/+100°	25



DIMENSIONS

TYPE	$\varnothing A$ UNI 4534	$\varnothing B$	C	D	E	$\varnothing F$	$\varnothing F1$	G	H	L	CH	WEIGHT KG
34	3/4"-16 UNF	12,7	15,3	12,7	28	27	50	40,7	68,7	6	24	0,112
78	7/8"-14 UNF	15,9	17,5	15	32,5	33	70	46	78,5	8	27	0,115

MATERIALS

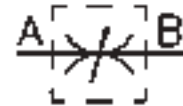
BODY	9 S MN Pb 28 - UNI 5105
NEEDLE	1 C 40 - UNI 8373
OR	MESCOLA NITRICA
ANTIEXTRUSION RINGS	PTFE
KNOB	GD AL SI 12 - UNI 5706
KNOB (MP)	ABS

EXAMPLE FOR ORDERING

	CODE	TYPE	VITON SEAL	PLASTIC KNOB
STEEL	FT 266/2	34	V	MP

SEAL KIT ON THE SEATING

TYPE	1 (OR)	2 (BK)	(3)
34	2037	266/6.022.00.1-34	2068
78	2050	267/2.022.00.1-38	3075



CARTRIDGE MOUNTED DOUBLE-ACTING
CONTROL VALVES MAX 350 BAR

They control a free flow in both directions.

- On request
- Complete with Viton seals (V)
 - Knob in ABS (mp)
 - Version in AISI 316 code FT 2266/2



FT 266/2 - UNF

HOME

PRESENTATION

VALVES INDEX

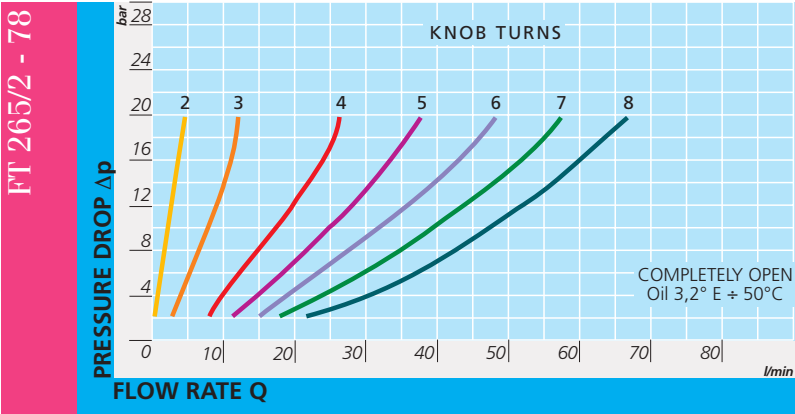
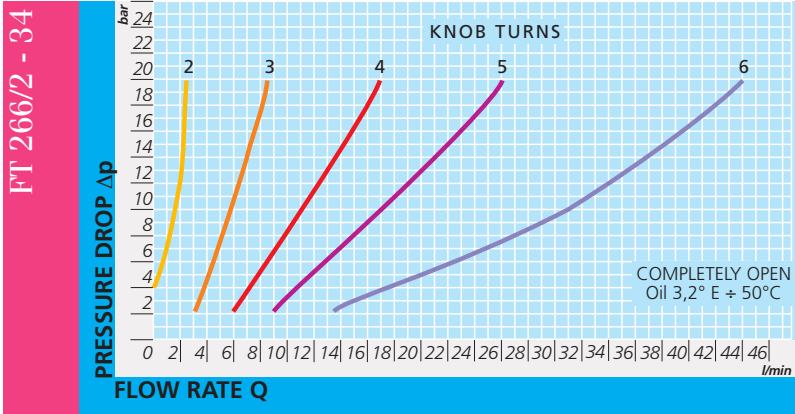


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WHOLE PAGE

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ESC



TECHNICAL DATA

TYPE	FLOW SECTION CM ²	MAX. WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE μM ABSOLUTE
34	0,20	320	1300	-20°/+100°	25
78	0,50	320	1300	-20°/+100°	25

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

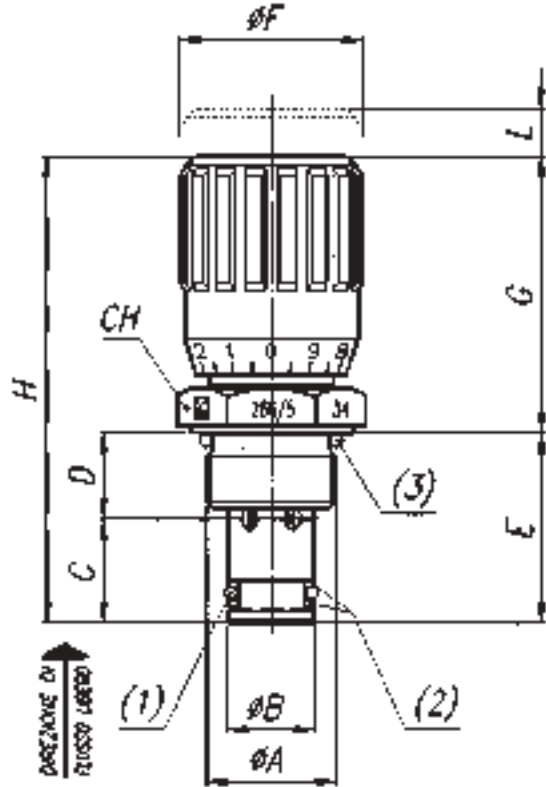
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ESC



FT 266/5 - UNF



DIMENSIONS

TYPE	Ø A UNI 4534	Ø B	C	D	E	Ø F	G	H	L	CH	WEIGHT KG
34	3/4"-16 UNF	12,7	15,3	12,7	28	27	40,7	68,7	6	24	0,112
78	7/8"-14 UNF	15,9	17,5	15	32,5	33	46	78,5	8	27	0,115

MATERIALI

BODY	9 S MN Pb 23 - UNI 5105
NEEDLE	38 Ni Cr Mo 4 - UNI - EN 10083
OR	NITRILE
ANTIEXTRUSION RING	PTFE
CHECK VALVE	38 Ni Cr Mo 4 - UNI - EN 10083
SPRING	C72 - UNI 3545
KNOB	GD AL Si 12 - UNI 5706
KNOB (MP)	ABS

EXAMPLE FOR ORDERING

	CODE	TYPE	VITON SEAL	KNOB IN PLASTIC
STEEL	FT 266/5	34	V	MP

SEAL KIT ON THE SEATING

TYPE	1 (OR)	2 (BK)	(3)
34	2037	266/6.022.00.1-34	2068
78	2050	267/2.022.00.1-38	3075



HOME

PRESENTATION

VALVES INDEX

+

-

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▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

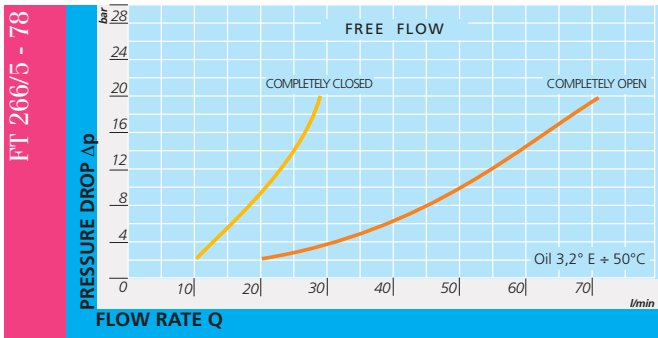
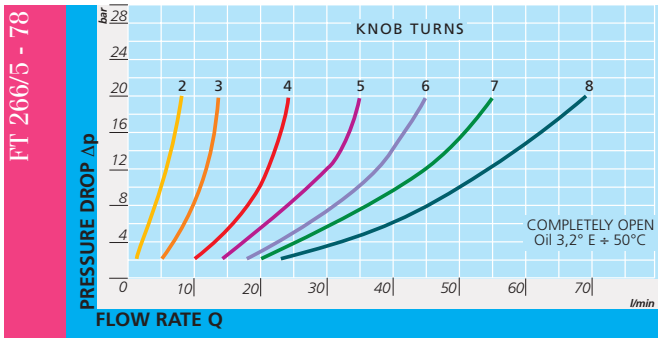
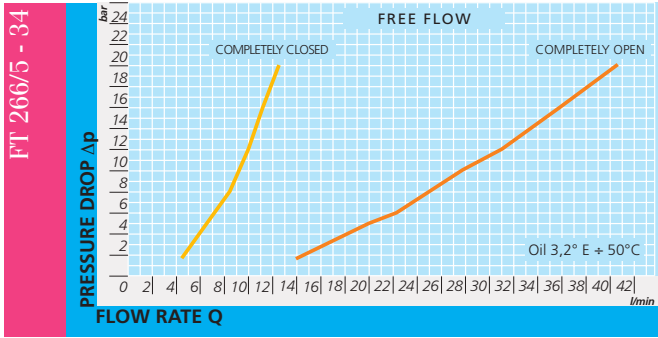
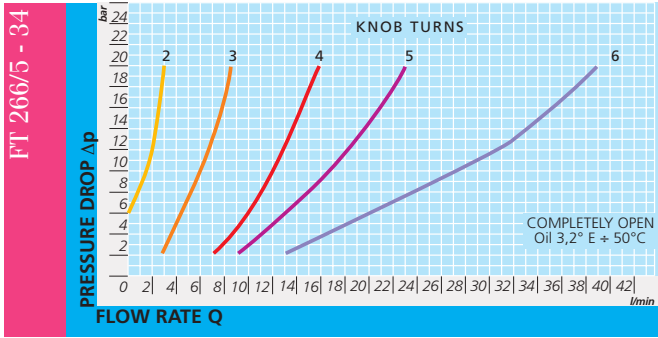
CARTRIDGE MOUNTED SINGLE-ACTING
CONTROL VALVES MAX 350 BAR

They control and eventually shut-off the flow in one direction,
allowing a free return in the opposed direction.

- On request
- Complete with Viton seals (V)
 - Knob in ABS (mp)

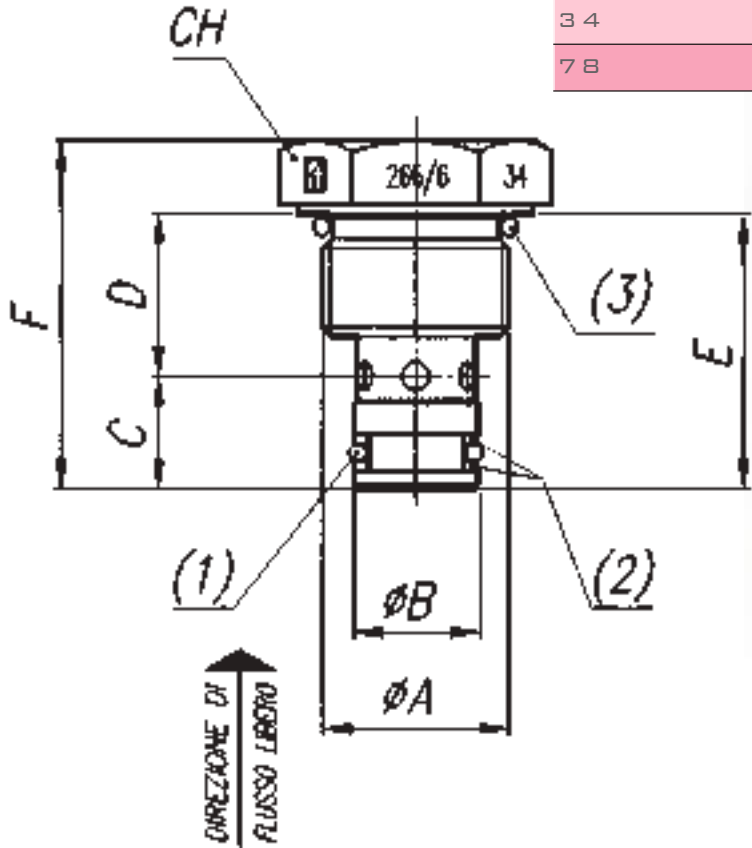


FT 266/5 - UNF



TECHNICAL DATA

TYPE	FLOW SECTION CM ²	MAX. WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE μM ABSOLUTE
3 4	0,20	320	1300	-20°/+100°	25
7 8	0,50	320	1300	-20°/+100°	25



MATERIALS	
BODY	9 S MN PB 23 - UNI 5105
BALL	UNI 100 C 6
SPRING	AISI 302
BALL GUIDE	NYLON 66 + CARBON FIBRE

EXAMPLE FOR ORDERING			
	CODE	TYPE	VITON SEAL
STEEL	FT 266/6	34	V

SEAL KIT ON THE SEATING		
TYPE	1 (OR)	2 (BK)
34	2037	266/6.022.00.1-34
78	2050	267/2.022.00.1-38

DIMENSIONS								
TYPE	Ø A UNI 4534	Ø B	C	D	E	F	CH	(3)
34	3/4"-16 UNF	12,7	11,5	16,5	28	35,5	24	2068
78	7/8"-14 UNF	15,9	12,5	20	32,5	40	27	3075

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

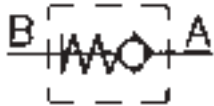
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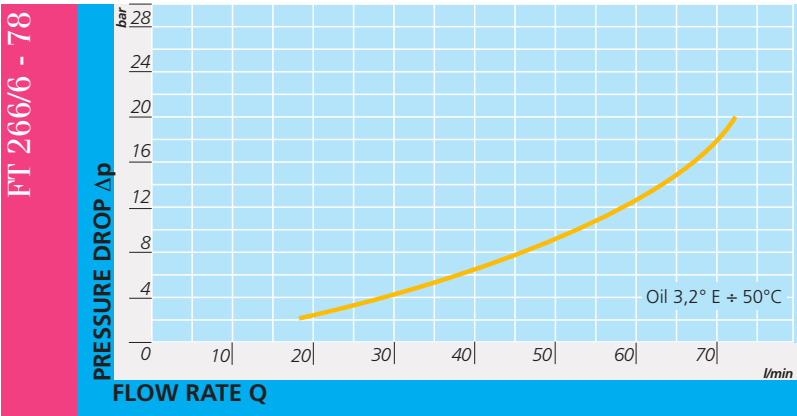
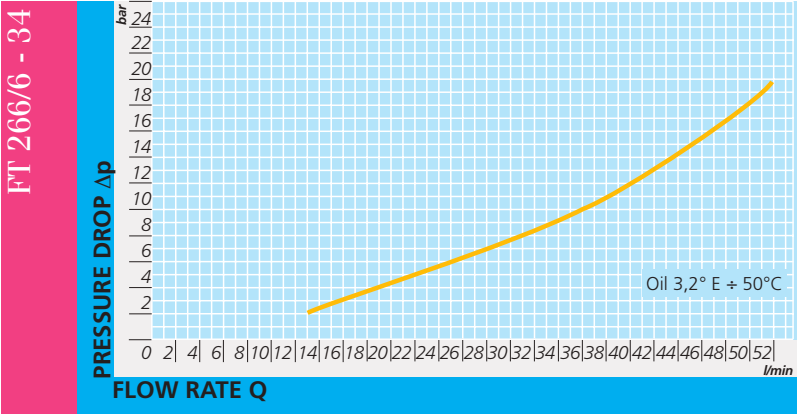
CARTRIDGE MOUNTED SINGLE-ACTING CONTROL VALVES MAX 350 BAR

They allow the flow in one direction, shutting-off the same in the opposed direction.

- On request
- Complete with Viton seals (V)
 - Knob in ABS (mp)

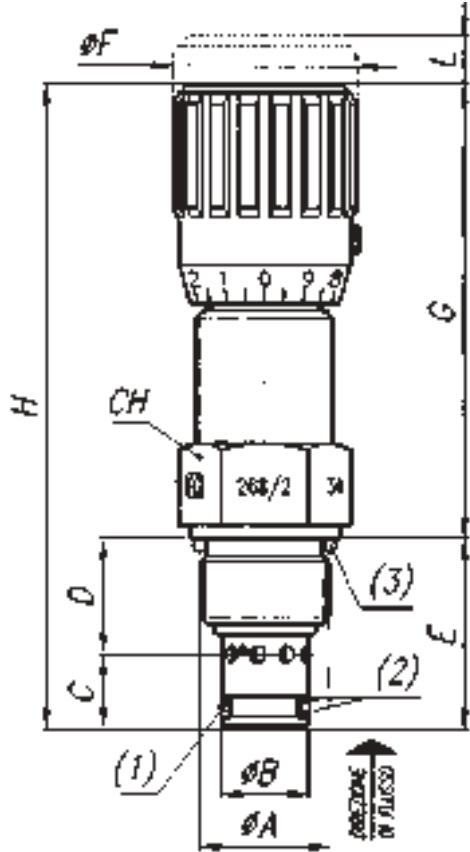


FT 266/6 - UNF



TECHNICAL DATA

TYPE	MAX. WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE μm ABSOLUTE
34	320	1300	-20°/+100°	25
78	320	1300	-20°/+100°	25



DIMENSIONS

TYPE	Ø A UNI 4534	Ø B	C	D	E	Ø F	G	H	L	CH	(3)
34	3/4"-16 UNF	12,7	11	17	28	27	67	95	7	22	2068
78	7/8"-14 UNF	15,9	11,7	20,8	32,5	33	80	112,5	10	27	3075

MATERIALS

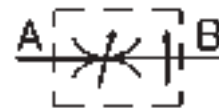
BODY	9 S MN Pb 28 - UNI 5105
NEEDLE	1 C 40 - UNI 8373
OR	NITRILE
ANTIEXTRUSION RING	PTFE
KNOB	GD - AL SI 12 - UNI 5706
KNOB (MP)	ABS

EXAMPLE FOR ORDERING

	CODE	TYPE	VITON SEAL	KNOB IN PLASTC
STEEL	FT 268/2	34	V	MP

SEAL KIT ON THE SEATING

TYPE	1 (OR)	2 (BK)
34	2037	266/6.022.00.1-34
78	2050	267/2.022.00.1-38



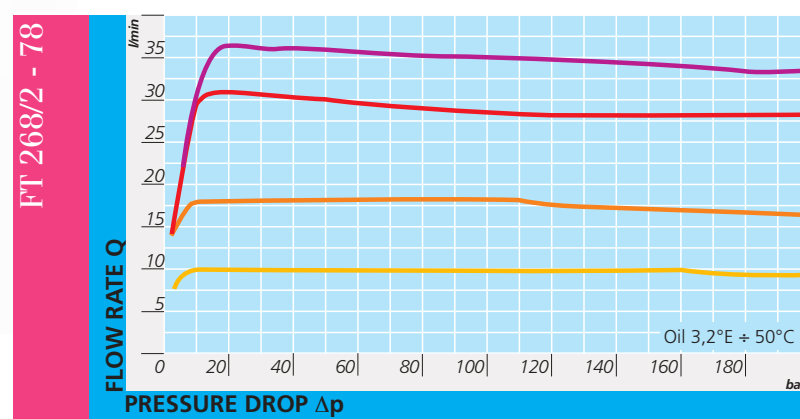
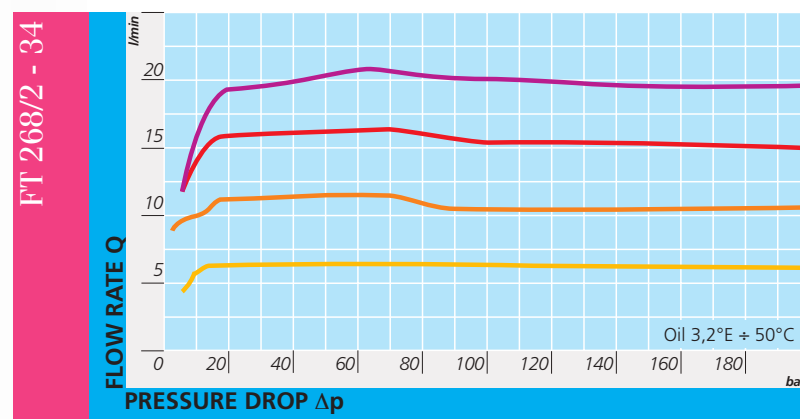
CARTRIDGE MOUNTED PRESSURE COMPENSATED TWO-WAY LOW FRICTION CONTROL VALVES MAX 350 BAR

Pressure compensated flow control valves, to insert in modular units in line. The construction and functional characteristics reflect exactly those described for the two inlet valves.

It is recommended to keep them in their protective wrapping until the mounting, in order to avoid possible drawbacks caused by eventual entry of particles into the delicate and essential parts for a good working. On page 100 is proposed a machining scheme for the embedding seat, which has to be observed to ensure the necessary accuracy of the valve.

On request

- Viton seals (V)
- Knob in ABS (mp)



TECHNICAL DATA

TYPE	FLOW SECTION CM ²	MAX. WORKING PRESSURE BAR	MIN. BURSTING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE μM ABSOLUTE
3 4	0,10	320	1300	-20°/+100°	25
7 8	320	320	1300	-20°/+100°	25

Technical drawing of a mechanical part showing dimensions and tolerances. The drawing includes a cross-section view and a side view. Key dimensions and tolerances are labeled:

- Dimensions:** ϕL , ϕA , ϕB , ϕC , ϕH , M , N , P , Q , R , D , E , F , G , T , S .
- Tolerances:** ± 0.025 A, ± 0.10 A, ± 0.05 A.
- Surface Finish:** 1.6 , 1.6 , 1.6 .
- Angles:** 45° , 15° .
- Other Labels:** R OR R , R .

DRAWING OF CAVITY MACHINE FOR CARTRIDGE MOUNTED VALVES



FT 265/2 - 266/2 - 266/5 - 266/6 - 268/2

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



CONICAL SEATING FOR OR FT 265/2 - FT 266/2 FT 266/5 - FT266/6 - 268/2

TYPE	Ø A	Ø B	UNI ^C 4534	D	E	F	G	Ø H	Ø L
3 4	32±0,4	20,65±0,1	3/4"-16UNF-2B	2,75	9,5	18,9	28,6	11,7	12,7 ^{+0,05} ₋₀
7 8	32±0,4	24±0,1	7/8"-14UNF-2B	2,75	12,35	24,25	31,85	15	15,875 ^{+0,05} ₋₀

CONICAL SEATING FOR OR FT 265/2 - FT 266/2 FT 266/5 - FT266/6 - 268/2

TYPE	M	N	P	Q	R	S	T	α°	Ø R
3 4	0,5	14,3	19,05±0,13	1,53±0,08	0,1 ^{+0,15} ₋₀	29±0,4	29,8	70°	2068
7 8	0,5	15,75	24,45±0,1	1,4±0,1	0,1 ^{+0,15} ₋₀	33,75±0,4	34,5	60°	3075

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

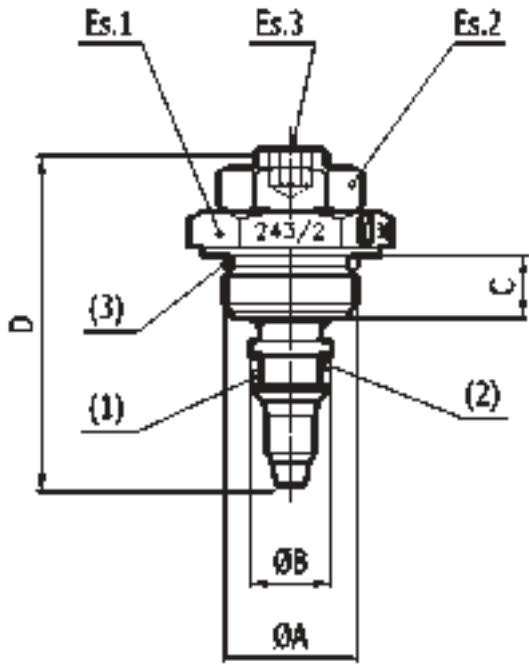
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ESC



FT 243/2



MATERIALS

BODY	ETG 100
NEEDLE	35SMNPB10 - AISI 303
O R	NITRILE
NUT	35SMNPB10
B K	PTFE



DIMENSIONS

TYPE	Ø A	Ø B	C	D	Es.1	Es.2	Es.3	(1) O R	(2) B K	(3) O R	Ø F	Ø G
1 4	M17x1	10	8.5	44.5	22	17	4	106	106	2056	26	17.5
3 8	M18x1	11	8.5	45.5	24	17	5	2031	2031	2062	28	18.5
1 2	M22x1.5	14	13.5	66.5	27	19	7	2043	2043	2075	33	22.5
3 4	M27x1.5	18	18	82	32	22	9	2056	2056	3093	35	28

DOUBLE-ACTING BRAKING VALVES

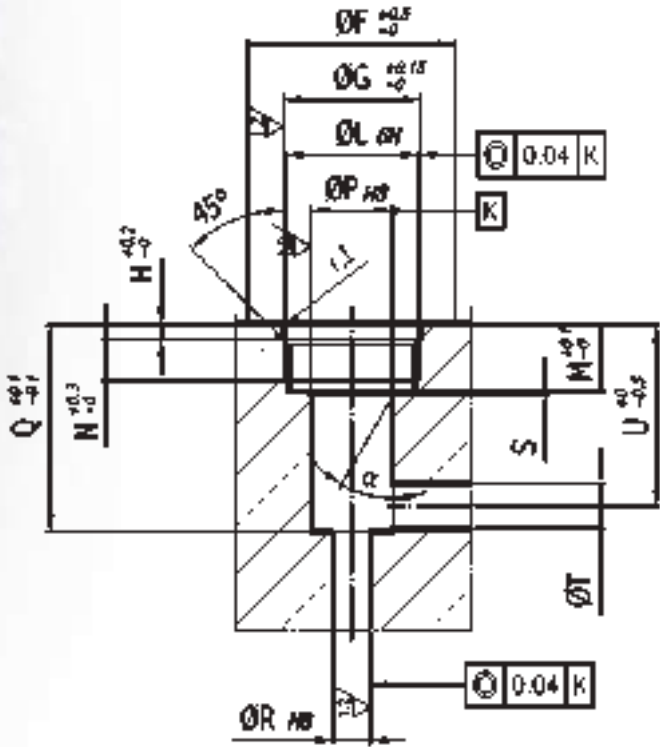
They are composed of a needle throttling which allows a very sensitive control. They can be used in the assembling in manifolds and integrated blocks and are also used as cylinder braking valves.

Recommended filtration: 60 micron or inferior.
Max. working pressure: 300 bar

On request
Version in AISI 316 code FT 2243/2



FT 243/2



DIMENSIONS

TYPE	H	Ø L	M	N	Ø P	Q	Ø R	S	Ø T	U	R.I	α°
1 4	2	M17x1	9	5.5	10	28	4	0.6	4.5	25	0.3	30°
3 8	2	M18x1	9	5	11	28	5	0.6	6	24.5	0.3	30°
1 2	2.5	M22x1.5	15	10	14	40.5	8	1	8	36	0.3	20°
3 4	3.5	M27x1.5	21	15	18	54.5	10	1.5	10	48.5	0.5	20°



FT 243/2

HOME

PRESENTATION

VALVES INDEX

+

-



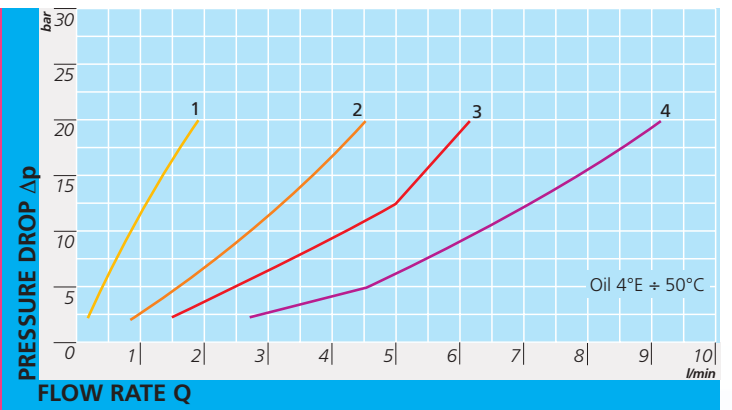
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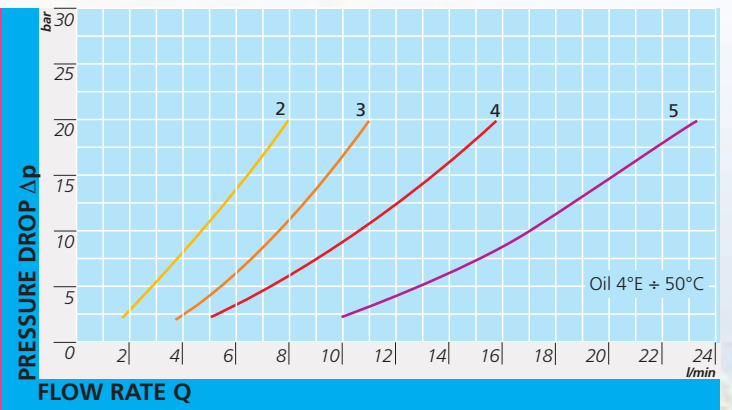
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FT 243/2 - 14



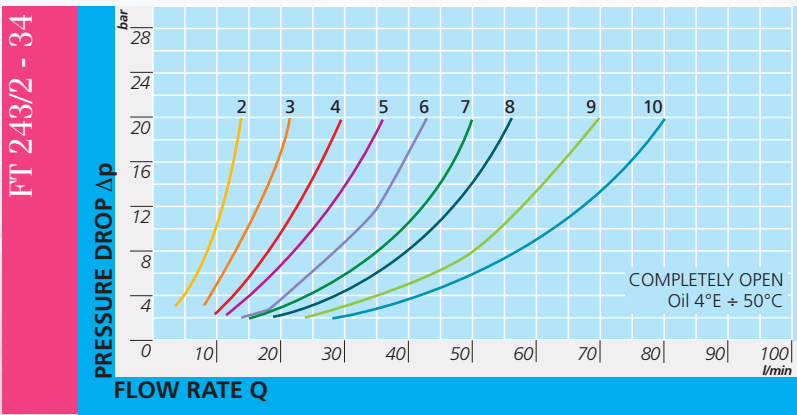
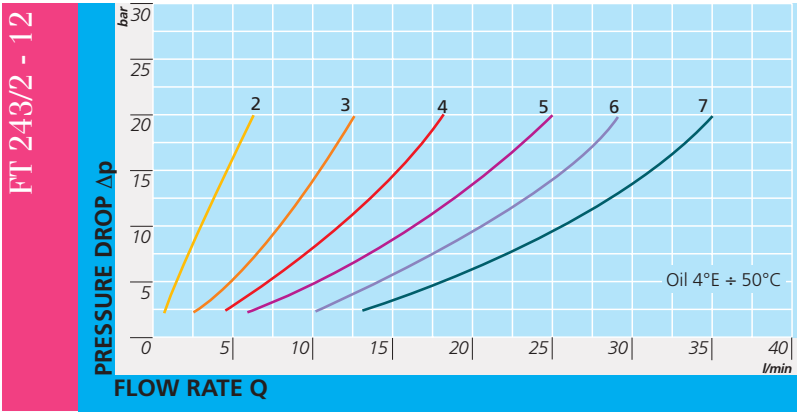
FT 243/2 - 38



FLOW RATE CURVES



FT 243/2



HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

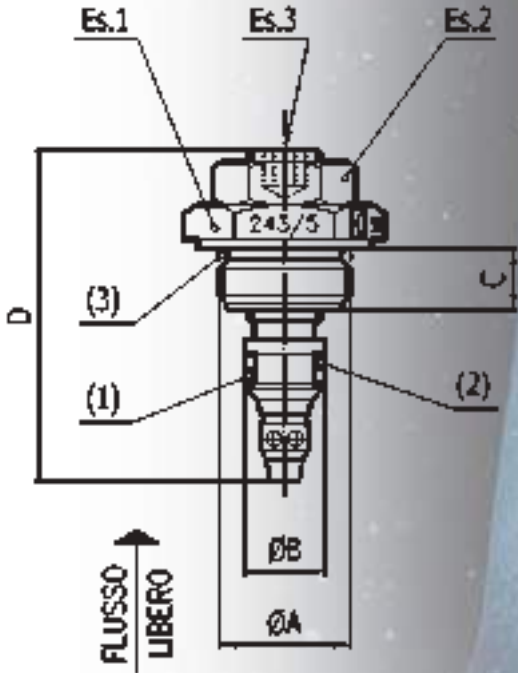
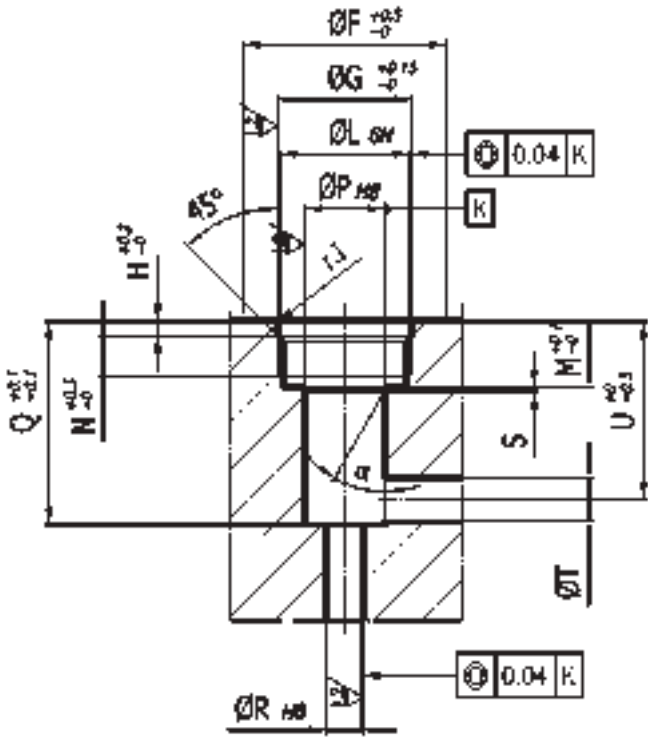


FT 243/5



MATERIALS

BODY	ETG 100
NEEDLE	35SMNPB10 - AISI 303
OR	NITRILE
NUT	35SMNPB10
BK	PTFE



DIMENSIONS

TYPE	Ø A	Ø B	C	D	Es.1	Es.2	Es.3	(1)	OR (2)	BK (3)	OR	Ø F	Ø G
1 4	M17x1	10	8.5	44.5	22	17	4	106	106	2056	26	17.5	
3 8	M18x1	11	8.5	45.5	24	17	5	2031	2031	2062	28	18.5	
1 2	M22x1.5	14	13.5	66.5	27	19	7	2043	2043	2075	33	22.5	
3 4	M27x1.5	18	18	82	32	22	9	2056	2056	3093	35	28	

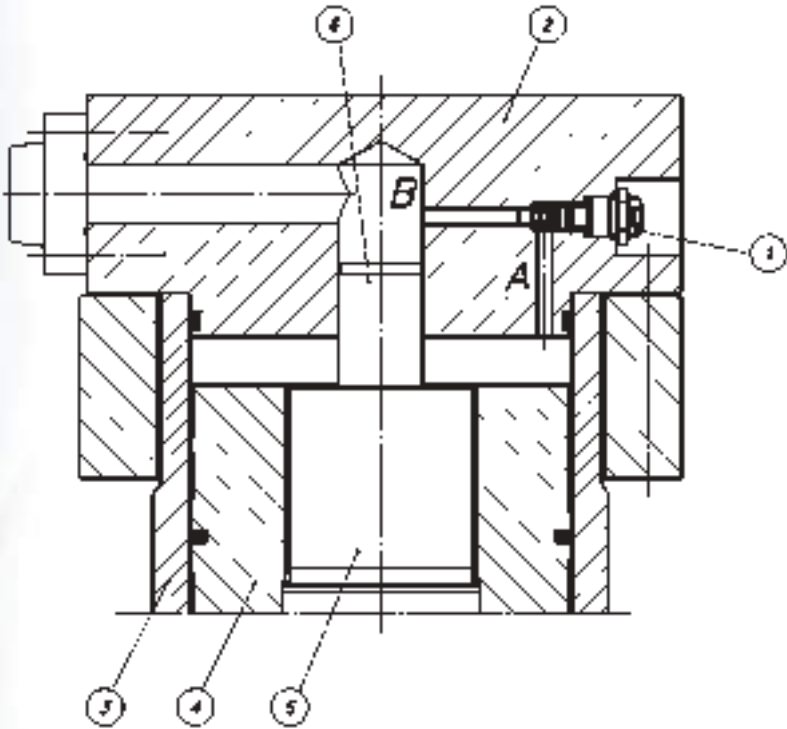
SINGLE-ACTING BRAKING VALVES

They are composed of a needle throttling, inside which there is a ball single-acting valve. They can be used in the assembling in manifolds and integrated blocks and are also used as cylinder braking valves.

Recommended filtration: 60 micron or inferior.
Max. working pressure: 300 bar



FT 243/5



DESCRIPTION	
1	VALVE FT 243/5
2	CYLINDER HEAD
3	BARREL
4	PISTON
5	STEM
6	PIN OF BRAKE

DIMENSIONS

TYPE	H	Ø L	M	N	Ø P	Q	Ø R	S	Ø T	U	R.I	α°
1 4	2	M17x1	9	5.5	10	28	4	0.6	4.5	25	0.3	30°
3 8	2	M18x1	9	5	11	28	5	0.6	6	24.5	0.3	30°
1 2	2.5	M22x1.5	15	10	14	40.5	8	1	8	36	0.3	20°
3 4	3.5	M27x1.5	21	15	18	54.5	10	1.5	10	48.5	0.5	20°



FT 243/5

HOME

PRESENTATION

VALVES INDEX

+

-

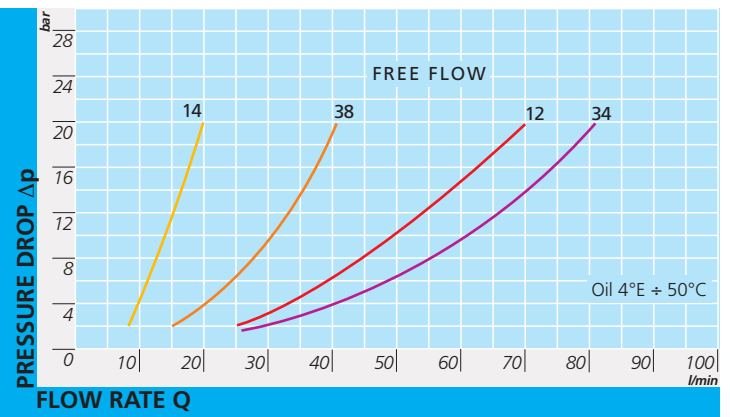
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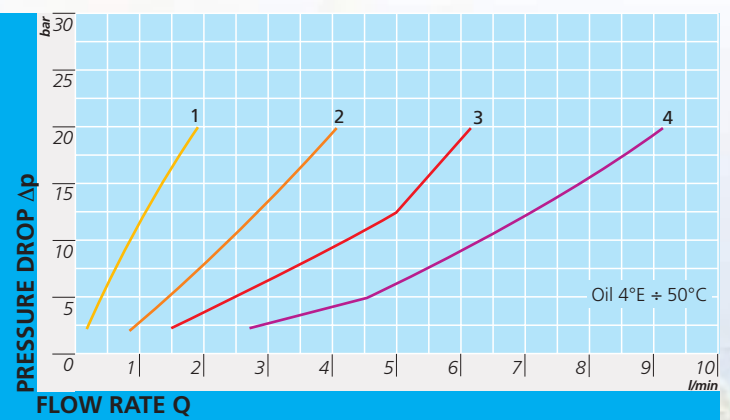
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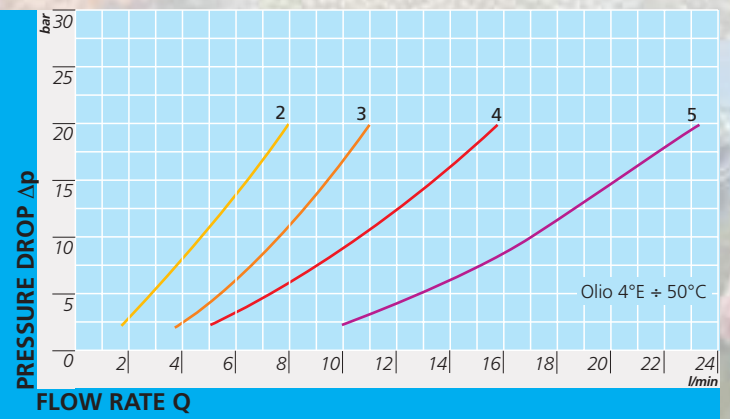
FT 243/5



FT 243/5 - 14



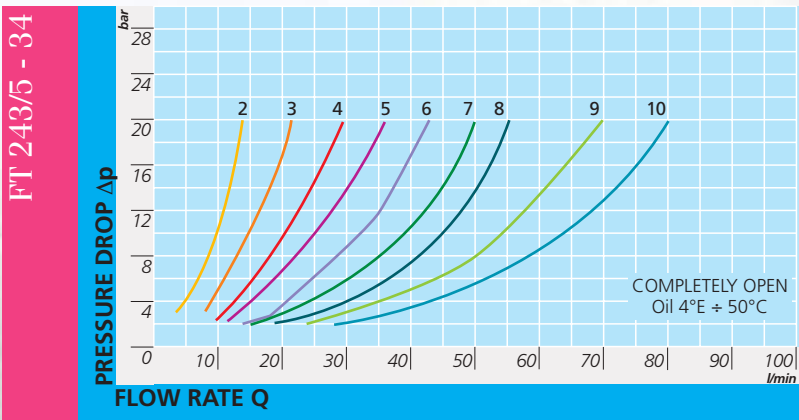
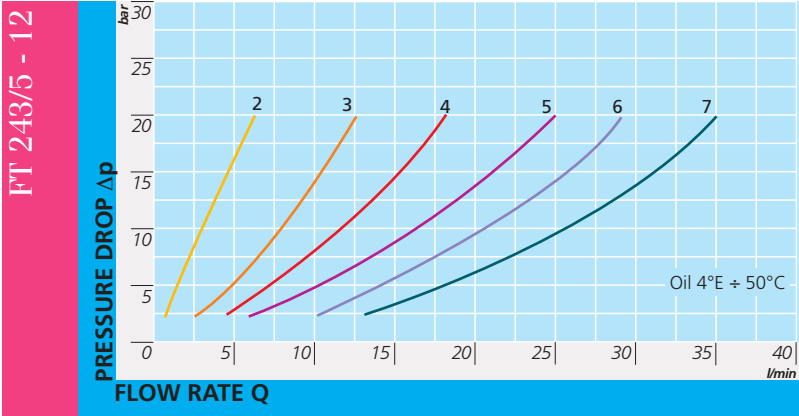
FT 243/5 - 38



FLOW RATE CURVES



FT 243/5



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

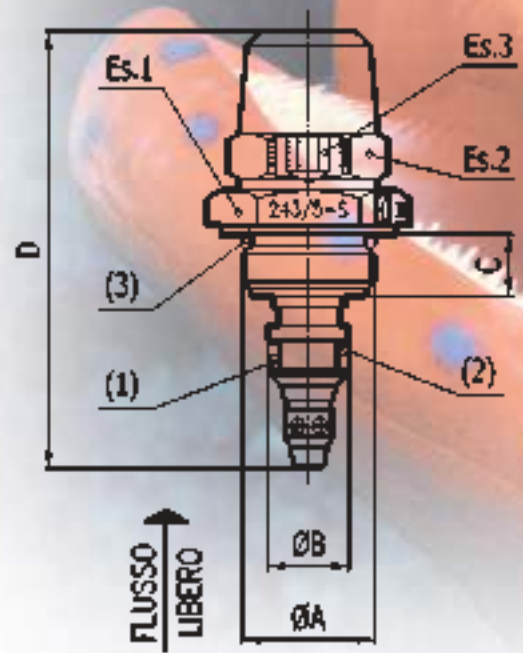
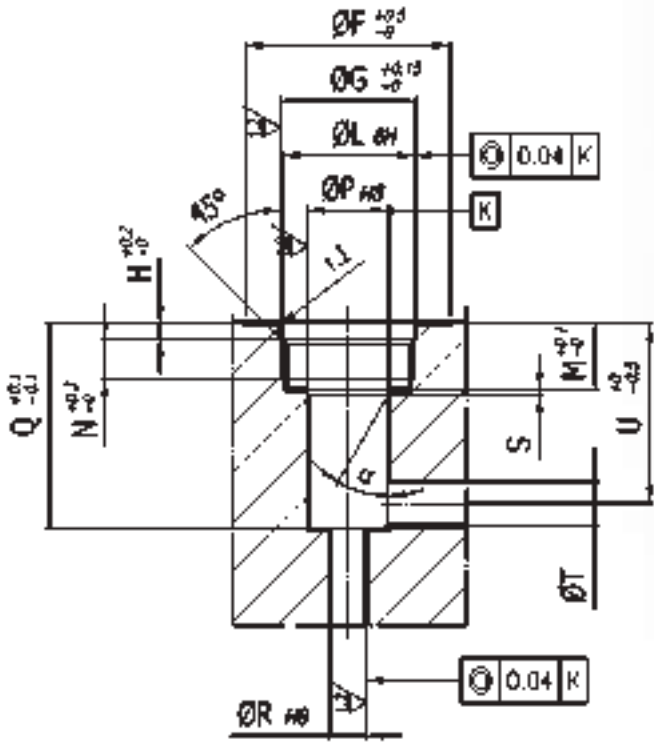
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ESC



FT 243/5 - S



MATERIALS

BODY	ETG 100
NEEDLE	35SMNPB10 - AISI 303
Ø R	NITRILE
NUT	35SMNPB10
B K	PTFE

DIMENSIONS

TYPE	A	Ø B	C	D	Es.1	Es.2	Es.3	(1) Ø R	(2) B K	(3) Ø R	Ø F	Ø G	H
1 4	M17x1	10	8.5	59	22	17	4	106	106	2056	26	17.5	2
3 8	M18x1	11	8.5	59	24	19	5	2031	2031	2062	28	18.5	2
1 2	M22x1.5	14	13.5	87	27	22	7	2043	2043	2075	33	22.5	2.5
3 4	M27x1.5	18	18	106	32	27	9	2056	2056	3093	35	28	3.5

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

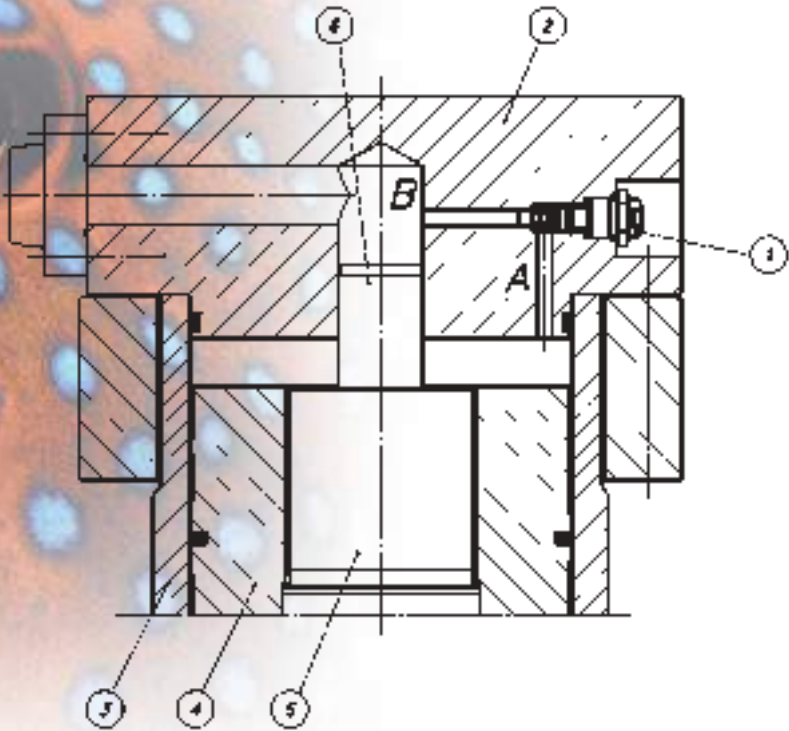
SINGLE-ACTING BRAKING VALVES BLEED-AIR

They are composed of a needle throttling, inside which there is a ball single-acting valve. They can be used in the assembling in manifolds and integrated blocks and are also used as cylinder braking valves. This kind of valve can be used also as air breather. By removing the cap nut it is possible to unscrew the needle and uncover the coaxial passage which allows the breather of the underlying chamber.

Recommended filtration: 60 micron or inferior.
Max. working pressure: 300 bar



FT 243/5



DESCRIPTION	
1	VALVE FT 243/5-S
2	CYLINDER HEAD
3	BARREL
4	PISTON
5	STEM
6	PIN OF BRAKE

DIMENSIONS

TYPE	∅ L	M	N	∅ P	Q	∅ R	S	∅ T	U	R.I	α°
1 4	M17x1	9	5.5	10	28	4	0.6	4.5	25	0.3	30°
3 8	M18x1	9	5	11	28	5	0.6	6	24.5	0.3	30°
1 2	M22x1.5	15	10	14	40.5	8	1	8	36	0.3	20°
3 4	M27x1.5	21	15	18	54.5	10	1.5	10	48.5	0.5	20°



FT 243/5-S

HOME

PRESENTATION

VALVES INDEX

+

-



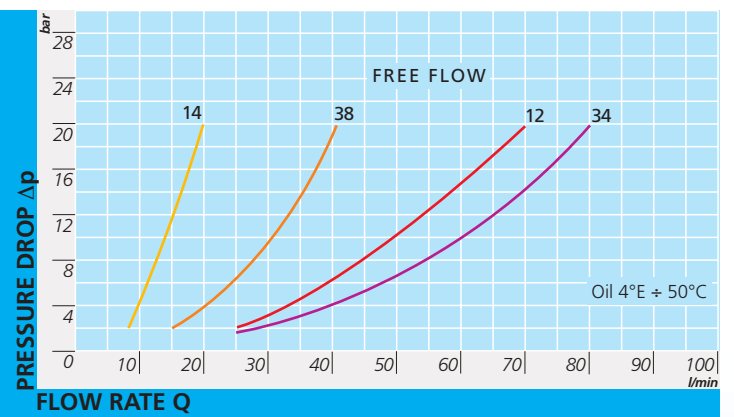
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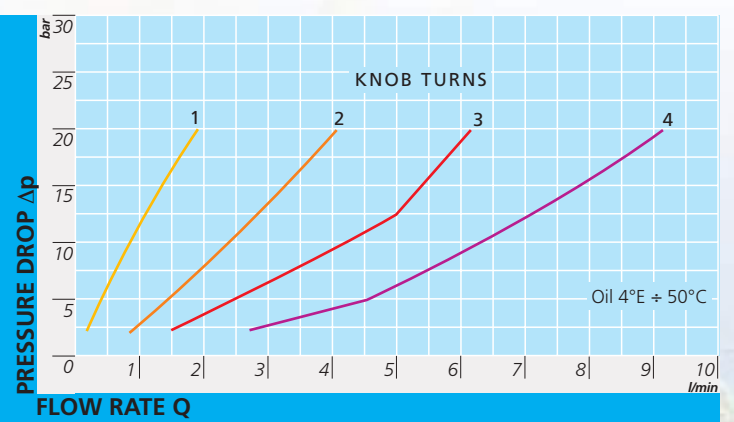
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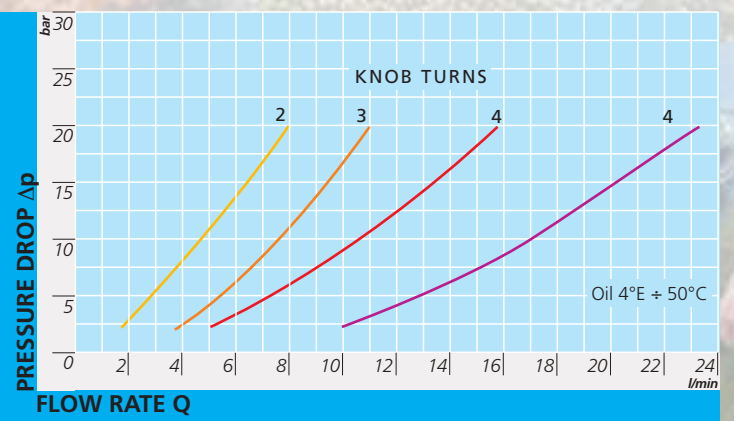
FT 243/5 - S



FT 243/5 - 14 - S



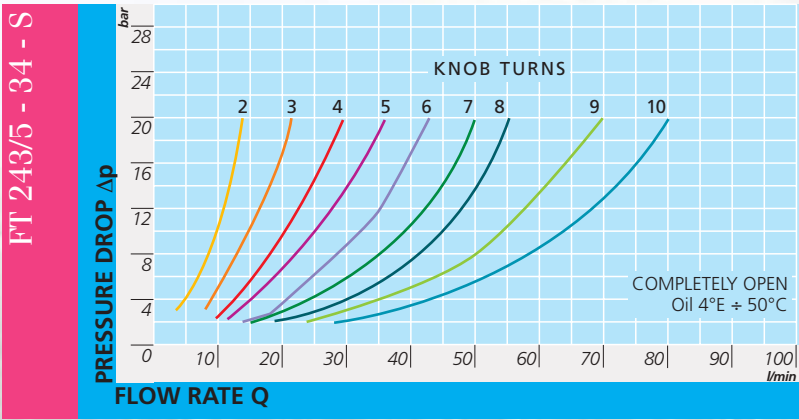
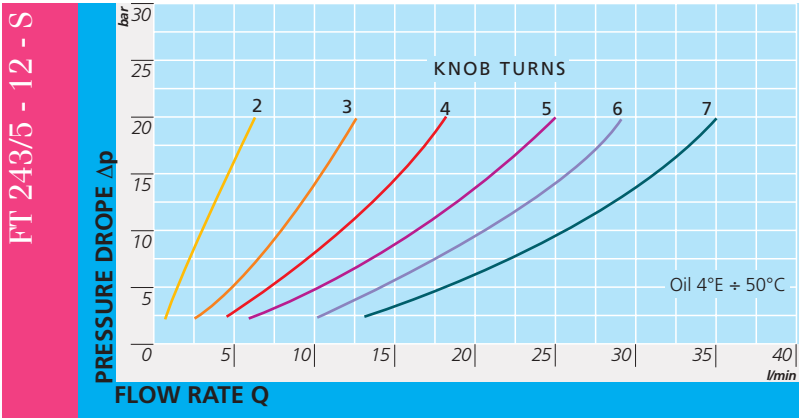
FT 243/5 - 38 - S



FLOW RATE CURVES



FT 243/5-S



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



FT3 FC



FT3 FX



FT3 FO



FT3 CO



FT3 RO



FT3 CP



FT3 RP



FT3 MO



FT3 LSP3



FT3 MP



FT3 Q3P



FT3 PC



STACKABLE VALVES

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

FT3 FC
Stackable valves cetop 03 flow control valves
FT3 FX
Stackable valves cetop 03 flow control valves
FT3 CO
Stackable valves cetop 03 check valves
FT3 CP
Stackable valves cetop 03 pilot operated check valves
FT3 MO
Stackable valves cetop 03 pressure relief valves
FT3 MP
Stackable valves cetop pressure relief valves
FT3 FO
Stackable valves cetop 03 flow restrictor valves
FT3 RO
Stackable valves cetop 03 pressure reducing valves
FT3 RP
Stackable valves cetop 03 pressure reducing valves
FT3 LSP3
Stackable valves cetop 03 3-way pressure compensator with load sensing function
FT3 Q3P
Stackable valves cetop 03 pressure compensated flow control valves
FT3 PC
Stackable valves cetop 03 2-way pressure compensator

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

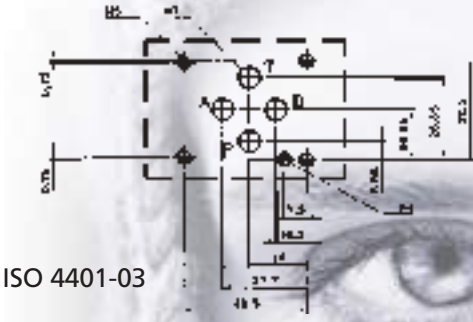
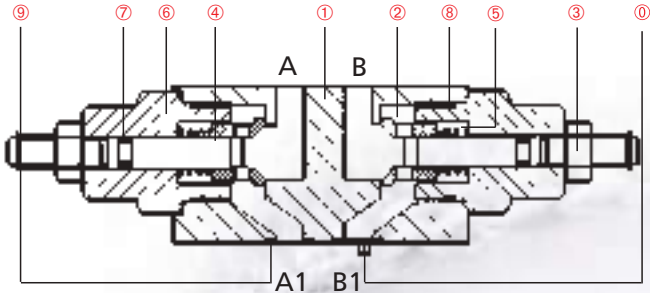
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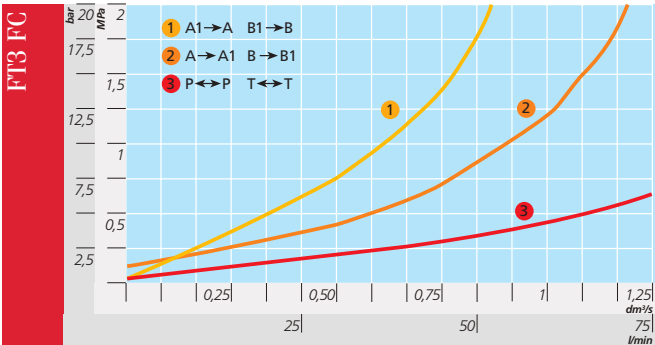
FT3 FC



A HOW TO READ THE MODEL CODE FOR VALVES FT3-FC

FT3 - FC - (AB) - * - ** / 10					
1	2	3	4	5	6
1	FT3	stackable valve CETOP 03 - Pressure 32 MPa (320 bar)			
2	FC	one-way flow control valve			
3	(AB) service lines where the control operates; see also functional symbols A AB Flow controlled from A1 → A and from B1 → B A Flow controlled from A1→ A, free on B B Flow controlled from B1 → B, free on A				
4	Flow control characteristics for A1 → A and B1 → B - See B and opening pressure (Pm) for flow A → A1 and B → B1 - standard control and e Pm approx. 0.04 MPa (0.4 bar) V fine flow control 4 Pm approx. 0.4 MPa (4 bar)				
5	Code reserved for special variants (seals, materials, surface treatments, etc.).				
6	Design number (progressive) of the valve.				

B TYPICAL DIAGRAMS



Typical _p-Q curves for valves FT3 - FC - AB, in standard configuration, with mineral oil at 36 cSt at 50° C, with throttling axis at full retraction.

Fluid flows freely on P and T lines; on service lines A and/or B with controls, fluid flows from A → A1 (and/or B → B1) overcoming the force of spring ⑤ acting on sleeve ②; fluid flows from A1 → A (and/or B1 → B) through orifice of sleeve ②; the throttling axis ④, which is shifted by screwing it and locked by its nut ③, partially obstructs the control orifices, thus making the flow rate entirely dependent on the available pressure drop

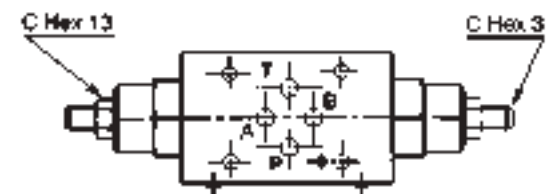


FTB FOC

The diagram shows a rectangular circuit with four vertical branches. The top nodes are labeled P, T, B, and A from left to right. The bottom nodes are labeled P, T, B1, and A1 from left to right. Vertical lines connect P to P, T to T, B to B1, and A to A1. A horizontal line connects the top nodes P, T, B, and A. Another horizontal line connects the bottom nodes P, T, B1, and A1. A load impedance Z_L is connected between node B and node B1.

All data are expressed in mm

Technical drawing of a shaft with dimensions: 164 mm total length, 62 mm diameter, and 10 mm end flange thickness.



The control is made by throttling from A1→ A (e/o B1→B), through variable orifices. Depending on the various sleeve/axis combination, the control adjustment is:

V (fine)	from 100% (**) to 0% with 5 complete turns of the adjustment screw
----------	--

(**) approx. Q=0.5 dm³/s (30 l/min) at
ΔP=2MPa (20 bar)

The axis ④ is shifted to increase throttling by unlocking its nut ③ and turning clockwise the adjustment screw. Suitable mechanical stops prevent dangerous manoeuvring.

Recommended max. flow rate	1dm³/s (60 l/min)
Max. nominal pressure	32 MPa (320 bar)
Loss of pressure	see B
Adjustment	see C
Dimensions	see F
Mass about	circa 1,2 kg

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

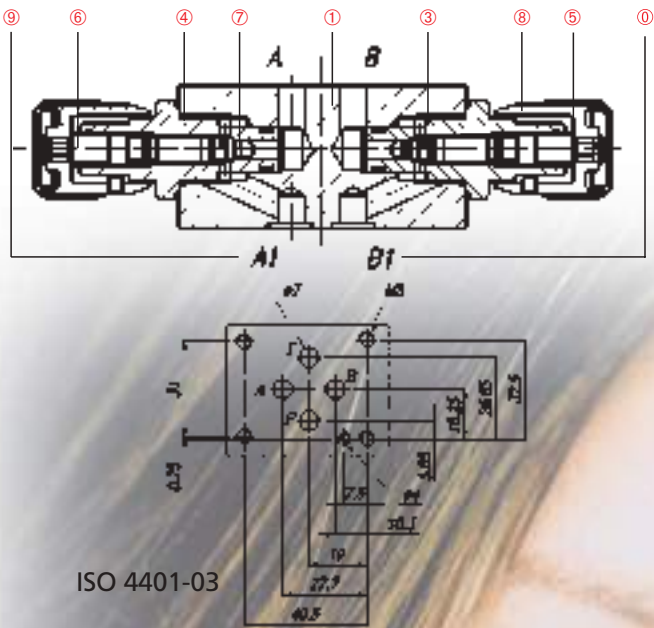
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ESC



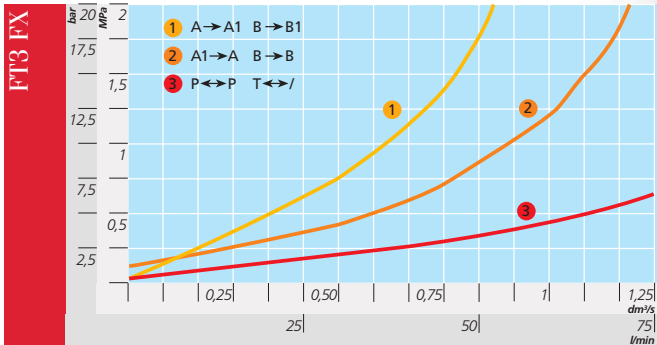
FT3 FX



A HOW TO READ THE MODEL CODE FOR VALVES FT3- FX

FT3 - FX - (AB) - * - ** / 10					
1	2	3	4	5	6
1	FT3	stackable valve CETOP 03 - Pressure 32 MPa (320 bar)			
2	FX	one-way flow control valve			
3	(AB)	Services lines where the control operate; see also functional symbols A AB Flow controlled from A1 → A and from B1 → B A Flow controlled from A1 → A, free on B B Flow controlled from B1 → B, free on A			
4		Flow control characteristics for A1 → A and B1 → B - see also B and check valve opening pressure (Pm) for flow A1 → A e B → B1 - standard control and e Pm approx. 0.04 MPa (0.4 bar) V fine flow control W extrafine flow control 4 Pm approx. 0.4 MPa (4 bar)			
5		Code reserved for special variants (seals, materials, surface treatments, etc.).			
6		Design number (progressive) of the valve.			

B TYPICAL DIAGRAMS



Typical Δp -Q curves for valves FT3 - FX, in standard configuration, with mineral oil at 36 cSt at 50° C, with throttling axis at full retraction.

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

STACKABLE VALVES CETOP 03 FLOW CONTROL VALVES

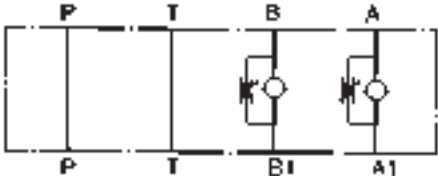
Fluid flows freely on P and T lines; on service lines A and/or B with controls, fluid flows from A1→ A (and/or B1→ B) overcoming the force of spring ⑤ acting on sleeve ②; fluid flows from A1→ A (and/or B1→ B) through orifice of sleeve ②; the throttling axis ④, which is shifted by screwing it and locked by handle rotation, partially obstructs the control orifices, thus making the flow rate entirey dependent on the available pressure drop.



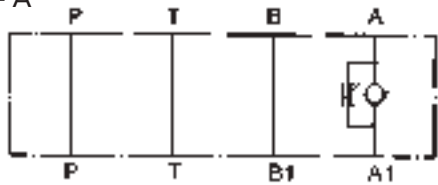
D DATA AND OPERATING PRESSURE	
Recommended max. flow rate	1dm3/s (60 l/min)
Max. nominal pressure	32 MPa (320 bar)
Loss of pressure	see B
Dimensions	see F
Mass about	1,2 kg

E FUNCTIONAL SYMBOLS

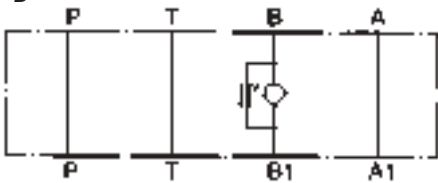
FT3 - FX - AB



FT3 - FX - A

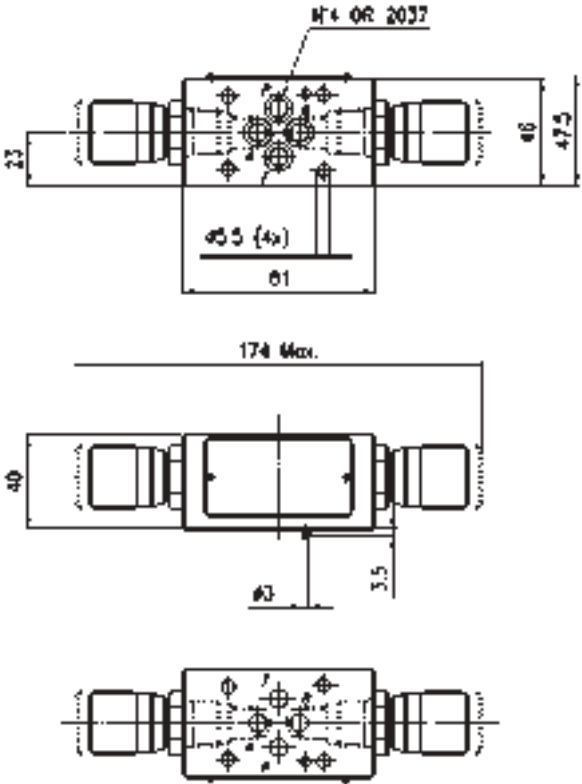


FT3 - FX - B



F INSTALLATION DIMENSION

All data are expressed in mm



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

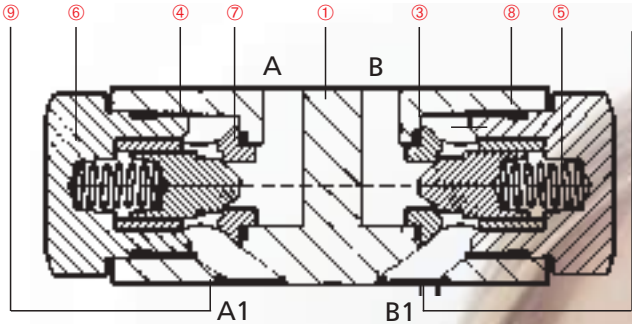
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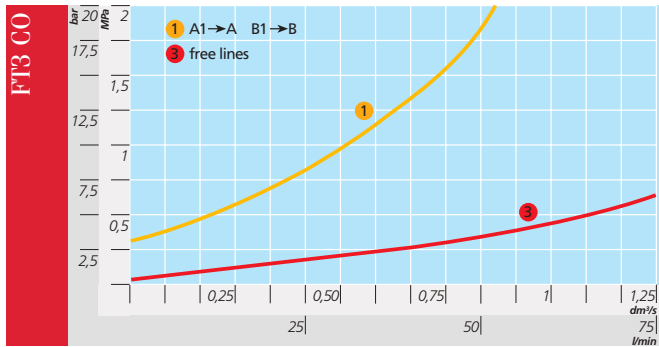
FT3 CO



A HOW TO READ THE MODEL CODE FOR VALVES FT3-CO

FT3 - CO - (AB) - * - ** / 10					
1	2	3	4	5	6
1	FT3	stackable valve CETOP 03 - Pressure 32 MPa (320 bar)			
2	CO	one-way flow control valve			
3	(AB)	Services lines where the control operate; see also functional symbols A AB Flow blocked from A1 → A free on P e T B Flow blocked from B1 → B, free on A, P and T P Flow blocked from P → P1, free on A, B and T			
4		Opening pressure (Pm) of the one-way valve: - (no indication): Pm approx. 0.2 MPa (2 bar) 4 Pm approx. 0.4 MPa (4 bar)			
5		Code reserved for special variants (seals, materials, surface treatments, etc.).			
6		Design number (progressive) of the valve.			

B TYPICAL DIAGRAMS



Typical Δp-Q curves for valves FT3-CO, in standard configuration, with mineral oil at 36 cSt and at 50° C.

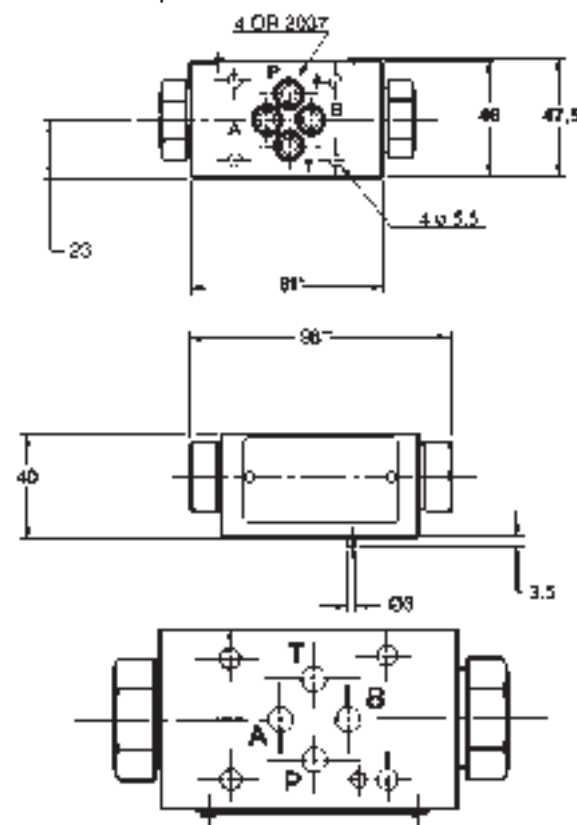
Fluid flows freely on P and T lines; on service lines A and/or B with p.o. check, fluid flows from A→A1 (and/or B→B1) overcoming the force of spring ⑤ acting on poppet ④ and fluid is blocked from A1→A (and/or B1→B).



COB

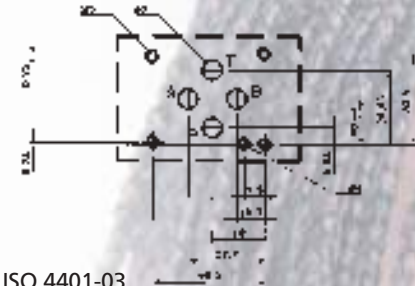
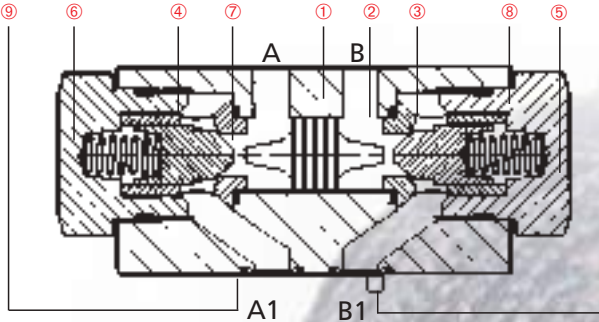
Recommended max. flow rate	1dm ³ /s (60 l/min)
Max. nominal pressure	32 MPa (320 bar)
Loss of pressure	see B
Dimensions	see F
Mass about	1,2 kg

All data are expressed in mm





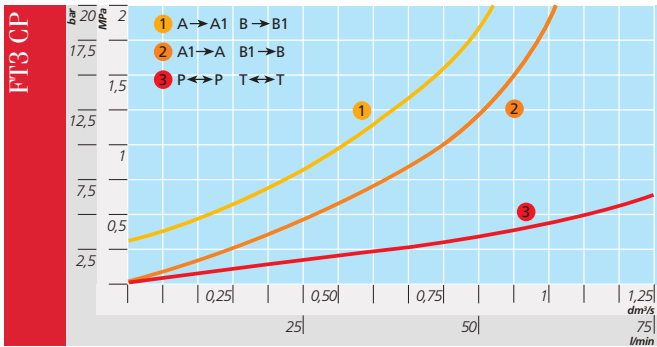
FT3 CP



A HOW TO READ THE MODEL CODE FOR VALVES FT3-CP

FT3 - CP - (AB) - * - ** / 10					
1	2	3	4	5	6
1	FT3	stackable valve CETOP 03 - Pressure 32 MPa (320 bar)			
2	CO	one-way flow control valve, pilot operated (hydraulically)			
3	(AB)	service lines where the control operates; without piloting pressure see also functional symbols A			
	AB	Flow blocked from A1 → A and from B1 → B			
	A	Flow blocked from A1 → A, free on B			
	B	Flow blocked from B1 → B, free on A			
4	Opening pressure (Pm) of the one-way valve, for flow A → A1 and B → B1without piloting				
	-	(no indication):		Pm approx.	0.2 MPa (2 bar)
	4			Pm approx.	0.4 MPa (4 bar)
5	Code reserved for special variants (seals, materials, surface treatments, etc.).				
6	Design number (progressive) of the valve.				

B TYPICAL DIAGRAMS



Typical Δp-Q curves for valves FT3 - CP - AB, in standard configuration, with mineral oil at 36 cSt and at 50° C.

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

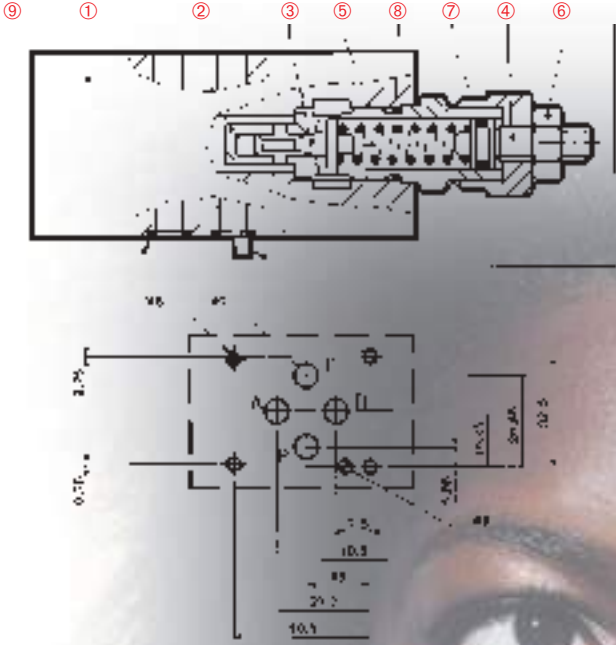
WHOLE PAGE

PRINT

ESC



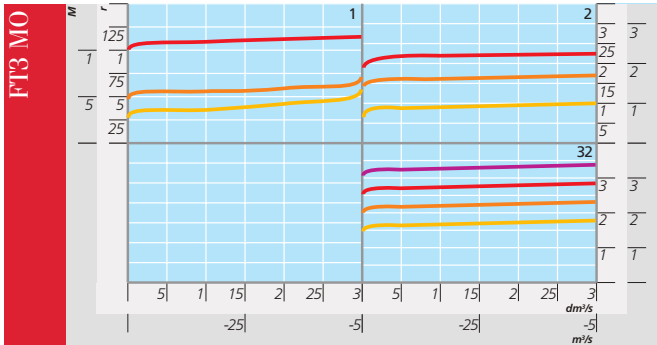
FT3 MO



A HOW TO READ THE MODEL CODE FOR VALVES FT3-MO

FT3 - MO - (P) / (20) - (10) - ** / 10						
1	2	3	4	4a	5	6
1		FT3	stackable valve CETOP 03 - Pressure 32 MPa (320 bar)			
2		MO	one-way flow control valve, pilot operated (hydraulically)			
3		(P)	service line where the control operates - see also functional symbols A P: relief on P and discharge to T B: relief on B and discharge to T BA: independent relief on B and A and discharge to T			
4		(20)	pressure adjustment ranges: 10: from 2,5 to 12,5 Mpa (from 25 to 125 bar) 20: from 4 to 25 Mpa (from 40 to 250 bar) 32: from 40 to 32 Mpa (from 100 to 320 bar)			
4a		(10)	pressure adjustment range for relief on A (only for models FT3-MO-BA) see 4			
5		Code reserved for special variants (seals, materials, surface treatments, etc.).				
6		Design number (progressive) of the valve.				

B TYPICAL DIAGRAMS



Typical P-Q curves for valves FT3-MO, in standard configuration, with mineral oil at 36 cSt and at 50° C.

STACKABLE VALVES CETOP 03
PRESWSURE RELIEF VALVES

Fluid flows freely on A, B, P, and T lines; when on service line, protected by the relief valve, the pressure exceeds the settled value, the piston ③ is pushed by axial hydraulic forces, overcomes the force of spring ⑤ , and shifts in its cylindrical seat ② and opens to the pressurized fluid annular passage to T, thus keeping the pressure level at the requested value.

C ADJUSTMENT OF THE RELIEF PRESSURE

Relief pressure is reached when the axial hydraulic forces on piston ③ equal the force of spring ⑤. The value of the relief pressure can be therefore changed, within the limits of the chosen adjustment range, by changing the compression of the spring ⑤. To increase the relief pressure, turn clockwise the adjustment screw ④, After having unlocked the nut ⑥. For each pressure adjustment range, the pressure gradient is approximate:

10	1,6 MPa/mm (24 bar/turn)
20	3,2 Mpa/mm (48 bar/ turn)
32	5 Mpa/mm (75 bar/ turn)

By screwing pressure increases. When the required level of pressure is reached, lock the nut ⑥.

D DATA AND OPERATING PRESSURE

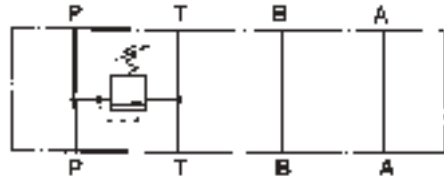
Recommended max. flow rate	
in free lines	1dm³/s (60 l/min)
in controlled lines	0,5dm³/s (30 l/min)
Max. nominal pressure	32 MPa (320 bar)
Adjustment	see B
Pressure adjustment	see C
Dimensions	see F
Mass	
FT3-MO-P e B	approx. 1,7 kg
FT3-MO-BA	approx. 2,3 kg



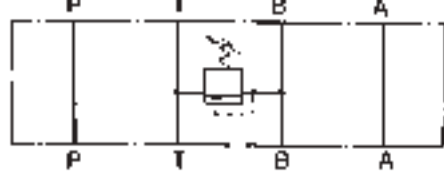
FT3 MO

E FUNCTIONAL SYMBOLS

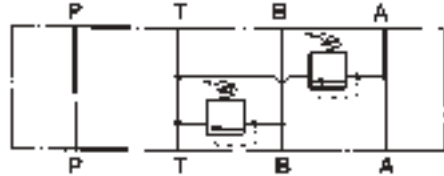
FT3 - MO - P



FT3 - MO - B

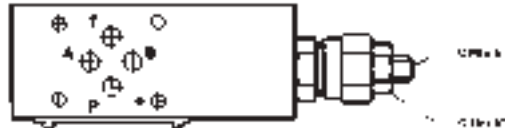
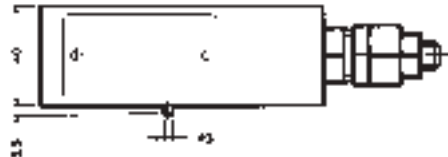
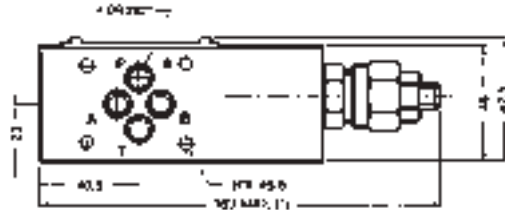


FT3 - MO - BA



F INSTALLATION DIMENSION

All data are expressed in mm
(*) per FT3-MO-BA: 216 max



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

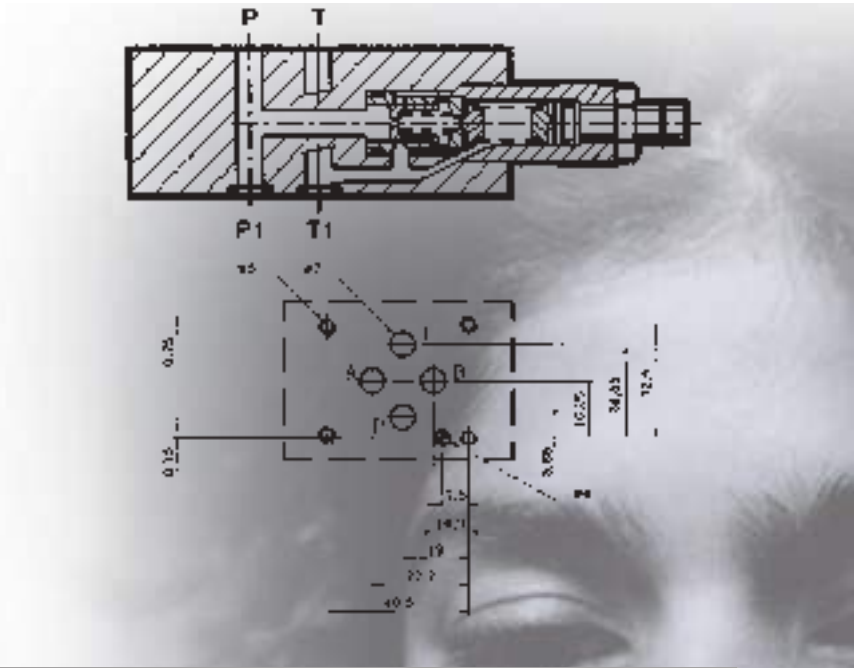
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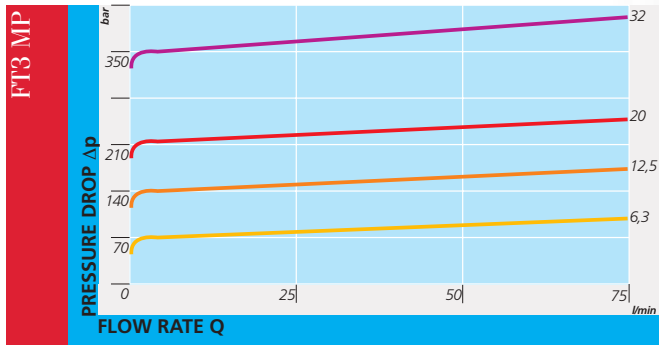
FT3 MP



A HOW TO READ THE MODEL CODE FOR VALVES FT3-MP

FT3 - FC - (P) / (20) - (32) - ** / 10					
1	2	3	4	4a	5 6
1	FT3	stackable valve CETOP 03 - Pressure 32 MPa (320 bar)			
2	MP	pressure relief - pilot operated			
3	(P)	service lines where the control operate, see also functional symbols A P relief on P and discharge to T B relief on B and discharge to T BA independent relief on B and A and discharge to T AB relief on B and A with crossed discharge			
4	(20)	pressure adjustment ranges: 6,3 from 1 to 7 MPa (from 10 to 70 bar) 12,5 from 1 to 14 MPa (from 10 to 140 bar) 20 from 2 to 21 MPa (from 20 to 210 bar) 32 from 2 to 32 MPa (from 20 to 320 bar)			
4a	(32)	pressure adjustment range for relief on A (only for models FT5 - MP - BA) or on B for FT5 - MP - AB			
5	Code reserved for special variants (seals, materials, surface treatments, etc.).				
6	Design number (progressive) of the valve.				

B TYPICAL DIAGRAMS



Typical P-Q curves for valves FT3-MP, in standard configuration, with mineral oil at 36 cSt and at 50° C.

STACKABLE VALVES CETOP 03
PRESSURE RELIEF VALVES

The hydraulic fluid crosses freely into service lines A, B, P and T. The control valve includes a piston and an adjustment and setting pilot valve with a compression of spring. When in the line where control works pressure overcomes the settled valve pressure value, the piston opens because not balances and opens a way through T maintaining the pressure level at the requested value.

C RELIEF PRESSURE ADJUSTMENT

Relief pressure is reached when the axial hydraulic forces on piston equal the force of spring. The value of the relief pressure can be therefore changed, within the limits of the chosen adjustment range, by changing the compression of the spring. To increase the relief pressure, turn clock wise the adjustment screw CH5, after having unlocked the nut CH17mm.

For each pressure adjustment range, the pressure gradient is approximate:

6,3	2	MPa/turn	(20 bar/turn)
12,5	4	MPa/turn	(40 bar/turn)
20	6,3	MPa/turn	(63 bar/turn)
32	10	MPa/turn	(100 bar/turn)

By screwing the pressure increases.
When the required level of pressure is reached, lock the nut with CH17.

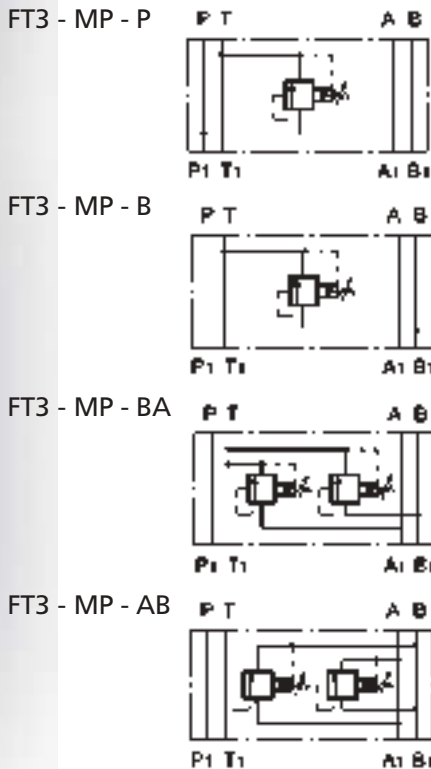


FT3-MP

D DATA AND OPERATING PRESSURE

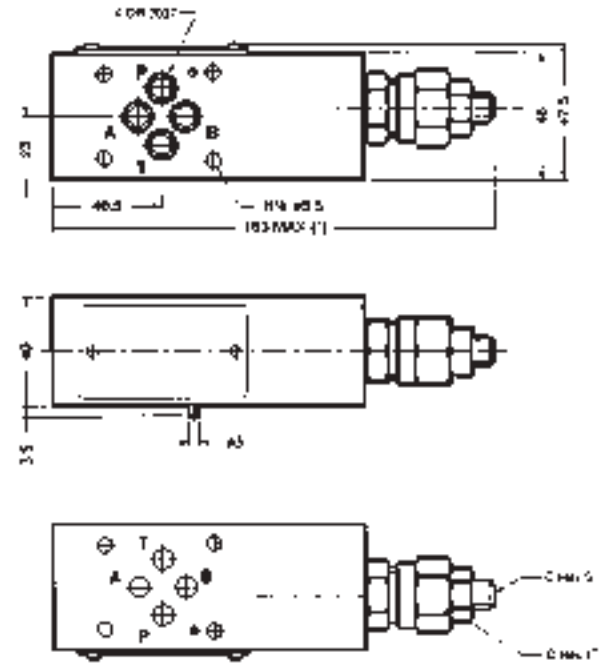
Recommended max. flow rate	1dm3/s (60 l/min)
Max. nominal pressure	32 MPa (320 bar)
Loss of pressure	see B
Adjustment	see C
Dimensions	see F
Mass	approx. 1,2kg

E FUNCTIONAL SYMBOLS



F INSTALLATION DIMENSION

All data are expressed in mm
(*) for FT3-MP-BA and AB: 235 max



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

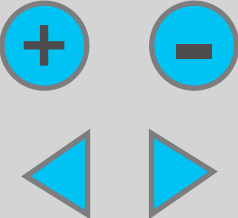
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ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

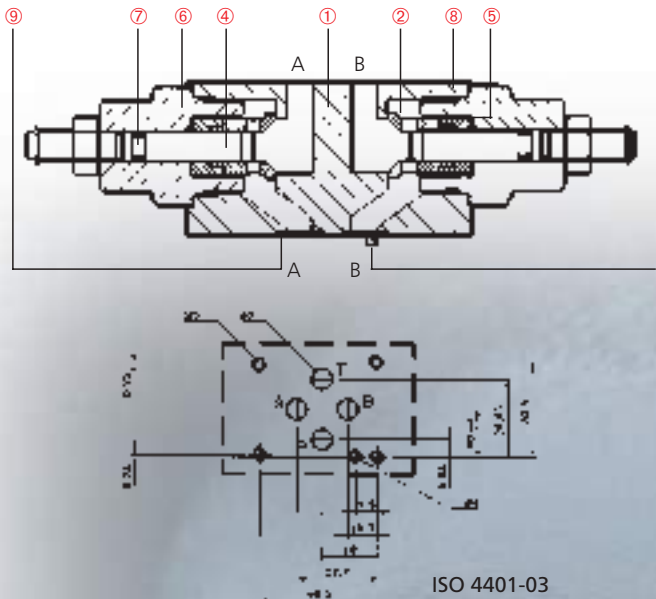
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ESC



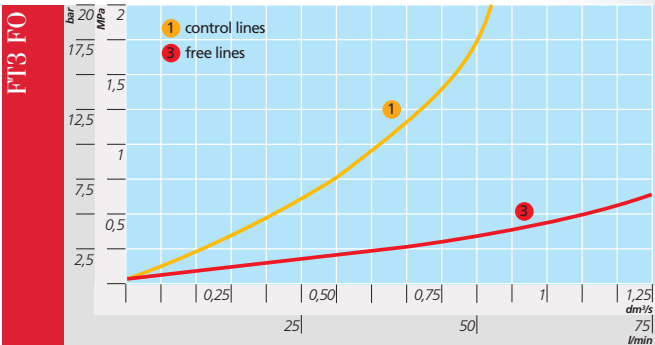
FT3 FO



A HOW TO READ THE MODEL CODE FOR VALVES FT3-FO

FT3 - FO - (AB) - * - ** / 10					
1	2	3	4	5	6
1		FT3	stackable valve CETOP 03 - Pressure 32 MPa (320 bar)		
2		FO	flow restrictor valve with two-way control		
3		(AB)	service lines where the control operates , see also FUNCTIONAL SYMBOLS A		
		AB	controlled flow on A and on B		
		A	controlled flow on A, free on B, P and T		
		B	controlled flow on B, free on A, P and T		
		P	controlled flow on P, free on A, B e T		
4		Flow control	characteristics See F		
		-	standard control		
		V	fine control		
		W	fine and sensitive control		
5		Code reserved for special variants (seals, materials, surface treatments, etc.).			
6		Design number (progressive) of the valve.			

B TYPICAL DIAGRAMS



Typical Δp-Q curves for valves FT3 - FO, in standard configuration, with mineral oil at 36 cSt and at 50° C with throttling axis at full retraction.

STACKABLE VALVES CETOP 03
FLOW RESTRICTOR VALVES

Fluid flows freely on P and T lines; on service lines A and/or B with c.o. valve, fluid flows from A→A1 (and/or B→B1) through orifices of sleeve ②; the throttling axis ④ which is shifted by handle rotation, partially obstructs the orifices, thus making the flow rate entirely dependent upon the available pressure drop.

C RELIEF PRESSURE ADJUSTMENT

The adjustment is made by throttling through variable orifice. Depending on the various sleeve/axis combination, the control adjustment is:

- (standard)	orifice area is reduced from 100% (*) to 0% with 6 complete turns of the adjustment screw
V (fine)	from 100% (**) a 0% with 5 complete turns of the adjustment screw
W (fine and sensitive)	(from 100% (**) a 0% with 8 complete turns of the adjustment screw
(*) corresponding to	Q=1 dm³/s (60 l/min) with ΔP=2MPa (20 bar)
(**) corresponding to	Q=0.5 dm³/s (30 l/min) with ΔP=2MPa (20 bar)

The axis ④ is shifted to increase throttling by unlocking its nut ③ and turning clock wise the adjustment screw. Suitable mechanical stops prevent dangerous manoeuvring.

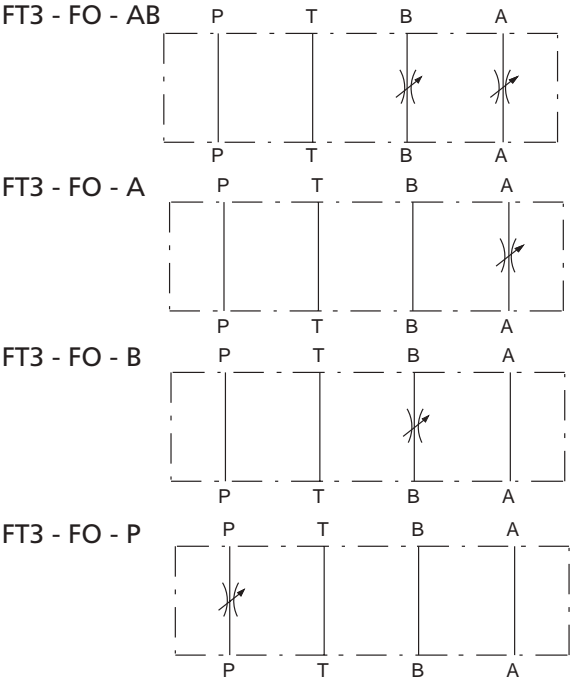
D DATA AND OPERATING PRESSURE

Recommended max. flow rate	1dm3/s (60 l/min)
Max. nominal pressure	32 MPa (320 bar)
Loss of pressure	see B
Adjustment	see C
Dimensions	see F
Mass	approx. 1,2kg



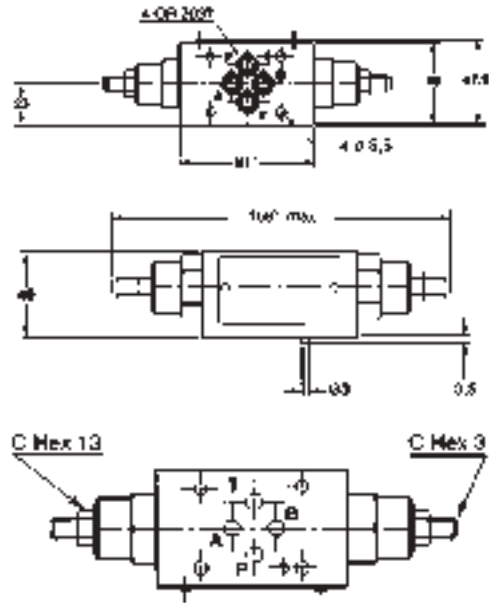
FT3 FO

E FUNCTIONAL SYMBOLS



F INSTALLATION DIMENSION

All data are expressed in mm



HOME

PRESENTATION

VALVES INDEX

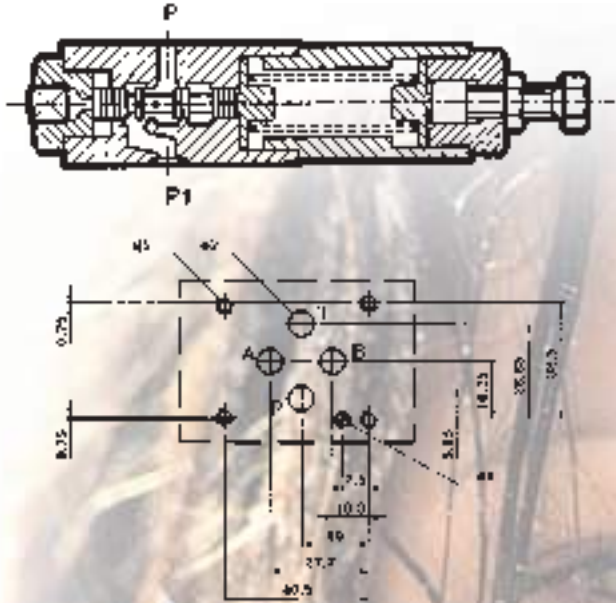


LAST SEEN

WHOLE PAGE

PRINT

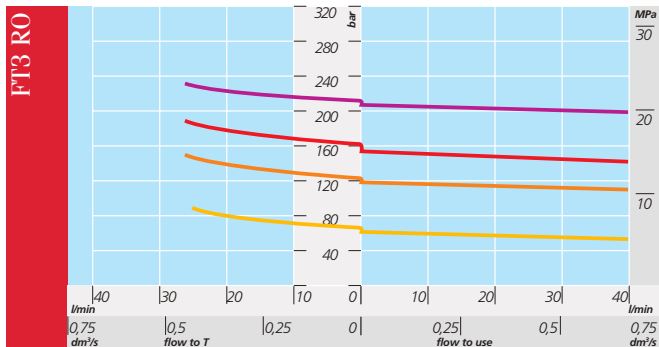
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A HOW TO READ THE MODEL CODE FOR VALVES FT3-RO

FT3 - RO - (P) / (2 5) - ** / 10					
1	2	3	4	5	6
1	FT3	stackable valve CETOP 03 - Pressure 32 MPa (320 bar)			
2	RO	pressure reducing, direct operated - 3-way valve			
3	(P)	service lines where the control operates, see also functional symbols A P control on P with 3° way and drain to T A control on A with 3° way and drain to T B control on B with 3° way and drain to T			
4	(25)	adjustment range of reduced pressureC 3,2 from 0,3 to 3,5 MPa (from 3 to 35 bar) 6,3 from 1 to 7 MPa (from 10 to 70 bar) 12,5 from 3 to 14 MPa (from 30 to 140 bar) 25 from 6 to 28 MPa (from 60 to 280 bar)			
5	Code reserved for special variants (seals, materials, surface treatments, etc.).				
6	Design number (progressive) of the valve 131				

B TYPICAL DIAGRAMS



Typical P_Q curves for valves FT3 - RO, in standard configuration, with mineral oil at 36 cSt and at 50° C.

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

STACKABLE VALVES CETOP 03
PRESSURE REDUCING VALVES

All valves FT3-RO-* are 3-way, direct operated: if the pressure in the regulated chamber overcomes the value of the adjusted reduced pressure, the valve discharges to T (at pressure value higher than the reduced pressure - see diagrams) thus acting as safety or relief valve.

All valves type FT3-RO-* reduce pressure on port P of the solenoid valve as follows:

- on version P the pilot pressure intake is on channel P and therefore the valve constantly reduces pressure at the settled value;
- on version A the pilot pressure intake is on channel A: the valve reduces pressure in A when the solenoid valve connects PA and BT; when the solenoid valve connects PB and AT, there is full pressure in B.
- on version B the pilot pressure intake is on channel B: there is full pressure in A when the solenoid valve connects PA and BT; the valve reduces pressure in B when the solenoid valve connects PB and AT.

All valves type FT3-RO-* are equipped with 1/4" BSP 2 manometer port for the direct reading of the reduced pressure.

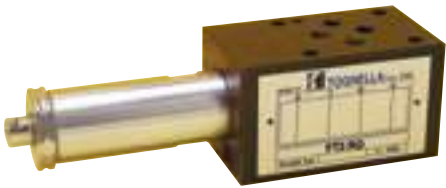
C ADJUSTMENT OF REDUCED PRESSURE

Reduced pressure is obtained by throttling the flow on spool which is balanced, on one side, by the reduced pressure and, on the other side, by the positioning spring. The value of the reduced pressure is changed by changing the compression of spring. To increase the value of the reduced pressure turn clockwise the handknob or screw ③ By acting on ex. CH 17 mm., after having unlocked its nut. When the required level of pressure is reached, lock the nut. For each adjustment range see E ④ the adjustment gradient is approx.:

3,2	0,7	MPa/turn	(7 bar/turn)
6,3	1,4	MPa/turn	(14 bar/turn)
12,5	2,5	MPa/turn	(25 bar/turn)
25	5	MPa/turn	(50 bar/turn)

D DATA AND OPERATING PRESSURE

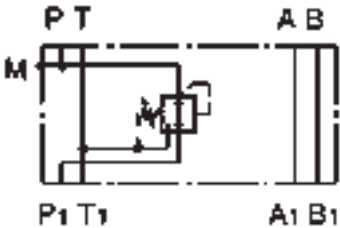
Recommended max. flow rate	
in free lines	1dm3/s (60 l/min)
in controlled lines	0,66 dm3/s (40 l/min)
Max. nominal pressure	32 MPa (320 bar)
Max. pressure on T line	10 MPa (100 bar)
Drain	<1,2 cm3/s (0,07 l/min)
Calibration	see C
Adjustment	see B
Dimensions	see F
Mass	approx. 1,45kg



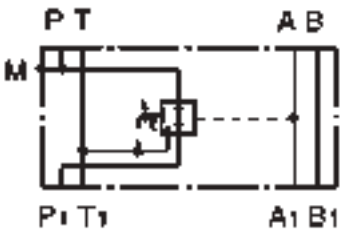
FT3 RO

E FUNCTIONAL SYMBOLS

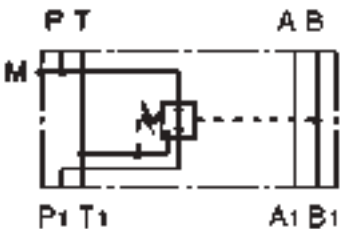
FT3 - RO - P



FT3 - RO - A

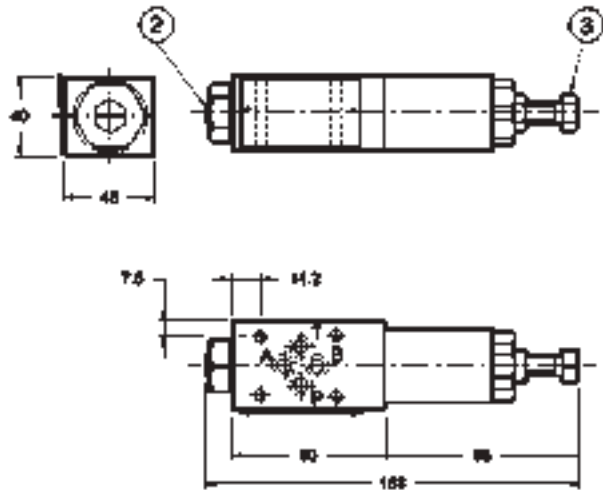


FT3 - RO - B



F INSTALLATION DIMENSION

All data are expressed in mm



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

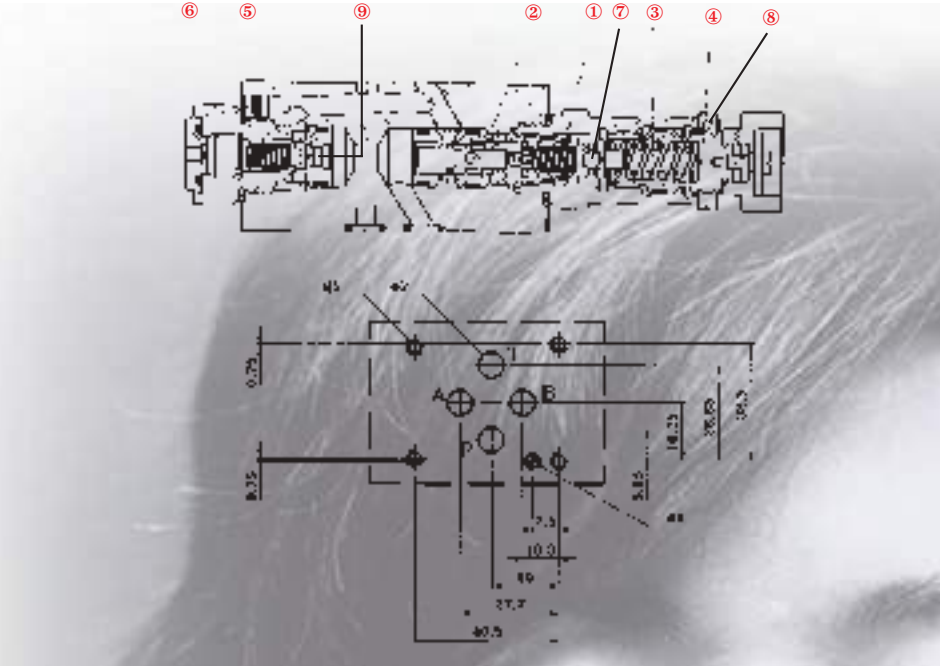
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PRINT

ESC



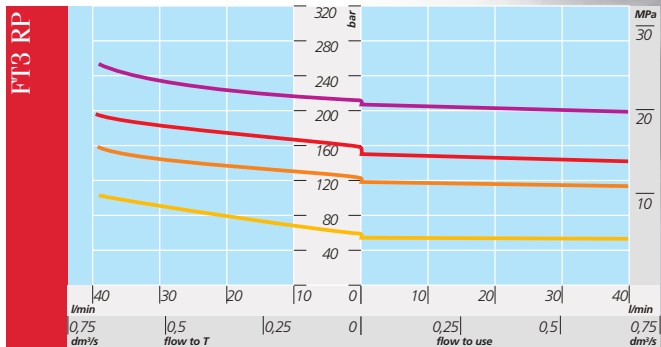
FT3 RP



A HOW TO READ THE MODEL CODE FOR VALVES FT3-RP

FT3 - RP - (P) / (20) - ** / 10					
1	2	3	4	5	6
1		FT3	stackable valve CETOP 03 - Pressure 32 MPa (320 bar)		
2		RP	pressure reducing, pilot operated - 3-way valve		
3		(P)	service lines where the control operates , see also functional symbols A P control on P with 3° way and drain to T line AC control on A with check valve BC control on B with check valve		
4		(25)	adjustment range of reduced pressure C 6,3 from 0,5 to 7 MPa (from 5 to 70 bar) 20 from 1 to 21 MPa (from 10 to 210 bar)		
5		Code reserved for special variants (seals, materials, surface treatments, etc.). V adjustment handwheel			
6		Design number (progressive) of the valve.			

B TYPICAL DIAGRAMS

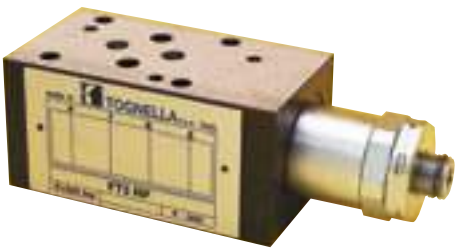


Typical curves for valves FT3 RP, in standard configuration, with mineral oil at 36 cSt and at 5p° C.

MODULAR VALVE CETOP 03
PRESSURE REDUCING

All valves FT3-RP-* are 3-way, direct operated: if the pressure in the regulated chamber overcomes the value of the adjusted reduced pressure, the valve discharges to T (at pressure value higher than the reduced pressure - see diagrams) thus acting as safety or relief valve.

All pressure regulating valves on A or B lines are (types FT3-RP-AC or -BC) equipped with check valve _through and they allow reverse flow to port A or B of the solenoid valve. (See ΔP - C).



FT3 RP

C ADJUSTMENT OF REDUCED PRESSURE

Reduced pressure is obtained by throttling the flow on spool ② which is balanced, on one side, by the reduced pressure and, on the other side, by the positioning spring.

The value of the pilot pressure is determined by the force of spring ③ on the pilot valve ⑦.

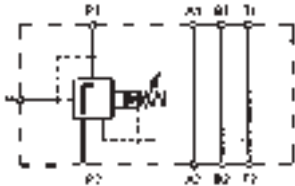
The change of the value of the reduced pressure is obtained by changing the compression of the spring ③. To increase the value of the reduced pressure, turn clockwise the handwheel or screw by acting on ex. CH 10 mm, after having unlocked its nut ⑥ CH 26 mm. When the required pressure is reached, lock the nut.

D DATA AND OPERATING PRESSURE

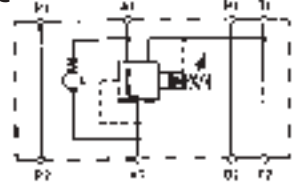
Recommended max. flow rate	
in free lines	1dm3/s (60 l/min)
in controlled lines	0,66 dm3/s (40 l/min)
Max. nominal pressure	32 MPa (320 bar)
Max. pressure on T line	10 MPa (100 bar)
Pilot flow rate	4 cm3/s (0.24 l/min)
Adjustment	see B
Calibration	see C
Dimensions	see F
Mass	
FT3-MO-P e B	approx. 1,1 Kg
FT3-MO-BA	approx. 1,45 Kg

E FUNCTIONAL SYMBOLS

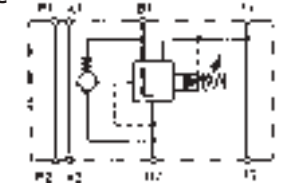
FT3 - RP - P



FT3 - RP - AC



FT3 - RP - BC

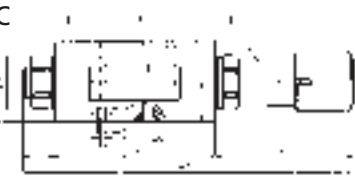


F INSTALLATION DIMENSION

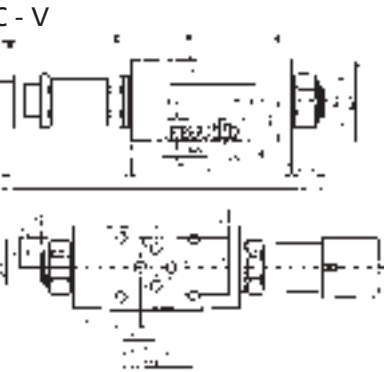
FT3 - RP - P



FT3 - RP - AC



FT3 - RP - BC - V



HOME

PRESENTATION

VALVES INDEX

+

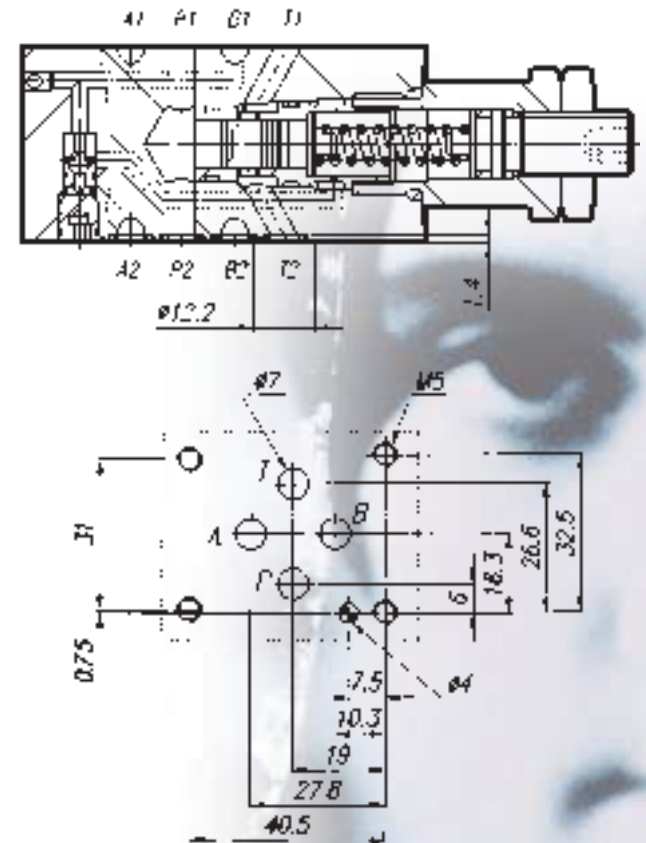
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LAST SEEN

WHOLE PAGE

PRINT

ESC



1	FT3	stackable valve CETOP 03 - Pressure 32 MPa (320 bar)
2	LS	compensator with "load-sensing" function, with adjustable DP, see also F
3	(P)	service line where the control operates - see also functional symbols A
4	(3)	3-way compensator with exhaust in T of the flow rate in excess
5	V	Code reserved for special variants (seals, materials, surface treatments, etc.). adjustment handwheel
6		Design number (progressive) of the valve.

FT3 LS P3

Pressure Drop Δp vs Flow Rate Q

Legend:

- use pressure = 30 bar
- - - use pressure = 140 bar

Flow Rate Q (l/min)	Pressure Drop Δp (bar) - 30 bar (Solid)	Pressure Drop Δp (bar) - 140 bar (Dashed)
0	~42	~12
10	~42	~11
20	~41	~10
30	~38	~9
40	~32	~6

134

STACKABLE VALVES CETOP 03
3-WAY PRESSURE COMPENSATOR
WITH LOAD SENSING FUNCTION

The valve is a 3-way pressure compensator, with direct action, realized in modular version with interface surface corresponding to CETOP and ISO standards.

When using this kind of valve, a constant pressure drop (characteristic Δp) between the P-way and alternately the A-way and B-way is held. It is normally used in combination with the directional valves with proportional control so that it is possible to realize flow rate controls, which are independent from pressure changes.

The selection of the pilot pressure on the A-way and B-way is carried out automatically through a bistable check valve inside the compensator.

C ADJUSTMENT OF REDUCED PRESSURE

The calibration of the valve FT3-LS-P3 is useful to calculate the range of the use flow rate.

According to a non-linear law, if ΔP increases, the value of the compensated flow rates, which pass through the adjusting mechanism increases too, and this does not depend on the operating pressure of the system. Ex. In a system like that shown in A, consisting of FT3-LS-P3 plus proportional valve HD3-PS-3RC-xx (see table HD-320), with ΔP of 1MPa (10 bar), the flow rate to the actuator changes between 0 and 16 l/min, with ΔP of 3MPa (30 bar) the flow rate to the actuator changes between 0 and 28 l/min (this does not depend on the value of the system working pressure).

To improve the system operation it is essential to adjust the ΔP of the compensator.

By operating with CH5mm on the adjusting pin ②, after loosening the check nut ① at CH17mm the ΔP of the compensator is adjusted. It is recommended to loose completely the spring, by turning (anticlockwise till the mechanical lock) the threaded pin ② at pitch 1,25mm. By screwing clockwise:

$\Delta P = 0,4 \text{ MPa}$ (4 bar) stroke 2,5 mm* (2 rev.)

$\Delta P = 1,2 \text{ MPa}$ (12 bar) stroke 3,75mm* (3 rev.)

$\Delta P = 2,1 \text{ MPa}$ (21 bar) stroke 5 mm* (4 rev.)

$\Delta P = 3 \text{ MPa}$ (30 bar) stroke 6,25mm* (5 rev.)

$\Delta P = 3,9 \text{ MPa}$ (39 bar) stroke 7,5 mm* (6 rev.)

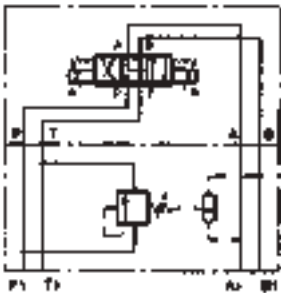
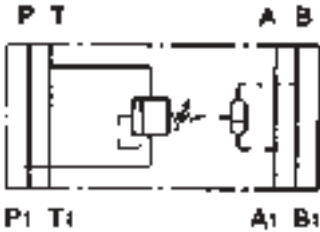
* including an initial "dead" stroke of about 2mm (1,5 rev.). When the required calibration is reached, tighten the check nut with CH17mm.

D DATA AND OPERATING PRESSURE

Recommended max. flow rate	0,66 dm ³ /s (40 l/min)
Max. nominal pressure	32 MPa (320 bar)
Adjustment	see B
Calibration ΔP adjustable	from 0,5 to 4
Adjustment	see C
Calibration	Mpa (from 5 to 40 bar)
Dimensions	see F
Mass	approx. 1,45 kg

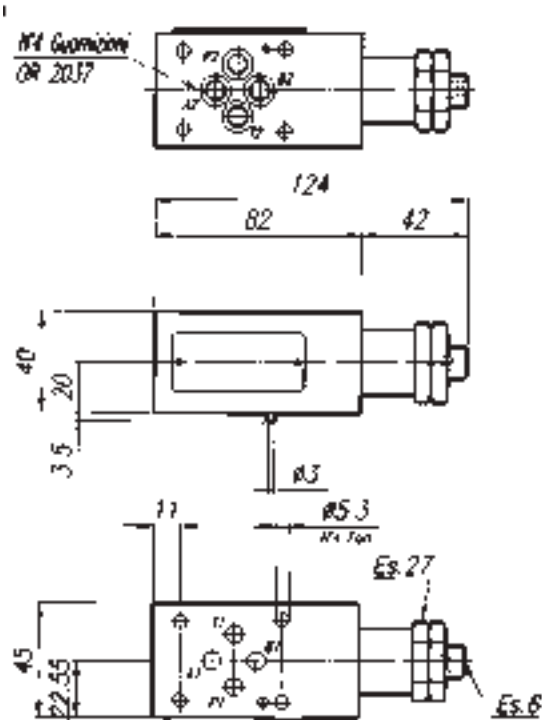


E FUNCTIONAL SYMBOLS



F INSTALLATION DIMENSION

Standardized ISO - All data are expressed in mm



FT3 LS P3



HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

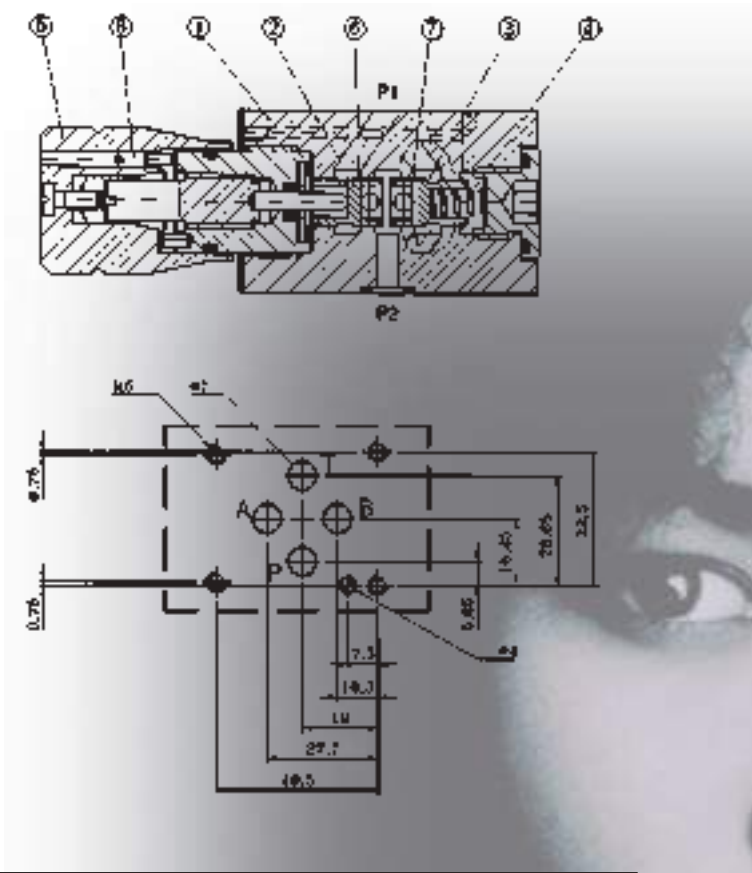
WHOLE PAGE

PRINT

ESC



FT3 Q3P

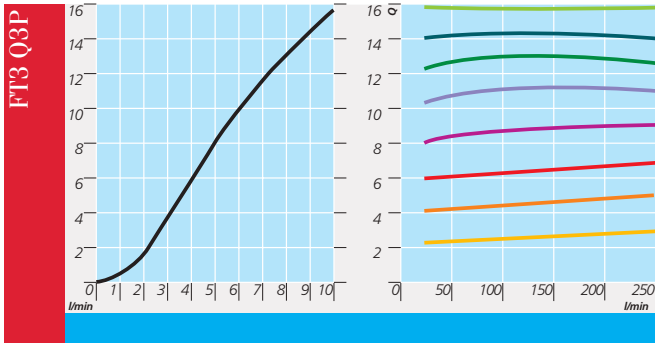


A HOW TO READ THE MODEL CODE FOR VALVES FT3-Q3P

FT3 - Q3 - (P) - (16) / ** / 10

1	2	3	4	5	6
1	FT3		stackable valve CETOP 03 - Pressure 32 MPa (320 bar)		
2	Q3		pressure reduced, pilot operated - 3-way valve		
3	(P)		service line where the control operates - see also functional symbols A		
4	(16)		Flow control characteristics 16=0,06 (16 l/min max. regulated flow control rate to P1. When the inlet flow (atP2) is higher than the required value, the excess is discharged in T.		
5			Code reserved for special variants (seals, materials, surface treatments, etc.).		
6			Design number (progressive) of the valve.		

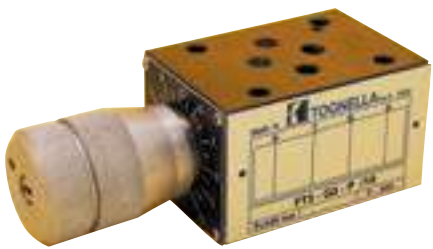
B TYPICAL DIAGRAMS



Typical holding curves (Q e Q-P) for valves AM3-Q3-P
Oil at 36 eSt and at 50°C

STACKABLE VALVES CETOP 03
FLOW CONTROL VALVES
PRESSURE COMPENSATED

3-way pressure compensated flow control valves are designed to provide adjustable controlled flow rates independent of changes in system pressure.
The flow control valve consists basically housing throttling spool ②, pressure compensator ③, spring handknob ⑤ with adjusting parts.
Fluid from port P2 is divided into two parts; one part passes through orifice area of the throttling spool and onwards to port P1, the other part proceeds through orifice area of the compensator to port T.

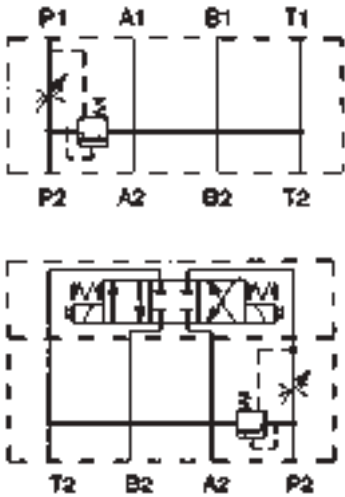


CETOP 03

C CONTROL OF THE FLOW

By turning the knob the value of the regulated flow changes.
The scale/flow characteristics is approx. linear and the full range is covered by turning the knob by approx. 320°.
The scale is divided in 10 marks.
Clockwise: flow increases
Anticlockwise: flow decreases
When the required value is reached, set the knob position by fixing the screw.

E FUNCTIONAL SYMBOLS

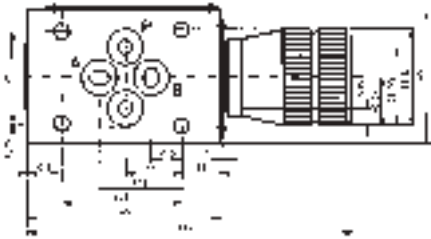


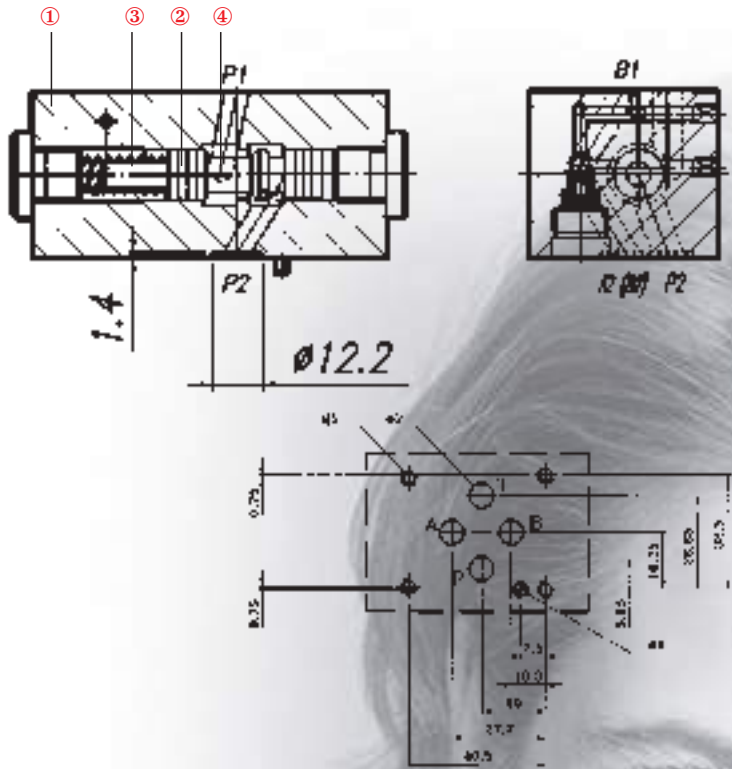
D DATA AND OPERATING PRESSURE

Recommended max. flow rate	42 l/min
Max. flow rate on	P1 16 l/min
Max. nominal pressure	32 MPa (320 bar)
Adjustment	see B
Correction	see C
Mass dimensions	see F
Weight	approx. 0,8 kg

F INSTALLATION DIMENSION

Standardized ISO - Alla data are expressed in mm

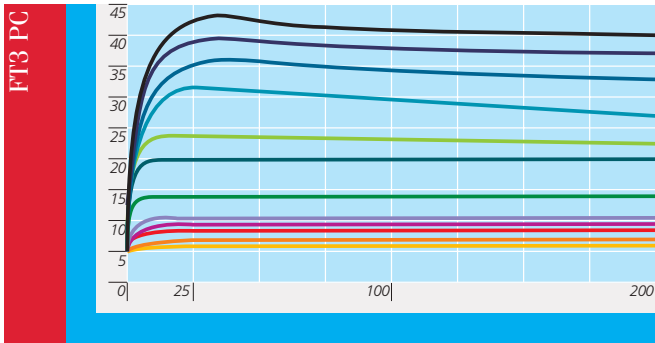




A HOW TO READ THE MODEL CODE FOR VALVES FT3-PC

FT3 - PC - (P) - (*) - (**) / 10					
1	2	3	4	5	6
1	FT3	stackable valve CETOP 03 - Pressure 32 MPa (320 bar)			
2	PC	2-way pressure compensator			
3	(P)	service line where the control operates - see also functional symbols A P control on P with selection A, B A control on A B control on BC			
4	(*)	(*) pressure compensator ΔP ΔP standard = 1 MPa (10 bar)			
5	(**)	Code reserved for special variants (seals, materials, surface treatments, etc.).			
6	Design number (progressive) of the valve.				

B TYPICAL DIAGRAMS



Typical curves for valves FT3-PC in standard configuration, with mineral oil at 36 cSt at 50° C
Flusso (l/min)

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

STACKABLE VALVES CETOP 03
2-WAY PRESSURE COMPENSATOR

2-way pressure compensator. When using the 2-way pressure compensator, a constant pressure difference across the metering edge of the proportional direction valve is held. In this case, the pressure variations due to loading changes, as well as pump pressure changes, are compensated.

This means that an increase in pump pressure cannot result in any flow increase.

Provided that there is no preloading of the outlet port, the use of a meter-in pressure compensator is limited only to drives with exclusively positive load direction

C CONTROL OF THE FLOW

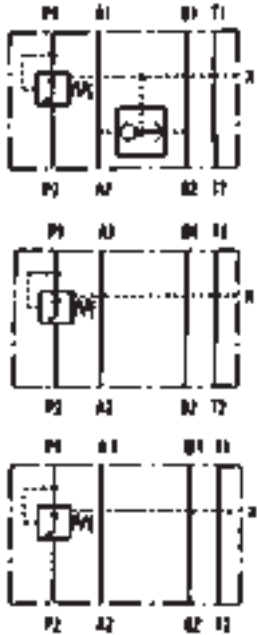
Valves FT3-PC-* are directly operated 2-way pressure compensators. The main parts of these valves are the housing (1), control spool (2), spring (3) and logic valve (4). The spring (3) holds the spool in the open position from P2 to P1, provided that the pressure difference between P1 and A (P1 - B) is less than (P = 10 bar. When the pressure difference exceeds the value (P = 10 bar, the spool shifts against spring until the requested pressure difference has been restored.

D DATA AND OPERATING PRESSURE

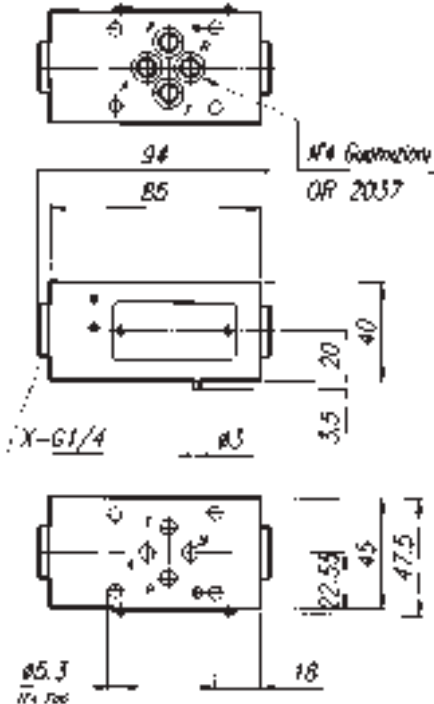
Recommended max. flow rate	32 l/min
Max. nominal pressure	32 MPa (320 bar)
Adjustment	see B
Mass dimensions	see F
Weight	approx. 1,4 kg



E FUNCTIONAL SYMBOLS



F INSTALLATION DIMENSION





HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



FT 280/2



FT 280/5



FT 280/6



FT 281/2



FT 281/5



FT 288/2



FT 288/5



FT 289/2



FT 289/5

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

CONTROL PLATE VALVES



FT 280/2
Double-acting control plate valves
FT 280/5
Single-acting control plate valves
FT 280/6
Single-acting plate valves
FT 281/2
Double-acting microfine control plate valves
FT 281/5
Single-acting microfine control plate valves
FT 288/2
Pressure compensated microfine flow control plate valves
FT 288/5
Single-acting pressure compensated microfine flow control plate valves
FT289/2
Pressure compensated flow control plate valves
FT289/5
Single-acting pressure compensated flow control plate valves

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

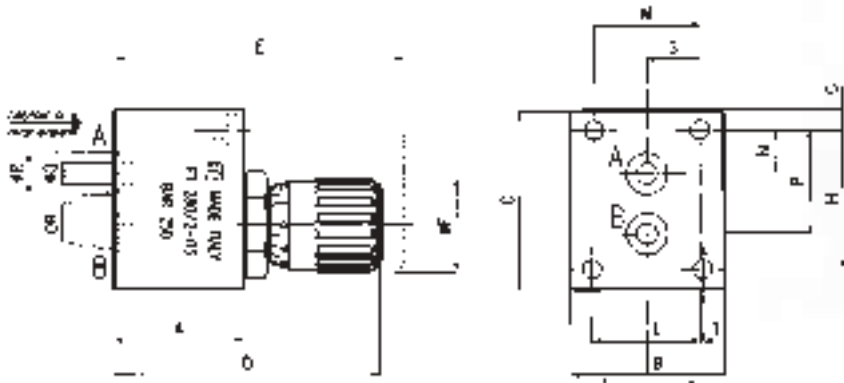
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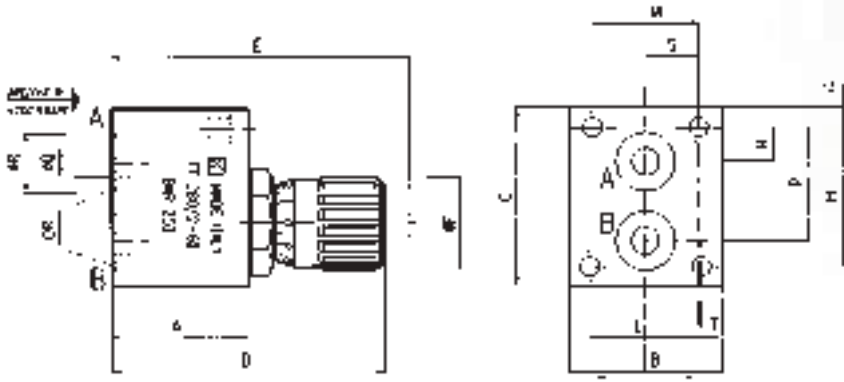


FT 280/2



DIMENSIONS

TYPE	A	B	C	D	E	Ø F	G	H	L	M	N	P	Ø Q	Ø R	S	T	Ø R	SCREW	WEIGHT KG
03	38	45	52	78,3	85,3	27	5,75	40,5	31,75	31	12,7	30,2	6	12	15,5	0,75	108	M5x40	0,700



DIMENSIONS

TYPE	A	B	C	D	E	Ø F	G	H	L	M	N	P	Ø Q	Ø R	S	T	Ø R	SCREW	WEIGHT KG
60	40	45	52	80,3	87,3	27	5,75	40,5	31,75	31	10	33	8	17,2	15,5	0,75	2056	M5x45	0,720

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

DOUBLE-ACTING CONTROL PLATE VALVES

They allow flow control in both directions.
Needle adjustment to give:

- efficient metallic sealing;
- flow linearity during opening;
- accurate flow control for a wide range of flow rates.

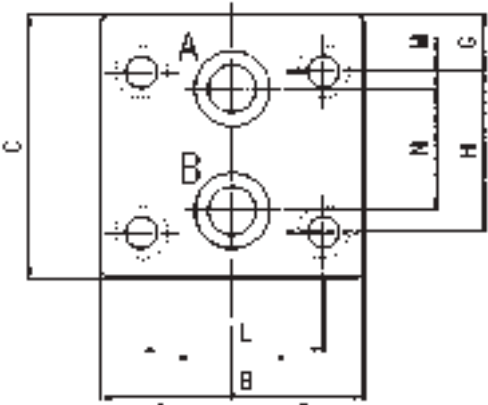
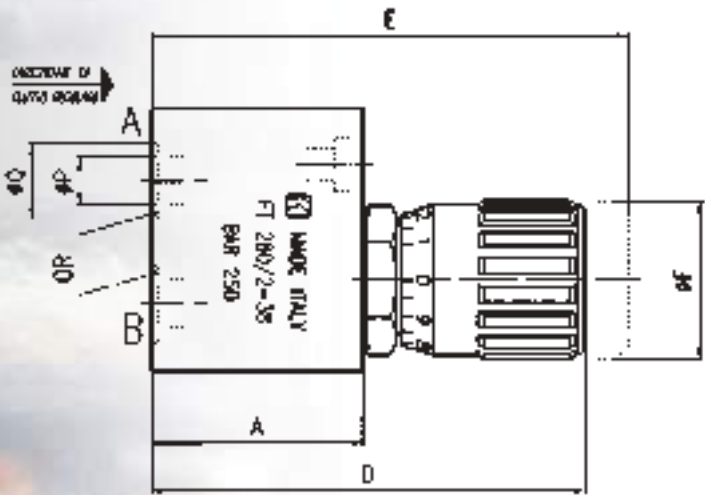
A double reference device consisting of a graduated scale on the handle and of a metallic ring, with a graduated scale, and divided in sectors allows identifying the flow rate conditions.

A locking screw in the handle ensures the stability of flow rate values preventing accidental adjustment or movement due to vibrations.

They are provided with plate connections mod. CETOP 03 or interchangeable with the broadly used valves. The connection seals are equipped in series.

Max. working pressure 250 bar.

- On request
- Complete with Viton seals (V)
 - Knob in ABS (mp)



DIMENSIONS

TYPE	A	B	C	D	E	Ø F	G	H	L	M	N	Ø P	Ø Q	Ø R	SCREW	WEIGHT KG
18	32	42	35	66,8	71,8	22	8	19	28,5	1,5	16	4	9,5	2025	M6x40	0,350
14	38	50	50	78,3	85,3	27	7,5	35	33,5	5	25,5	6	12,7	2037	M6x45	0,730
38	44	55	55	90,5	99,5	33	12	33,5	38	3,5	25,5	8	15,7	2050	M6x50	1,040
12	55	60	70	109,1	119,6	38	18	38	44,5	4	30	11	19,7	119	M6x60	1,810

EXAMPLE FOR ORDERING

CODE	TYPE
FT 280/2	18
FT 280/2	38

EXAMPLE FOR ORDERING

CODE	TYPE
FT 280/2	03
FT 280/2	60

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

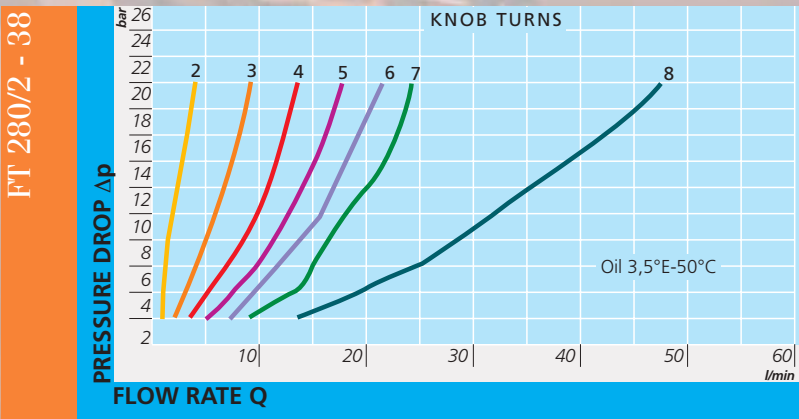
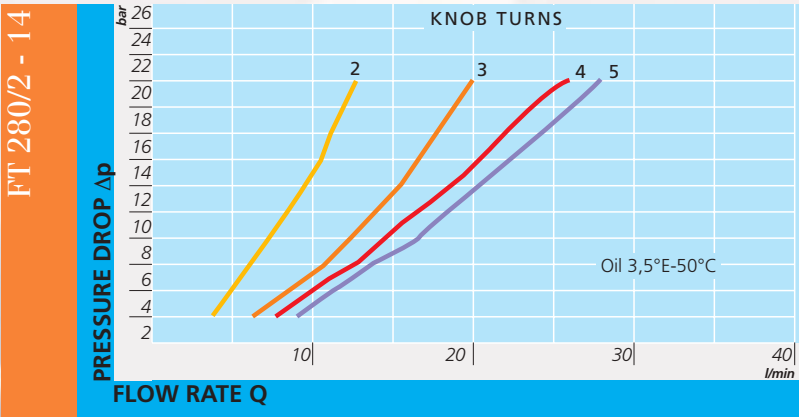
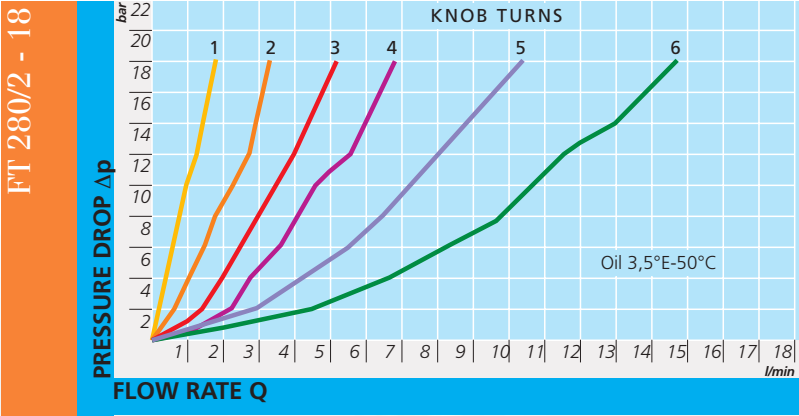
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ESC



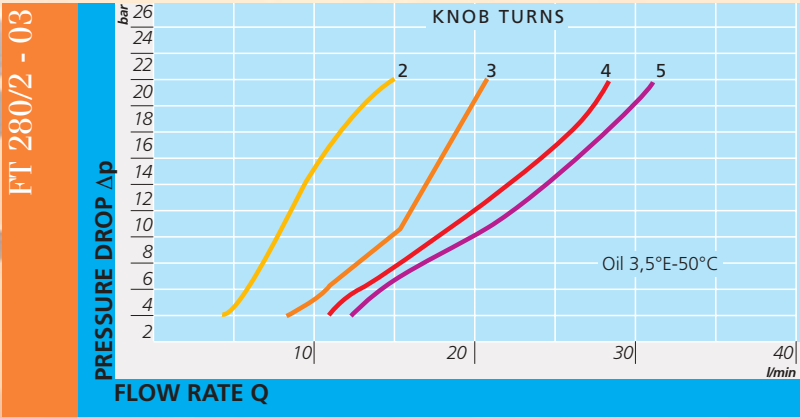
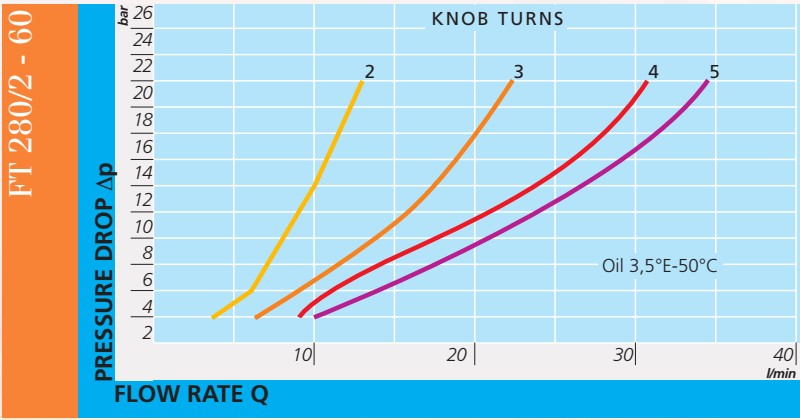
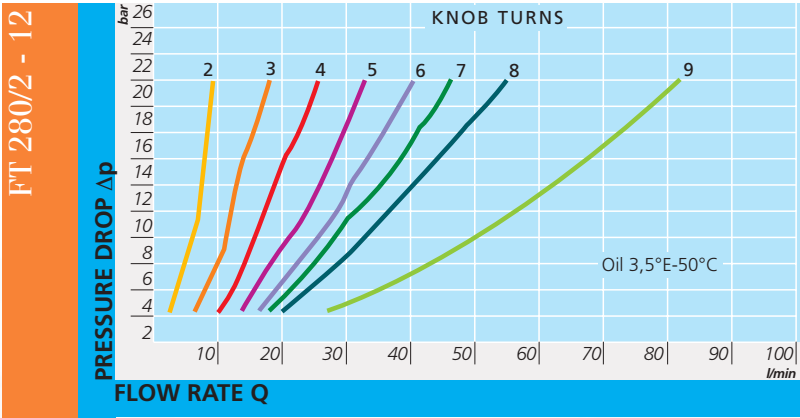
FT 280/2 CURVE DI PORTATA



CONTROL FLOW PLATE VALVES



FT 280/2



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



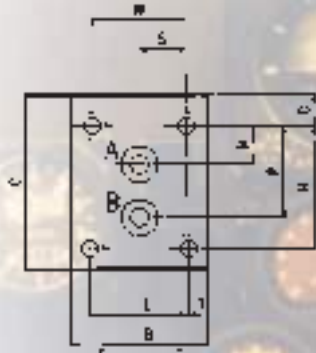
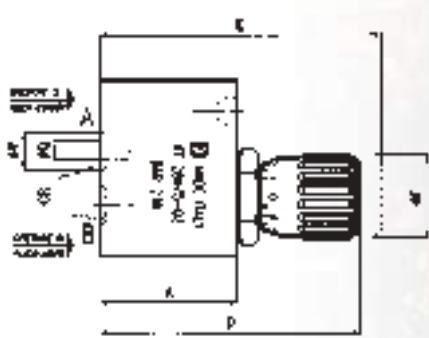
FT 280/5



MATERIALS

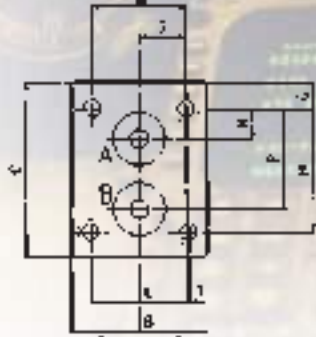
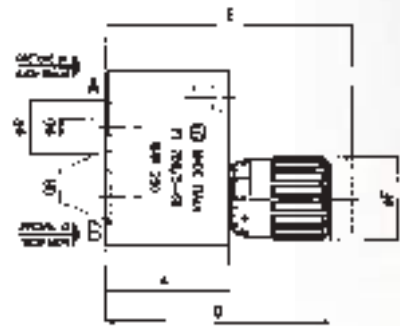
TERMINAL STRIP BODY	STEEL 9 S MN Pb 28 - UNI 5105
CARTRIGE BODY	STEEL 9 S MN Pb 28 - UNI 5105
NEEDLE	STEEL 1 C 40 - UNI 8373
HANDWHEEL	ALUMINIUM GD AL Si 12 UNI 5706 - PAINTED
NIPPLE	NYLON 6
GUIDE CAGE	NYLON 66 + CARBON FIBRE
BALL	STAINLESS STEEL - UNI 100 C 6
SPRING	STEEL INOX AISI 302
PLUG	ACCIAIO 35 S MN Pb 10 - UNI 5105
OR	NITRILE
ANTIEXTRUSION RING	PTFE
OBTURATOR	ACCIAIO C 15 Pb

All components are surface treated and protected



DIMENSIONS

TYPE	A	B	C	D	E	ØF	G	H	L	M	N	P	ØQ	ØR	S	T	OR	SCREW	WEIGHT KG
03	45	45	57,5	85,3	92,3	27	10,3	40,5	31,75	31	12,7	30,2	6	12	15,5	0,75	108	M5x50	0,885



DIMENSIONS

TYPE	A	B	C	D	E	ØF	G	H	L	M	N	P	ØQ	ØR	S	T	OR	SCREW	WEIGHT T KG
60	45	45	57	73,8	80,8	27	8,5	40,5	31,75	31	10	33	6	17,2	15,5	0,75	2056	M5x45	0,785

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

SINGLE-ACTING CONTROL PLATE VALVES

They control and eventually shut-off the flow in one direction, allowing a free return in the opposed direction.
The suitable dimensions allow to obtain in reduced spaces a remarkable mechanical resistance of components.

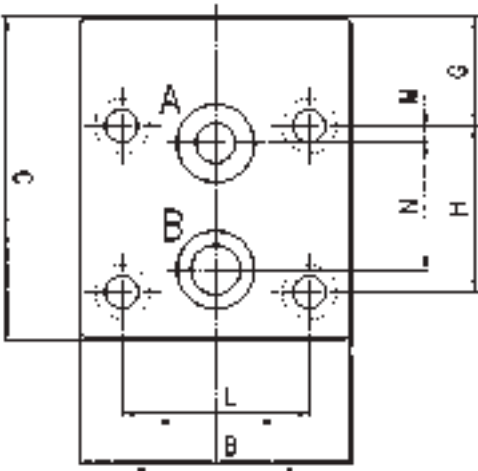
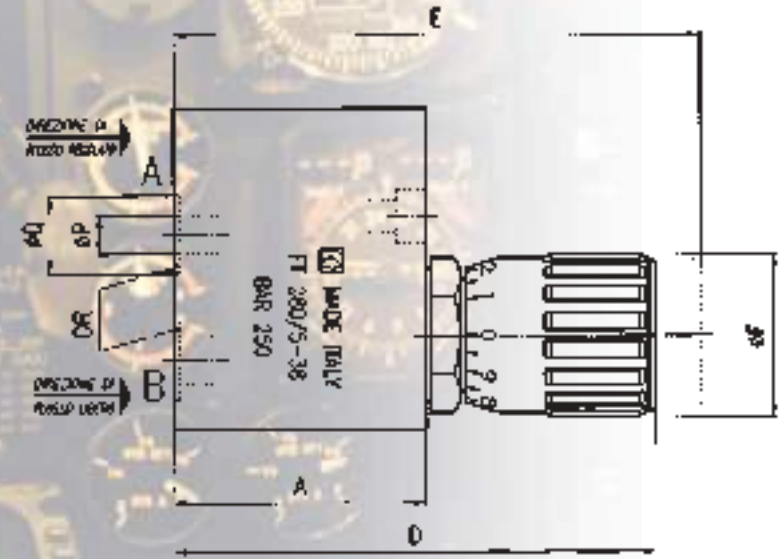
- As all valves pertaining to series FT 257 they ensure:
- efficient metallic sealing;
 - flow linearity during opening;
 - accurate flow control, made well visible by the double reference device;
 - wide control range of specific flow rate;
 - absolute safety against needle withdrawal also in the maximum opening position;
 - positioning stability, thanks to the dowel inserted in knob.

They are provided with plate connections mod. CETOP 03 or interchangeable with the broadly used valves. The connection seals are equipped in series.
Max. working pressure 250 bar.

- On request
- Complete with Viton seals (V)
 - Knob in ABS (mp)



FT 280/5



DIMENSIONS

TYPE	A	B	C	D	E	Ø F	G	H	L	M	N	Ø P	Ø Q	Ø R	SCREW	WEIGHT KG
1 4	45	50	60,5	85,3	92,3	27	18	35	33,5	5	25,5	6	12,7	2037	M6x50	1,020
3 8	51	55	65	97,5	106,5	33	22	33,5	38	3,5	25,5	8	15,7	2050	M6x55	1,380
1 2	65	65	82,5	119,1	129,6	38	30,5	38	44,5	4	30	11	19,7	119	M6x70	2.620

EXAMPLE FOR ORDERING

CODE	TYPE
FT 280/5	1 4

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

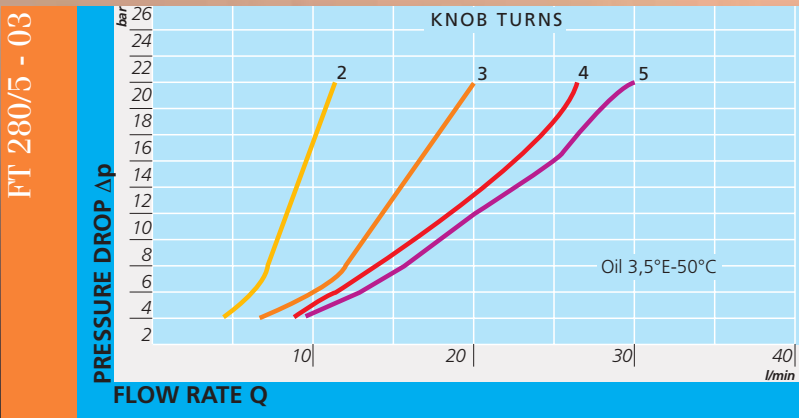
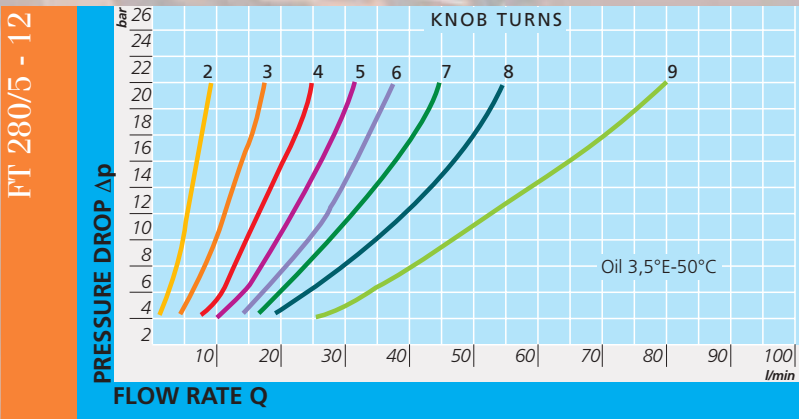
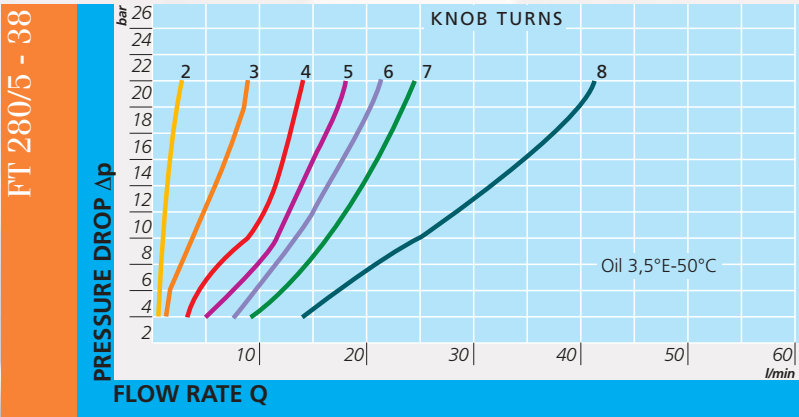
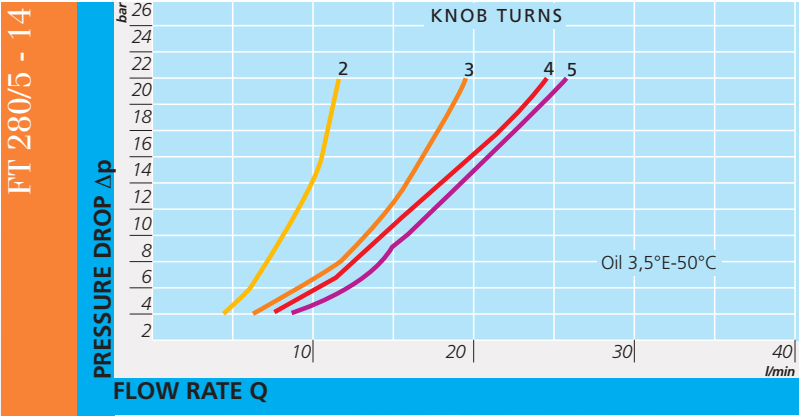
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PRINT

ESC



FT 280/5 CURVE DI PORTATA



CONTROL FLOW PLATE VALVES

HOME

PRESENTATION

VALVES INDEX

+

-

◀

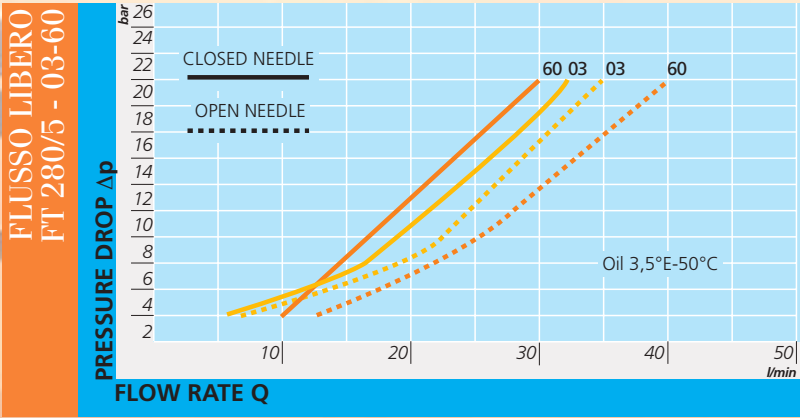
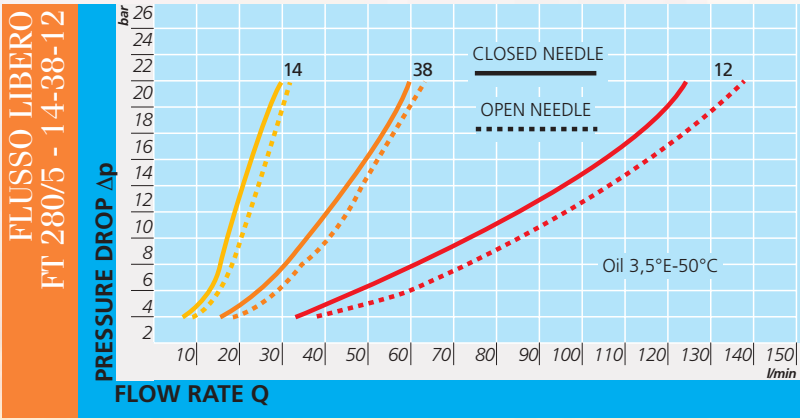
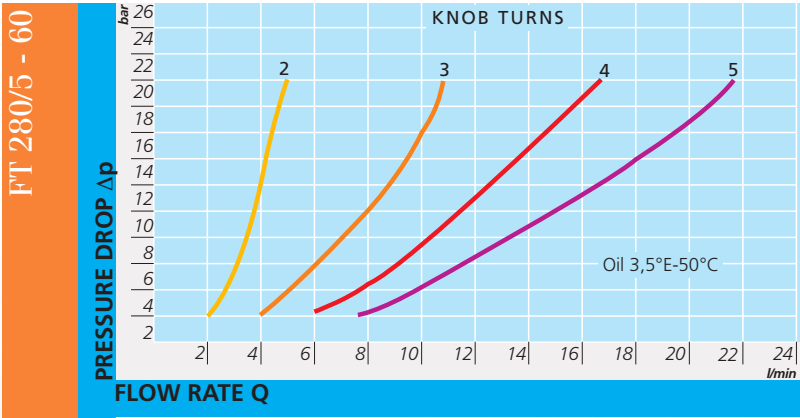
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LAST SEEN

WHOLE PAGE

PRINT

ESC



FT 280/5

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

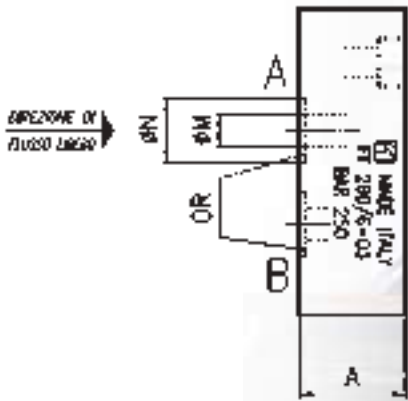
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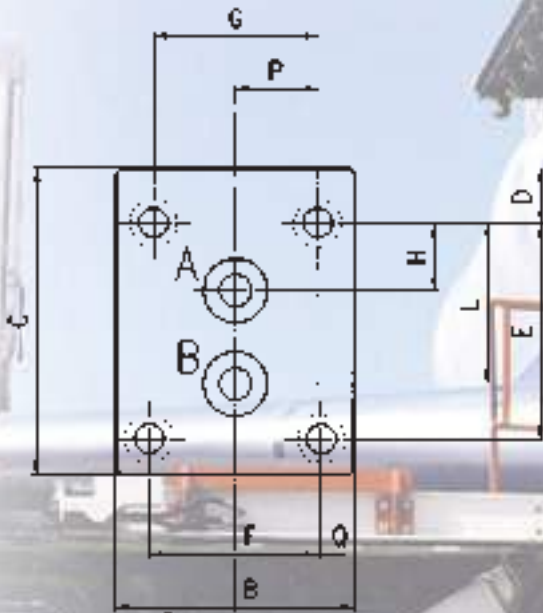


FT 280/6



MATERIALS

VALVE BODY	STEEL 9 S MN Pb 28 - UNI 5105
GUIDE CAGE	NYLON 66 + CARBON FIBER
BALL	STEEL - UNI 100 C 6
SPRING	STEEL INOX AISI 302
PLUG	STEEL 35 S MN Pb 10 - UNI 5105
All components are surface treated and protected	



DIMENSIONS

TYPE	A	B	C	D	E	F	G	H	L	Ø M	Ø N	P	Q	Ø R	SCREW	WEIGHT KG
03	20	45	57,5	10,3	40,5	31,75	31	12,7	30,2	6	12	15,5	0,75	108	M5x25	0,350

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

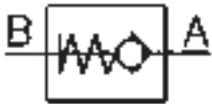
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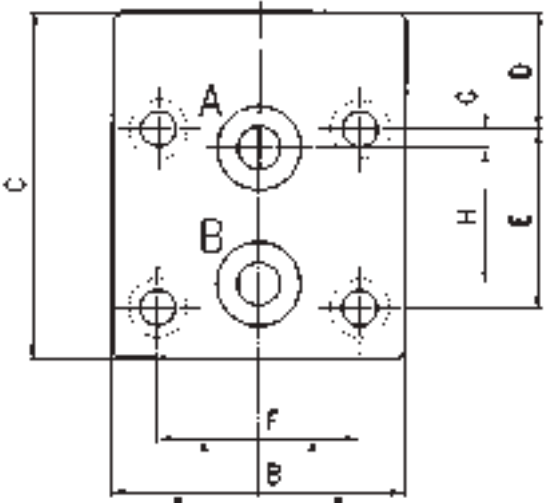
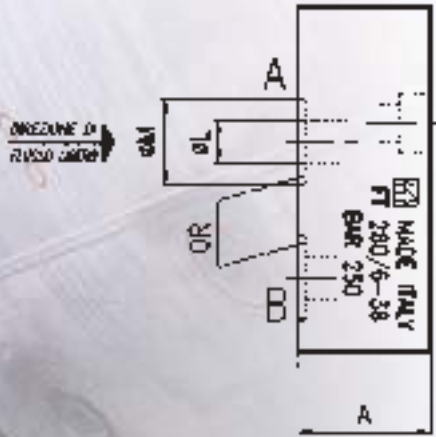
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SINGLE-ACTING PLATE VALVES

They are inserted in circuit branches where a free flow circulation is required in one direction and passage obstruction in the opposite direction. The single-acting valves are both of ball type with guide housing and cantering, made of composite Material with very high mechanical resistance, which allows a total passage and exceptional resistance to wear and breakage, shown by the numerous high stress and varied tests to which they were subjected. They may be supplied with two different setting values of the realised pressure (0,35 standard and 4,5 bar). They are provided with plate connections mod. CETOP 03 or interchangeable with the broadly used valves. The connection seals are equipped in series. Max. working pressure 250 bar.



FT 280/6

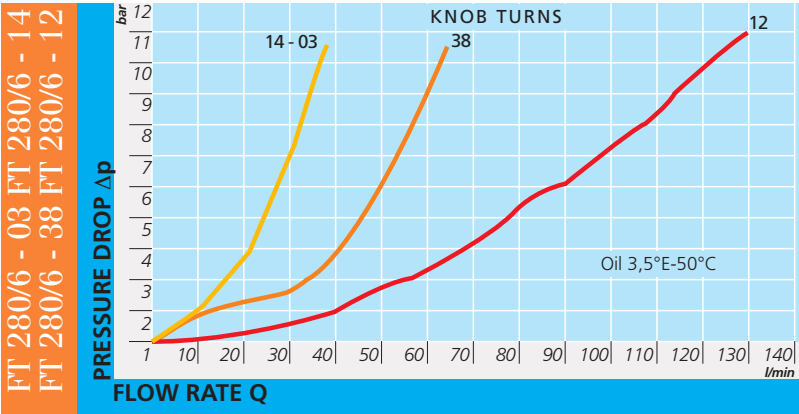


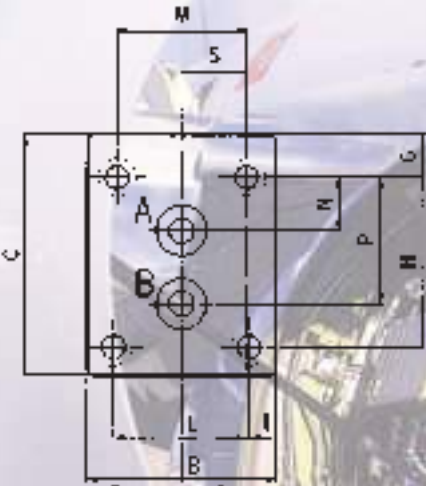
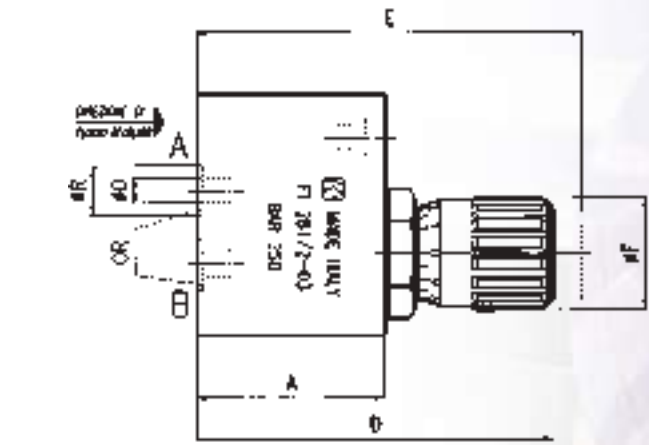
DIMENSIONS

TYPE	A	B	C	D	E	F	G	H	Ø L	Ø M	Ø R	SCREW	WEIGHT KG
1 4	20	50	60,5	18	35	33,5	5	25,5	6	12,7	2037	M6x25	0,410
3 8	25	55	65	22	33,5	38	3,5	25,5	8	15,7	2050	M6x30	0,605
1 2	30	65	82,5	30,5	38	44,5	4	30	11	19,7	119	M6x35	1,010

EXAMPLE FOR ORDERING

CODE	TYPE
FT 280/6	03





DIMENSIONS

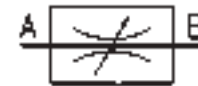
TYPE	A	B	C	D	E	∅ F	G	H	L
03	32	45	52	66	74	22	5,75	40,5	31,75
60	32	45	52	66	74	22	5,75	40,5	31,75

DIMENSIONS

TYPE	M	N	P	∅ Q	∅ R	S	T	OR	SCREW	WEIGHT KG
03	31	12,7	30,2	5	12	15,5	0,75	108	M5x40	0,570
60	31	10	33	5	17,2	15,5	0,75	2056	M5x40	0,570

EXAMPLE FOR ORDERING

CODE	TYPE
FT 281/2	60

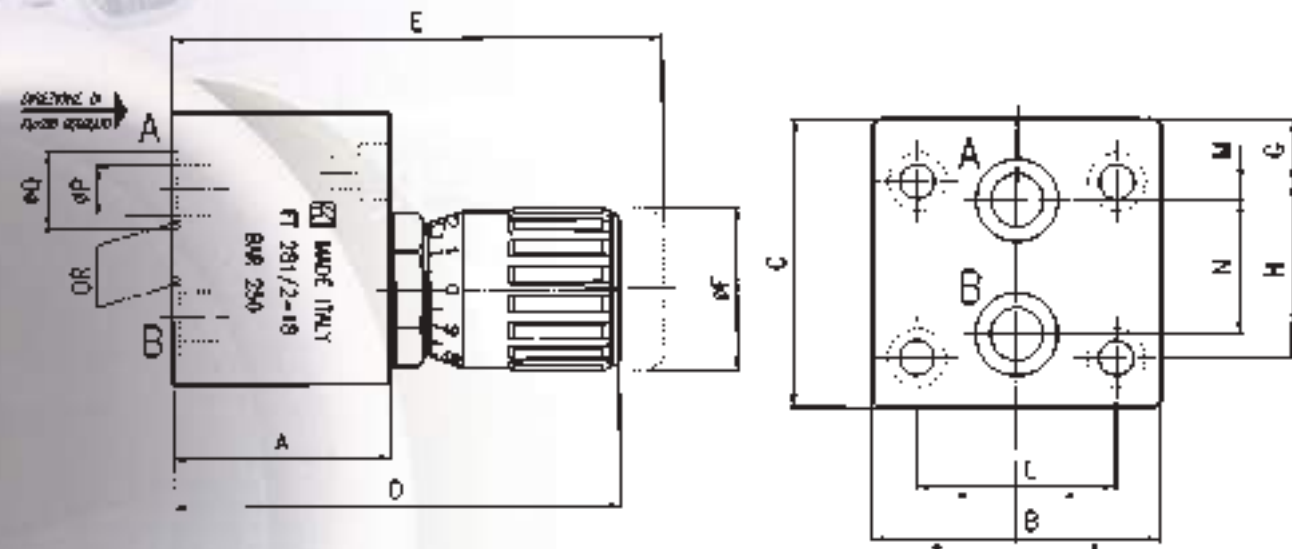


DOUBLE-ACTING MICROFINE CONTROL PLATE VALVES

They are the most suitable solution for those applications requiring precise adjustment characteristics or for reduced rate of flow. They are provided with plate connections mod. CETOP 03 or interchangeable with the broadly used valves. The connection seals are equipped in series. Max. working pressure 250 bar.



FT 281/2

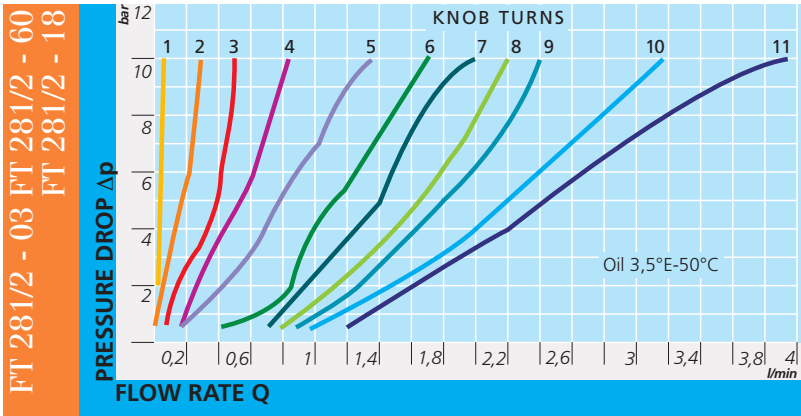


DIMENSIONS

TYPE	A	B	C	D	E	Ø F	G	H	L	M	N	Ø P	Ø Q	Ø R	SCREW	WEIGHT KG
18	32	42	35	66	74	22	8	19	28,5	1,5	16	4	9,5	2025	M6x40	0,350

EXAMPLE FOR ORDERING

CODE	TYPE
FT 281/2	18



HOME

PRESENTATION

VALVES INDEX

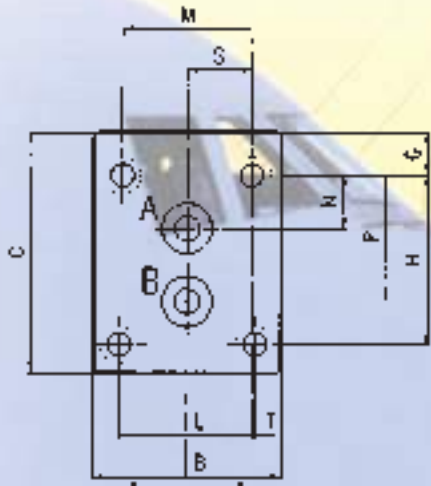
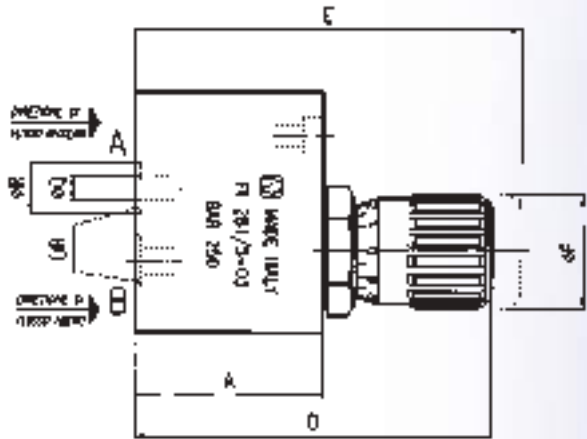


LAST SEEN

WHOLE PAGE

PRINT

ESC

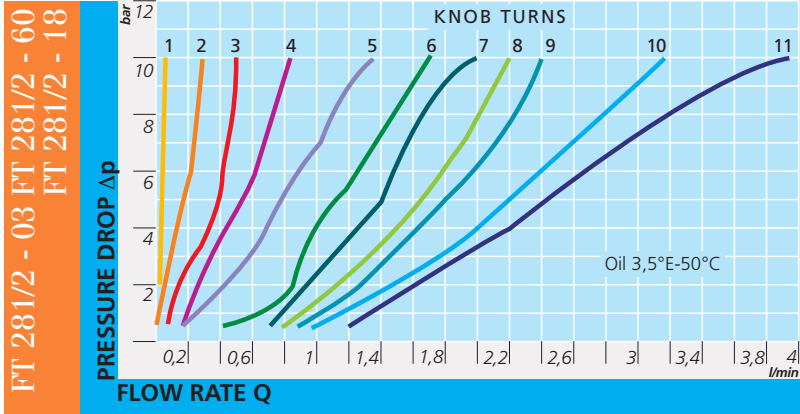


MATERIALS

TERMINAL STRIP BODY	STEEL 9 S MN PB 28 - UNI 5105
CARTRIDGE BODY	STEEL 9 S MN PB 28 - UNI 5105
NEEDLE	STAINLESS STEEL AISI 303 - UNI 6900
HANDWHEEL	ALUMINIUM GD AL SI 12 - UNI 5706
NIPPLE	NYLON 6
O R	NITRILE
ANTIEXTRUSION RINGS	PTFE
All components are surface treated and protected	

DIMENSIONS

TYPE	A	B	C	D	E	Ø F	G	H	L	M	N	P	Ø Q	Ø R	S	T	O R	SCREW	WEIGHT KG
03	38	45	55,5	72	80	22	9,25	40,5	31,75	31	12,7	30,2	5	12	15,5	0,75	108	M5x45	0,710



HOME

PRESENTATION

VALVES INDEX

+

-

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▶

LAST SEEN

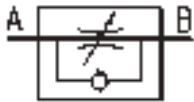
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PRINT

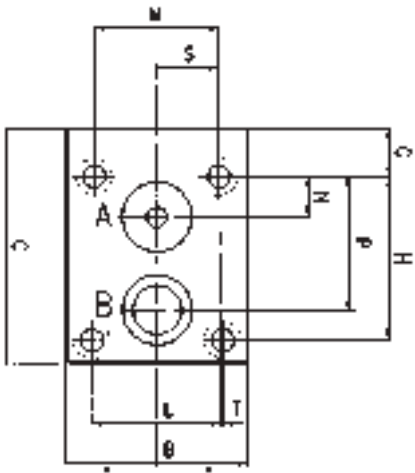
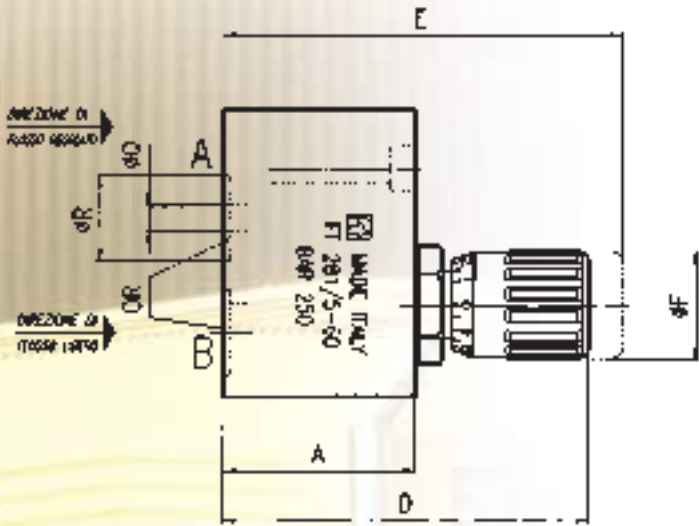
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SINGLE-ACTING MICROFINE CONTROL PLATE VALVES

They are the most suitable solution for those applications requiring precise adjustment characteristics or for reduced rate of flow. They are characterised by a great flow rate section in the direction of free flow. They are provided with plate connections mod. CETOP 03 or interchangeable with the broadly used valves. The connection seals are equipped in series. Max. working pressure 250 bar.



FT 281/5

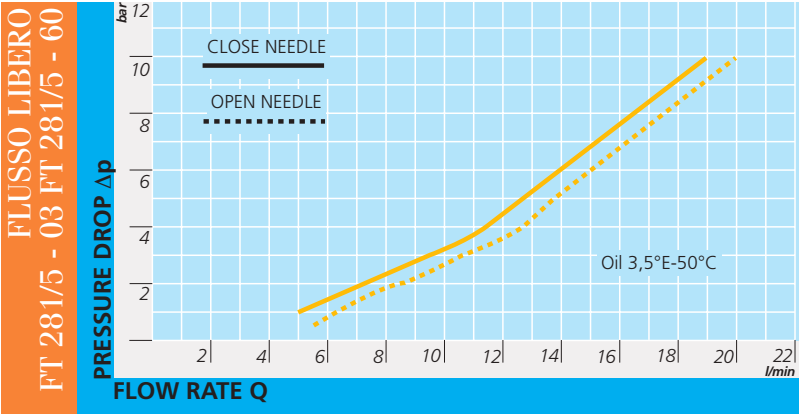


DIMENSIONS

TYPE	A	B	C	D	E	ØF	G	H	L	M	N	P	ØQ	ØR	S	T	ØR	SCREW	WEIGHT KG
60	39	45	58	73	81	22	12	40,5	31,75	31	10	33	5	17,2	15,5	0,75	2056	M5x45	0,760

EXAMPLE FOR ORDERING

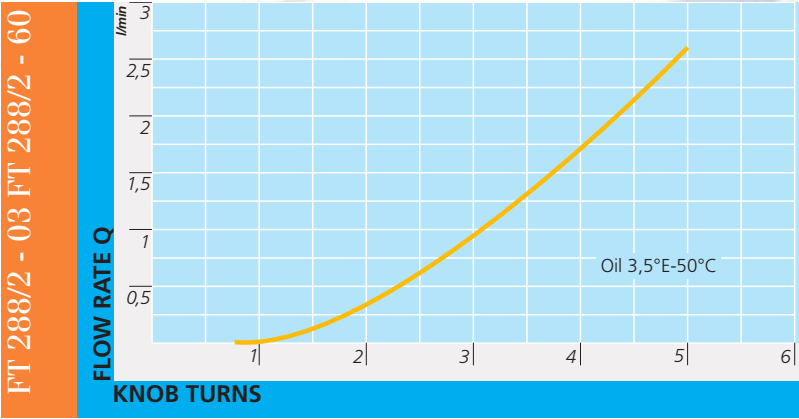
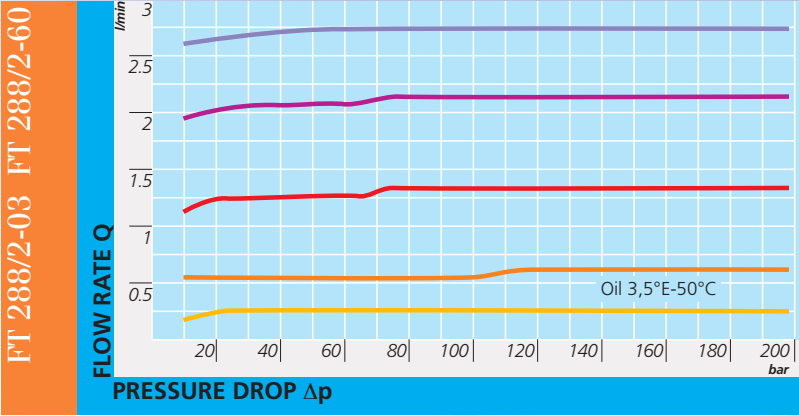
CODE	TYPE
FT 281/5	03
FT 281/5	60





MATERIALS

VALVE BODY	STEEL 9 S MN Pb 28 - UNI 5105
ADJUSTING MEMBERS	STEEL 35 S MN Pb 10 - UNI 5105
COMPENSATION PISTON	STEEL 38 Ni CR MO 5 - UNI 5332 HEAT TREATED
HANDWHEEL	ALLUMINIO 6D AL SI - UNI 5706 PAINTED
NIPPLE	NYLON 6
O R	NITRILE
ANTIEXTRUSION RINGS	PTFE
All components are surface treated and protected	





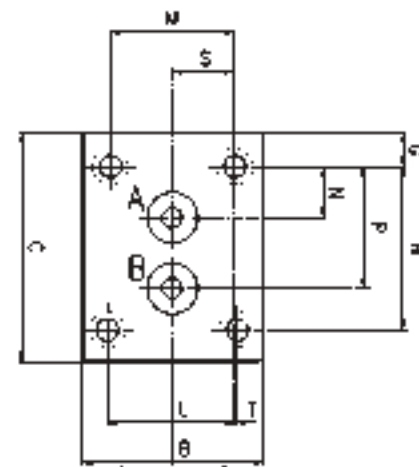
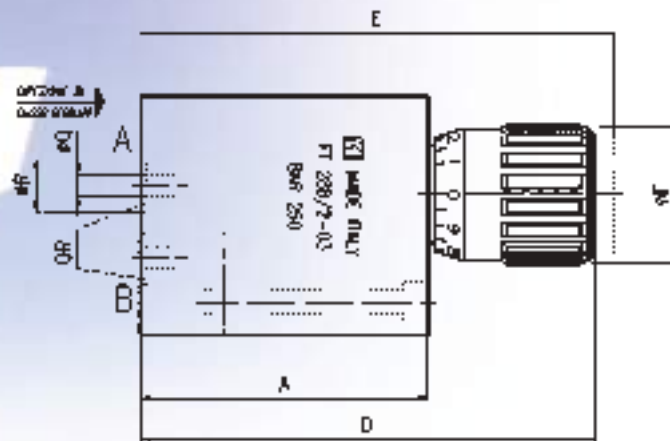
PRESSURE COMPENSATED MICROFINE FLOW CONTROL
PLATE VALVES

They are the equivalent version with panel mounting as the regulators series FT 297/2 with threaded cartridge.
Suitable for the adjustment of reduced flow rate with a high precision and stability level. They are provided with plate connections mod. CETOP 03 or interchangeable with the broadly used valves. The connection seals are equipped in series. The sealings are supplied in series.
Max. working pressure 250 bar.



FT 288/2

EXAMPLE FOR ORDERING	
CODE	TYPE
FT 288/2	60



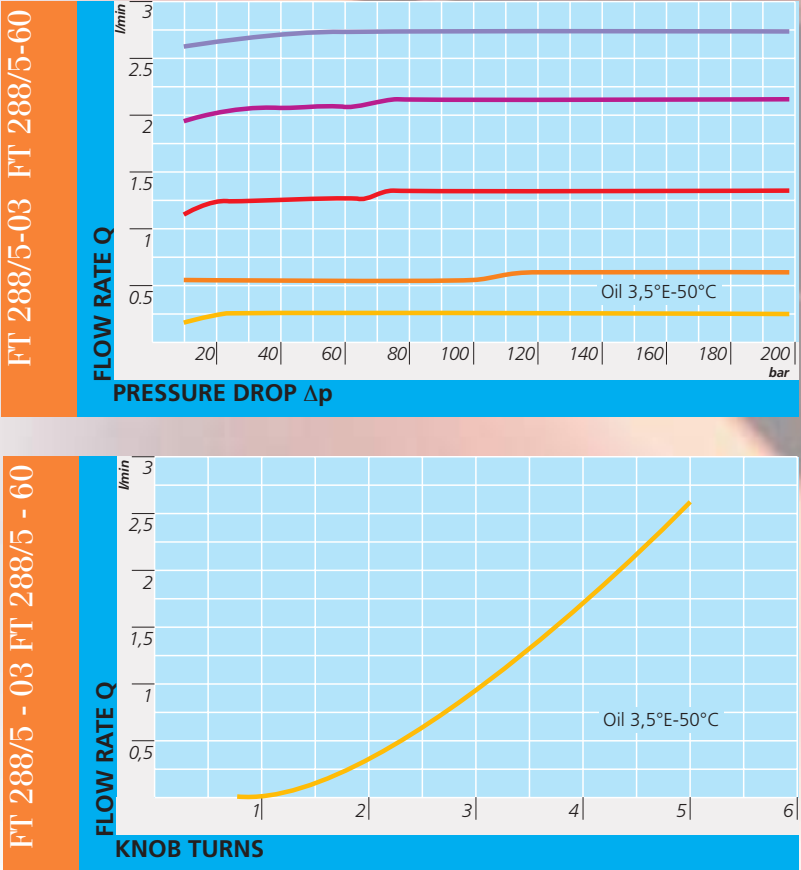
DIMENSIONS

TYPE	A	B	C	D	E	øF	G	H	L	M	N	P	øQ	øR	S	T	OR	SCREW	WEIGHT KG
03	69	45	57	109	113,5	33	8,5	40,5	31,75	31	12,7	30,5	5	12,5	15,5	0,75	2037	M5x75	1,285
60	69	45	57	109	113,5	33	8,5	40,5	31,75	31	10	33	6	17,2	15,5	0,75	2056	M5x75	1,270



MATERIALS

VALVE BODY	STEEL 9 S MN PB 28 - UNI 5105
ADJUSTING MEMBERS	STEEL 35 S MN PB 10 - UNI 5105
COMPENSATION PISTON	STEEL 38 NI CR MO 5 - UNI 5332 HEAT TREATED
HANDWHEEL	ALUMINIUM 6D AL SI - UNI 5706 PAINTED
NIPPLE	NYLON 6
BALL GUIDE	NYLON 66 + CARBON FIBER
BALL	STEEL - UNI 100 C 6
SPRING	STAINLESS STEEL AISI 302
PLUG	STEEL 35 S MN PB 10 - UNI 5105
OR	NITRILE
ANTIEXTRUSION RINGS	PTFE
All components are surface treated and protected	



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



SINGLE-ACTING PRESSURE COMPENSATED MICROFINE FLOW CONTROL PLATE VALVES

They are "single-acting" version of the valves series FT 288/2 while principal characteristics are maintained. The single-acting device, of ball type, allows a flow rate section.

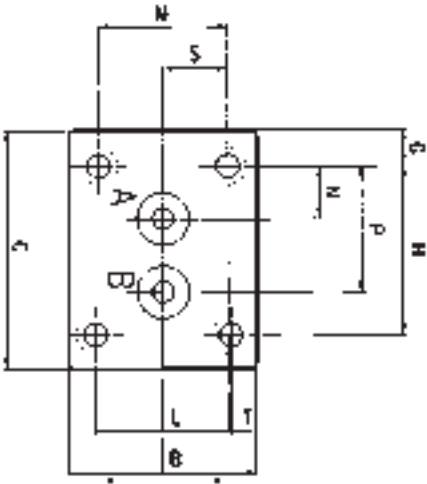
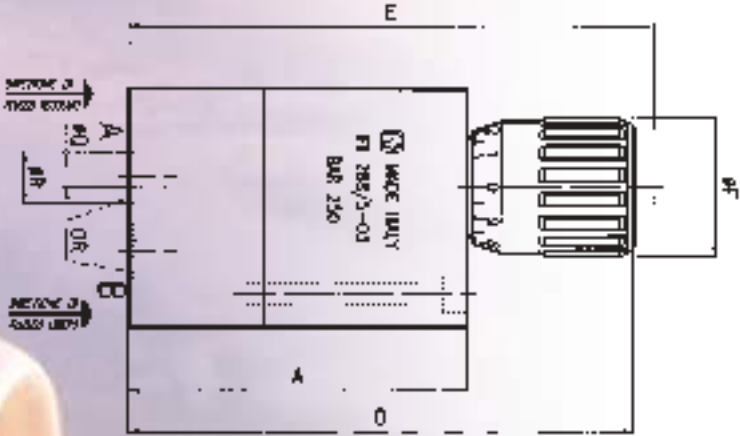
They are provided with plate connections mod. CETOP 03 or interchangeable with the broadly used valves. The connection seals are equipped in series. The sealings are supplied in series.

Max. working pressure 250 bar.



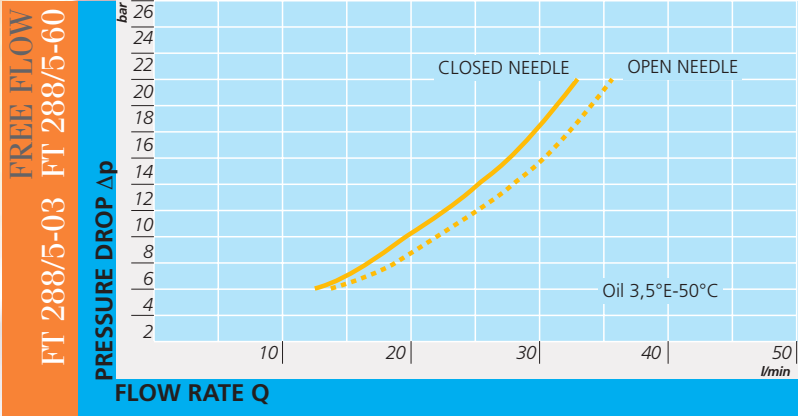
FT 288/5

EXAMPLE FOR ORDERING	
CODE	TYPE
FT 288/5	60



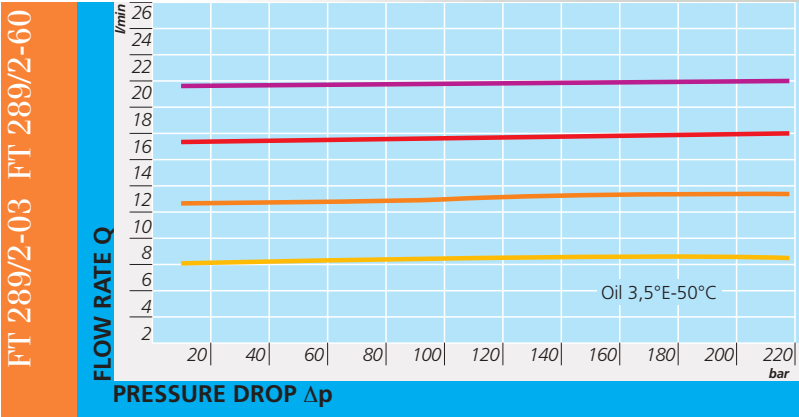
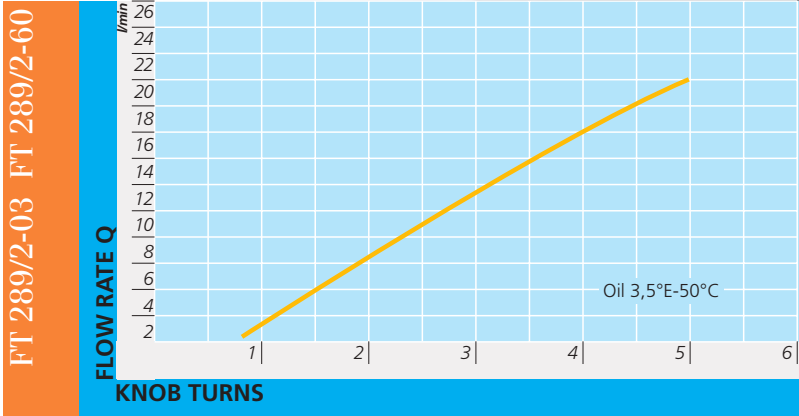
DIMENSIONS

TIPO	A	B	C	D	E	øF	G	H	L	M	N	P	øQ	øR	S	T	OR	SCREW	WEIGHT KG
03	81	45	57	121	125,5	33	8,5	40,5	31,75	31	12,7	30,2	5	12,5	15,5	0,75	2037	M5x85	1,490
60	84	45	57	124	128,5	33	8,5	40,5	31,75	31	10	33	6	17,2	15,5	0,75	2056	M5x90	1.530





MATERIALS	
VALVE BODY	STEEL 9 S MN Pb 28 - UNI 5105
ADJUSTING MEMBERS	STEEL 35 S MN Pb 10 - UNI 5105
COMPENSATION PISTON	STEEL 38 Ni CR MO 5 - UNI 5332 HEAT TREATED
HANDWHEEL	ALUMINIUM GD AL SI - UNI 5706 PAINTED
NIPPLE	NYLON 6
O R	NITRILE
ANTIEXTRUSION RINGS	PTFE
All components are surface treated and protected	





PRESSURE COMPENSATED FLOW CONTROL PLATE VALVES

They are provided with plate connections of two-port flow regulators (in line) series FT 287/2 whose main characteristics are maintained. Appreciated for the high precision level. They are provided with plate connections mod. CETOP 03 or interchangeable with the broadly used valves. The connection seals are equipped in series. The sealings are supplied in series. Max. working pressure 250 bar.

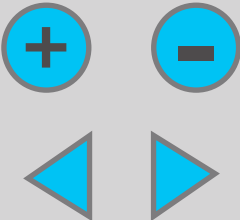


FT 289/2

HOME

PRESENTATION

VALVES INDEX



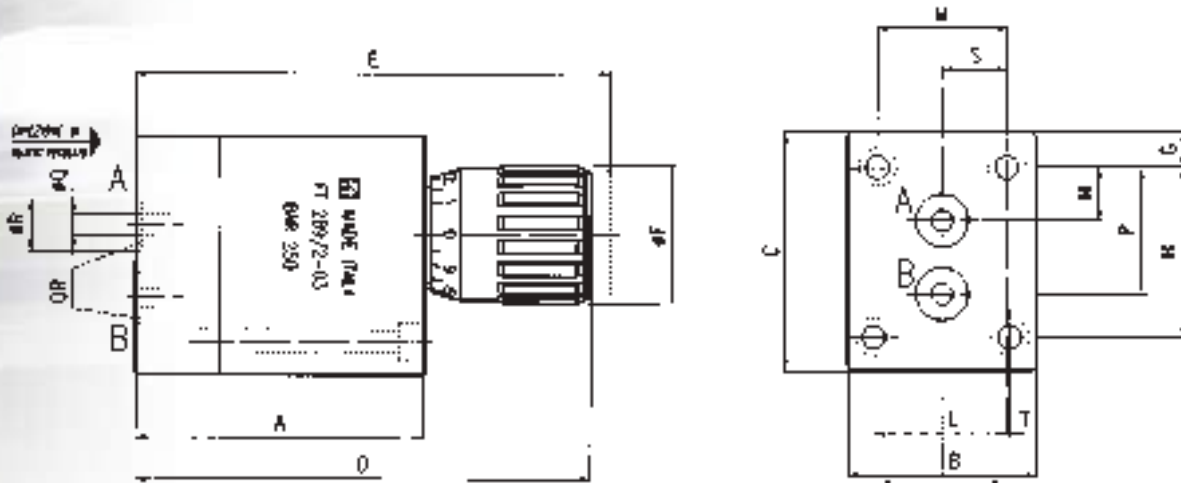
LAST SEEN

WHOLE PAGE

PRINT

ESC

EXAMPLE FOR ORDERING	
CODE	TYPE
FT 289/2	03



DIMENSIONS

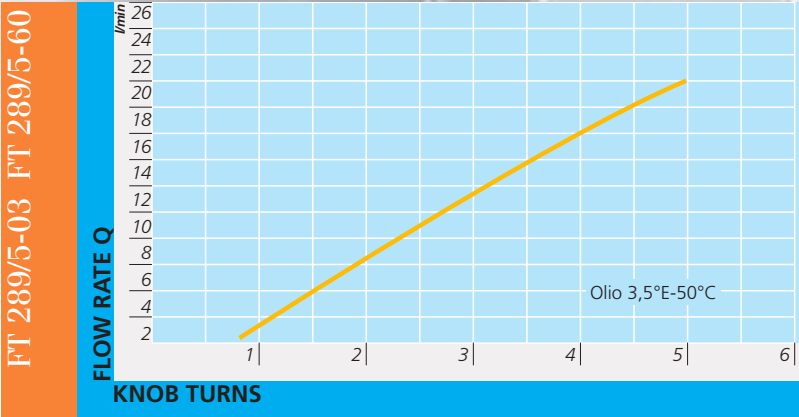
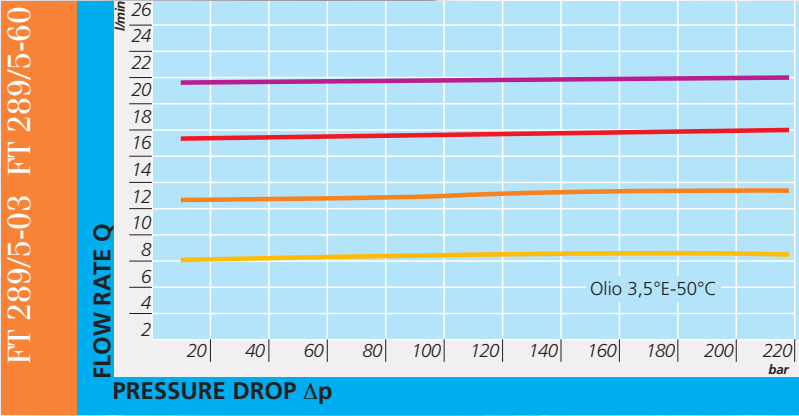
TYPE	A	B	C	D	E	ø F	G	H	L	M	N	P	ø Q	ø R	S	T	Ø R	SCREW	WEIGHT KG
03	69	45	57	109	113,5	33	8,5	40,5	31,75	31	12,7	30,5	5	12,5	15,5	0,75	2037	M5x75	1,285
60	69	45	57	109	113,5	33	8,5	40,5	31,75	31	10	33	6	17,2	15,5	0,75	2056	M5x75	1,270



MATERIALS

VALVE BODY	STEEL 9 S MN Pb 28 - UNI 5105
ADJUSTING MEMBERS	STEEL 35 S MN Pb 10 - UNI 5105
COMPENSATION PISTON	STEEL 38 NI CR MO 5 - UNI 5332 HEAT TREATED
HANDWHEEL	ALLUMINIO GD AL SI - UNI 5706 PAINTED
NIPPLE	NYLON 6
BALL GUIDE	NYLON 66 + CARBON FIBER
BALL	STEEL - UNI 100 C 6
SPRING	STAINLESS STEEL AISI 302
PLUG	STEEL 35 S MN Pb 10 - UNI 5105
OR	NITRILE
ANTIEXTRUSION RINGS	PTFE

All components are surface treated and protected



SINGLE-ACTING PRESSURE COMPENSATED MICROFINE FLOW CONTROL PLATE VALVES

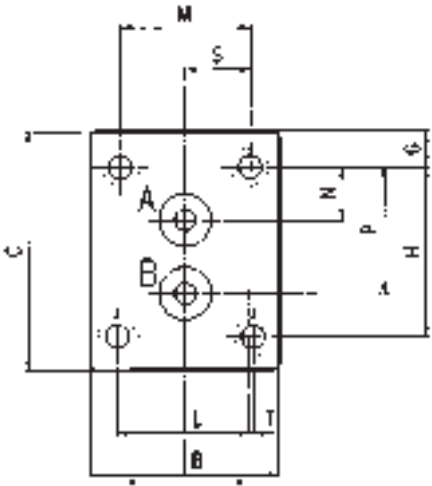
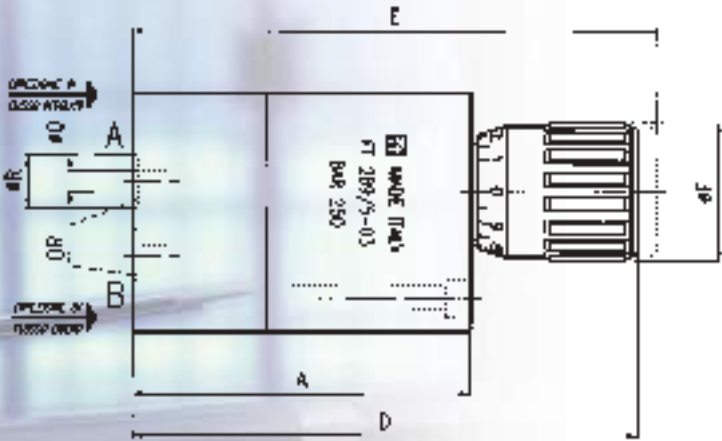
They are the “single-acting” version of the valve series FT 289/2 whose main characteristics are maintained.
They are provided with plate connections mod. CETOP 03 or interchangeable with the broadly used valves. The connection seals are equipped in series.
The sealings are supplied in series.
Max. working pressure 250 bar.



FT 289/5

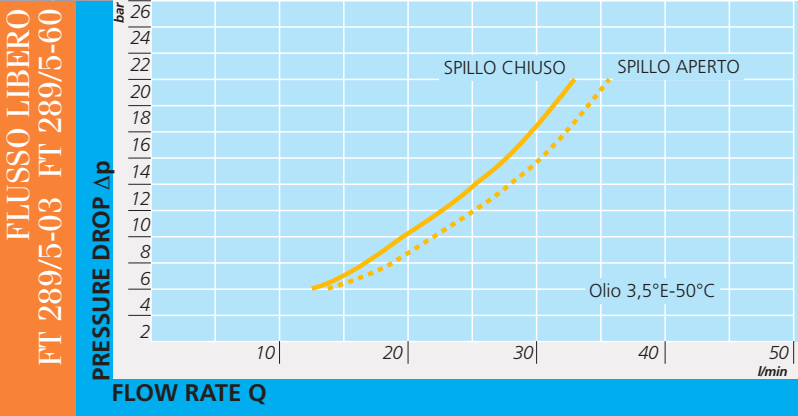
EXAMPLE FOR ORDERING

CODICE	TYPE
FT 289/5	60



DIMENSIONS

TYPE	A	B	C	D	E	øF	G	H	L	M	N	P	øQ	øR	S	T	OR	SCREW	WEIGHT KG
03	81	45	57	121	125,5	33	8,5	40,5	31,75	31	12,7	30,2	5	12,5	15,5	0,75	2037	M5x85	1.490
60	84	45	57	124	128,5	33	8,5	40,5	31,75	31	10	33	6	17,2	15,5	0,75	2056	M5x90	1.530





HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



FT 290



FT 01-290



FT 291



FT 01-291



FT 292



FT 293



FT 299



FT 1201



GAUGE ISOLATOR

- NEEDLE
- PUSH-BUTTON
- IN LINE AND 90° ANGLE
- PLATE VALVES

ACCESSORIES

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

FT 290
Gauge isolator needle valves in line
FT 01-290
Gauge isolator needle valves in line with lateral connection of 1/2
FT 291
Gauge isolator needle valves 90° angle
FT 01-291
Gauge isolator needle valves 90° angle with lateral connection of 1/2
FT 292
Gauge isolator push-button valves
FT 293
Esclusori per manometro a pulsante attacchi a piastra
FT 299
Connectors
FT 1201
Copper washers

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



FT 290

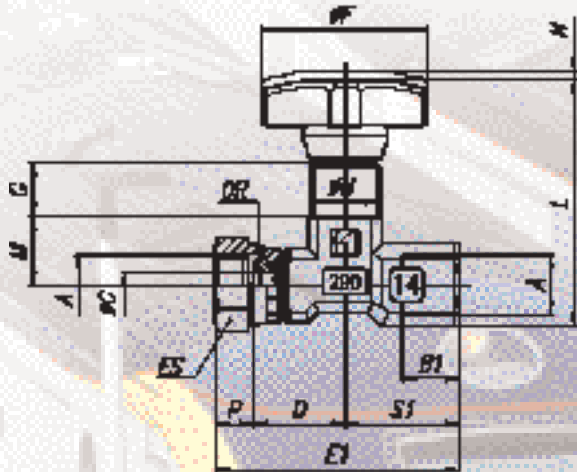


SPECIAL VERSIONS
ONLY FOR TYPE 14
SUPPLIED ON REQUEST
FOR QUANTITIES OF
AT LEAST 200 PIECES

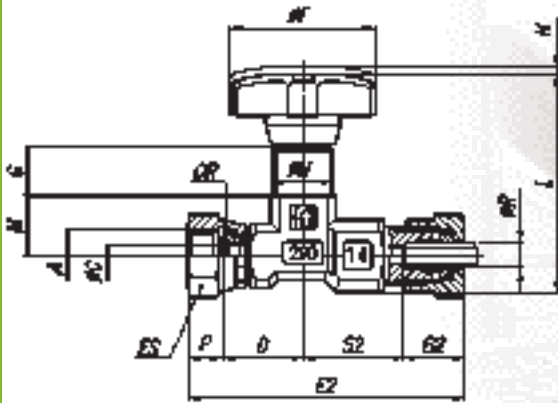
MATERIALS

BODY	9 S MN Pb 23 - UNI 5105 - PRESS FORG.
NEEDLE	35 S MN Pb 23 - UNI 5105 - BURNISHED
OR	NITRILE
ANTIEXTRUSION RING	PTFE
HANDWHEEL	NYLON 66

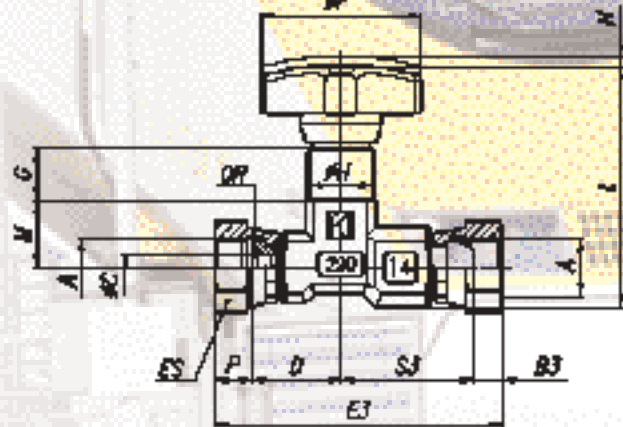
All components are surface treated and protected



CODE FT 290-01
CONNECTION: FEMALE-FEMALE



CODE FT 290-04
CONNECTION RIGID PIPES - DIN 2353



CODE FT 290-05
CONNECTION FLEXIBLE PIPES DIN 3861 - DIN 7611

DIMENSIONS

A	B1	B2	B3	ØC	D	E1	E2	E3	ØF	G	H	L	M	N	P	R	S1	S2	S3	OR	ES	WEIGHT KG
1/4" G	11	15	6,5	5,6	20	54,5	69,5	66	34	12	M15x1	53	15	2	8,5	6	25	25	30	2108	18	ø10,125
																						ø40,150
																						ø50,145

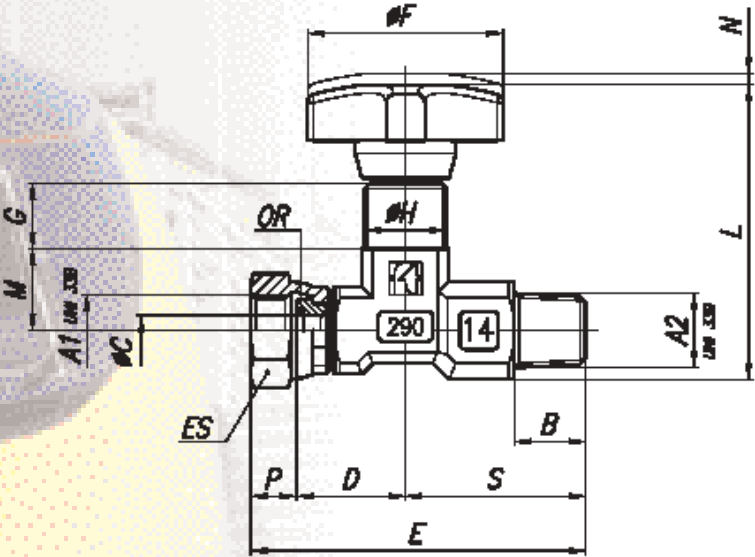
GAUGE ISOLATOR NEEDLE VALVES IN LINE

The FT290 isolator needle valves (in line) are normally used to protect the pressure gauge since they have the double function of dampening pressure surge during opening and of isolating the pressure gauge entirely. Pressed in high-resistance steel, protected by an accurate treatment, subjected to strict tests, they ensure reliability and long life. A rotating swivel nut allows for accurate pressure gauge orientation. The sealing, standard supplied, and inserted in the nut, prevents any drawing between the connection and the gauge. For pressure gauge with taper threads, it will be necessary to use copper washers FT 1201 shown on page 182 of this catalogue (to be requested separately). Suitable for pressure up to 400 bar and temperature from -20° to +100° they can be panel mounted by use of log nut (G), supplied on request.

- On request
- Versions with connections female/female (01)
 - For rigid pipes (04)
 - For flexible pipes (05)
 - Seals in Viton (V)
 - Complete with lock nut (G). Indicate whether KM or hexagonal
 - Version in AISI 316 code FT 2290



FT 290



DIMENSIONS

TYPE	A1 UNI 33B	A2 UNI 33B	B	ØC	D	E	ØF	G	H	L	M	N	P	S	OR	ES	WEIGHT KG
14	1/4" G	1/4" Gc	13	5,6	20	61,5	34	12	M15x1	53	15	2	8,5	33	2018	18	0,125
12	1/2" G	1/2" Gc	16	6,5	32	83	40	12,5	M20x1	82,5	19	6	11	40	2021	27	0,413

EXAMPLE FOR ORDERING

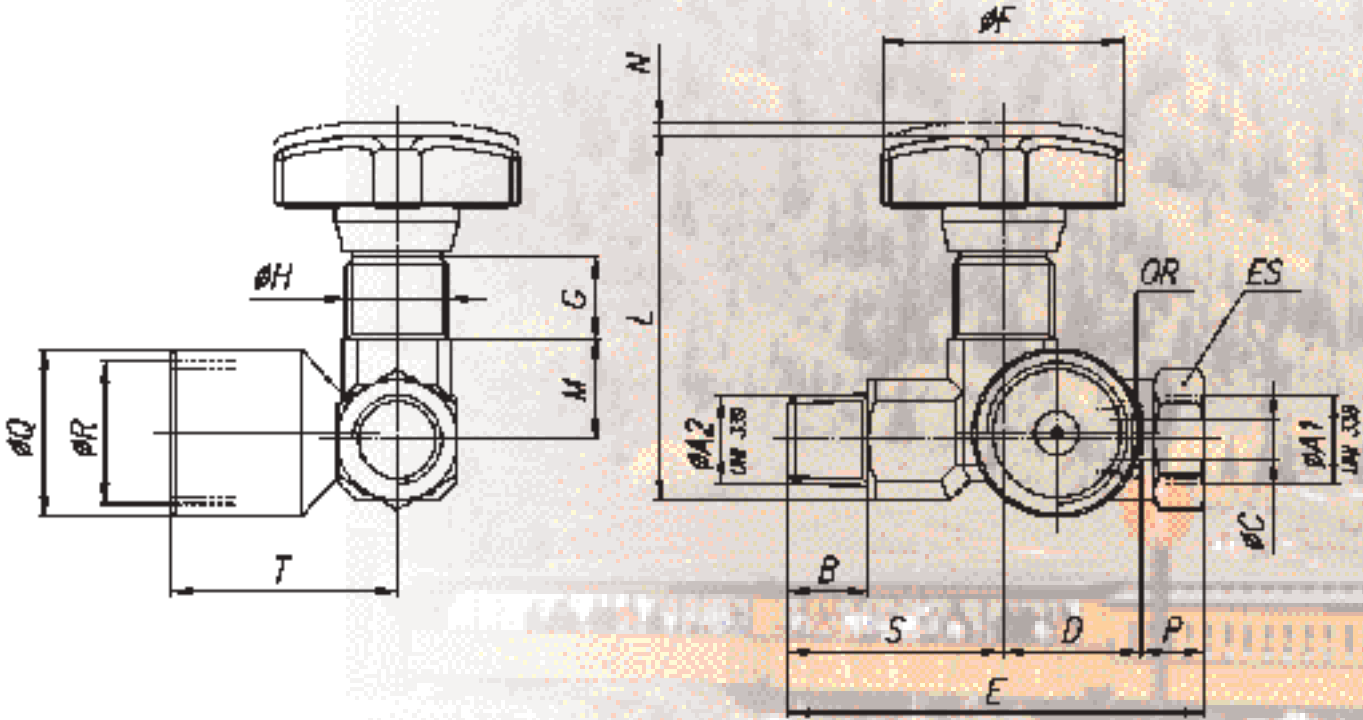
CODE	TYPE F/F	CONNECTION	PANEL LOCK NUT	VITON SEAL
FT 290	14	01	G	V
FT 290	12	-	G	-



MATERIALS

BODY	9 S MN Pb 23 - UNI 5105 - PRESS FORG.
NEEDLE	35 S MN Pb 23 - UNI 5105 - BURNISHED
OR	NITRILE
ANTIEXTRUSION RING	PTFE
HANDWHEEL	NYLON 66

All components are surface treated and protected



DIMENSIONS

TYPE	ØA1	ØA2	B	ØC	D	E	ØF	G	ØH	L	M	N	P	ØQ	ØR	S	T	OR	ES	WEIGHT KG
1 4	1/4" G	1/4" Gc	12	5,6	20,5	62	34	12	M15x1	53	15	2	9,5	25	1/2" G	32	33,5	2018	18	-

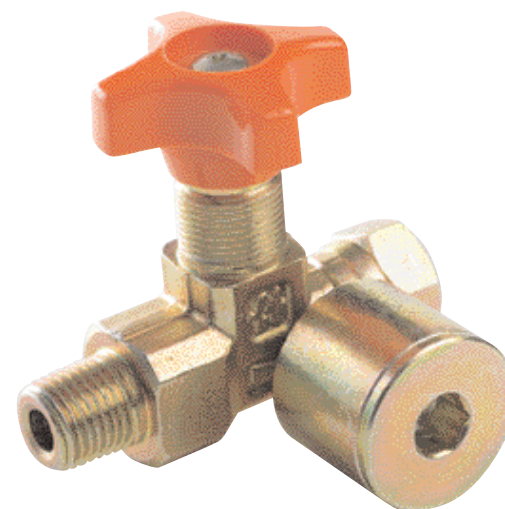


GAUGE ISOLATOR NEEDLE VALVES IN LINE WITH LATERAL INTERFACE OF 1/2

They are generally used for hydraulic-pneumatic elevators subjected to initial and periodical tests by the institution in charge. They are normally used to protect the pressure gauge since they have the double function of dampening pressure surge during opening and of isolating the pressure gauge entirely. Pressed in high-resistance steel, protected by an accurate treatment, subjected to strict tests, they ensure reliability and long life. A rotating swivel nut allows for accurate pressure gauge orientation. The sealing, standard supplied, and inserted in the nut, prevents any drawing between the connection and the gauge. For pressure gauge with taper threads, it will be necessary to use copper washers FT 1201 shown on page ??? of this catalogue (to be requested separately). Suitable for pressure up to 400 bar and temperature from -20° to +100° they can be panel mounted by use of lock nut (G), supplied on request.

On request

- Versions with connections female/female (01)
- For rigid pipes (04)
- For flexible pipes (05)
- Seals in Viton (V)
- Complete with lock nut (G). Indicate whether KM or hexagonal



FT 01-290

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

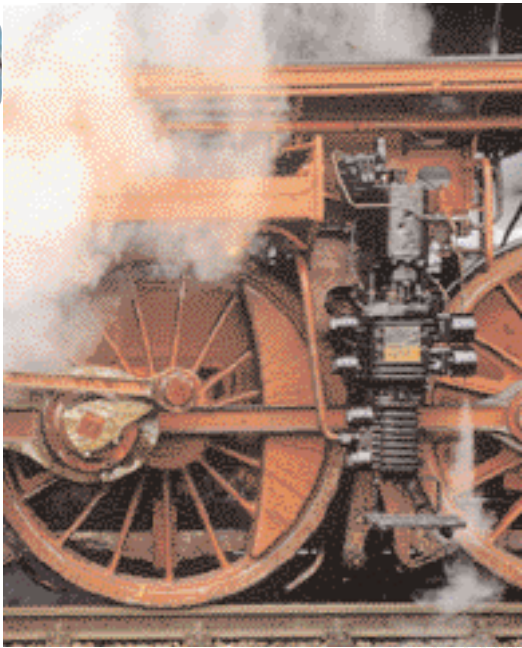
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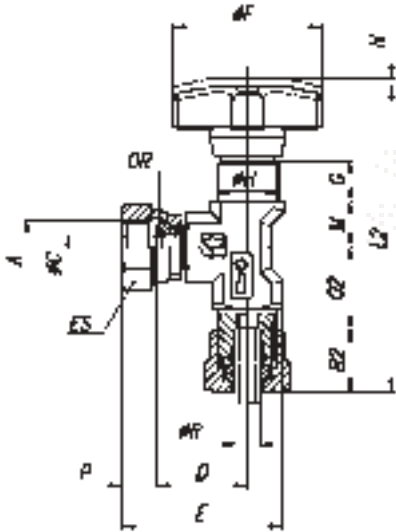
ESC



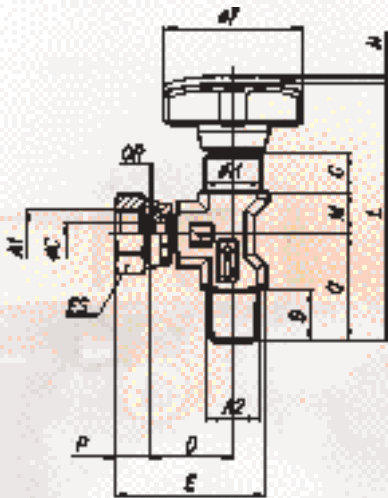
FT 291



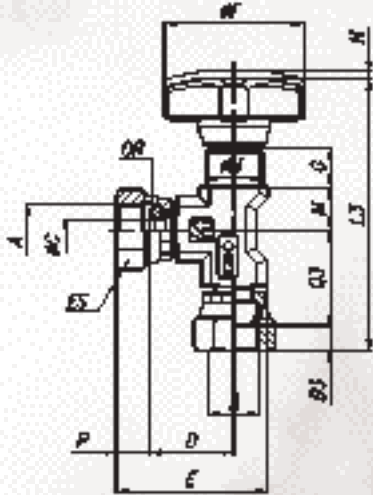
SPECIAL VERSIONS
SUPPLIED ON REQUEST
FOR QUANTITIES OF
AT LEAST 200 PIECES



CODE FT 291-04
CONNECTION RIGID PIPES - DIN 2353



CODE FT 291-01
CONNECTION FEMALE/FEMALE



CODE FT 291-05
CONNECTION FLEXIBLE PIPES DIN 3861 - DIN 7611

DIMENSIONS

A	B1	B2	B3	ØC	D	E	ØF	G	H	L1	L2	L3	M	N	P	Q1	Q2	Q3	R	ES	OR	PESO KG
1/4" G	11	15	6,5	5,6	22	40	34	10	M15x1	65	73	69,5	11	2	9,5	27	20	25	6	18	2018	01 Ø, 125
																						04 Ø, 135
																						05 Ø, 130

MATERIALS

BODY	9 S MN Pb 23 - UNI 5105 - PRESS FORG.
NEEDLE	35 S MN Pb 23 - UNI 5105 - BURNISHED
OR	NITRILE
ANTIEXTRUSION RING	PTFE
HANDWHEEL	NYLON 66

All components are surface treated and protected

GAUGE ISOLATOR NEEDLE VALVES 90° ANGLE

The isolator needle valves FT 291 (90° angle) are normally used to protect the pressure gauge since they have the double function of dampening pressure surge during opening and of isolating the pressure gauge entirely. Pressed in high-resistance steel, protected by an accurate treatment, subjected to strict tests, they ensure reliability and long life.

A rotating swivel nut allows for accurate pressure gauge orientation.

The sealing, standard supplied, and inserted in the nut, prevents any drawing between the connection and the gauge.

For pressure gauge with taper threads, it will be necessary to use copper washers FT 1201 shown on page ??? of this catalogue (to be requested separately).

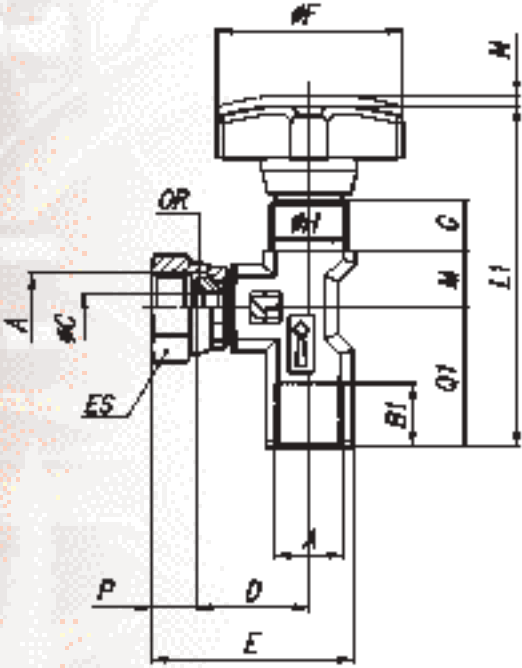
Equipped with connectors Ft 299-24 (see page 103), they also allow the connection with attack of 1/2" Gas (as alternative it is advisable the use of the series FT 290-12).

Suitable for pressure up to 400 bar and temperature from -20° to +100° they can be panel mounted by use of log nut (G), supplied on request.

- On request
- Versions with connections female/female (01)
 - For rigid pipes (04)
 - For flexible pipes (05)
 - Seals in Viton (V)
 - Complete with lock nut (G). Indicate whether KM or hexagonal
 - Version in AISI 316 code FT 2291



FT 291



DIMENSIONS

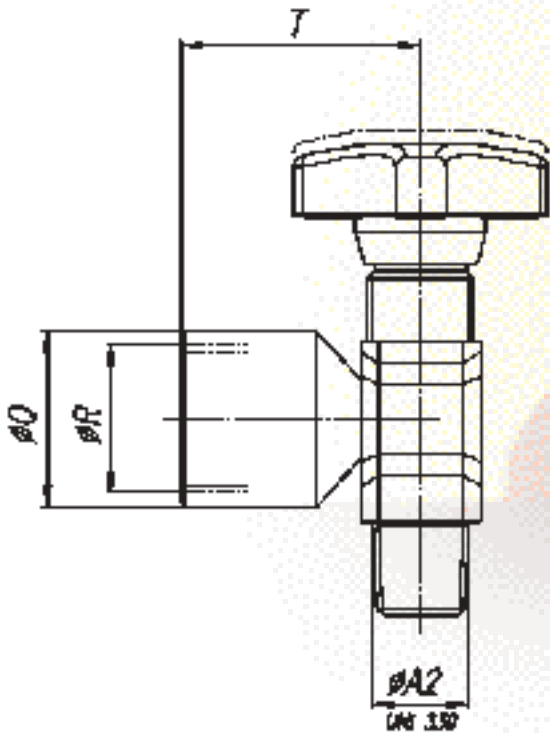
TYPE	A1 UNI 338	A2 UNI 339	B	ØC	D	E	ØF	G	H	L	M	N	P	Q	ES	OR	WEIGHT KG
1 4	1/4"Gb	1/4"Gb	13,5	5,6	22	40	34	10	M15x1	66	11	2	8,5	28	18	2018	0,105

EXAMPLE FOR ORDERING

CODE	CONNECTION FEMALE FEMALE	PANEL RING NUT	VITON SEAL
FT 291	01	G	V



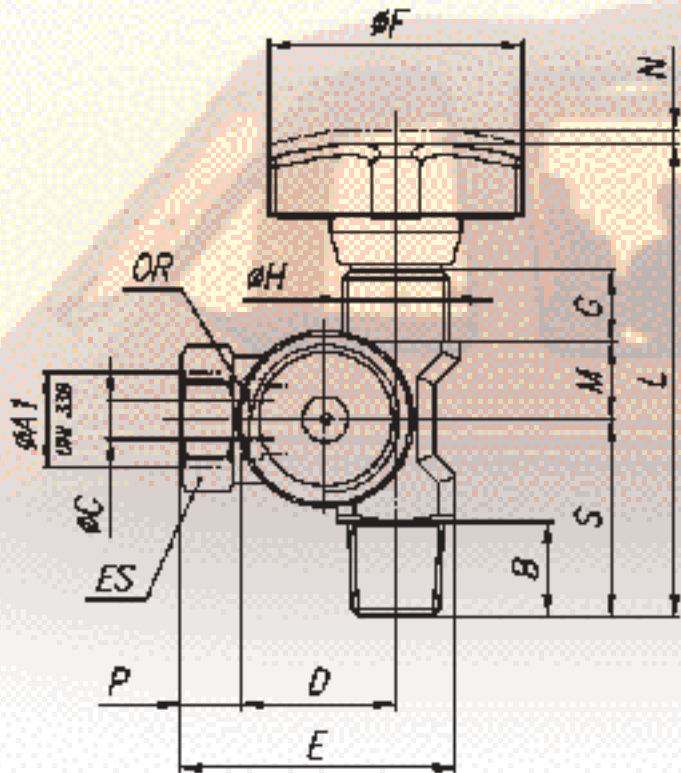
FT 01-291



MATERIALS

BODY	9 S MN Pb 23 - UNI 5105 - PRESS FORG.
NEEDLE	35 S MN Pb 23 - UNI 5105 - BURNISHED
OR	NITRILE
ANTIEXTRUSION RING	PTFE
HANDWHEEL	NYLON 66

All components are surface treated and protected



DIMENSIONS

TYPE	ØA1	ØA2	B	ØC	D	E	ØF	G	ØH	L	M	N	P	ØQ	ØR	S	T	OR	ES	WEIGHT KG
1 4	1/4" G	1/4" Gc	13,5	5,6	22	39	34	10	M15x1	66	11	2	8,5	25	1/2" G	28	34	2018	18	-

HOME

PRESENTATION

VALVES INDEX

+

-

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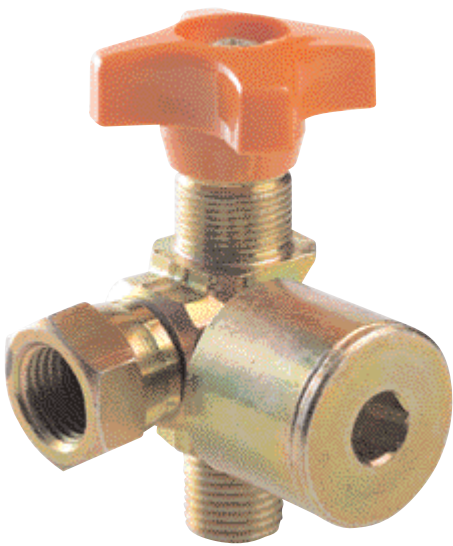
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GAUGE ISOLATOR NEEDLE VALVES 90° ANGLE
WITH LATERAL CONNECTION OF 1/2

They are generally used for hydraulic-pneumatic elevators subjected to initial and periodical tests by the institution in charge. They are normally used to protect the pressure gauge since they have the double function of dampening pressure surge during opening and of isolating the pressure gauge entirely. Pressed in high-resistance steel, protected by an accurate treatment, subjected to strict tests, they ensure reliability and long life. A rotating swivel nut allows for accurate pressure gauge orientation. The sealing, standard supplied, and inserted in the nut, prevents any drawing between the connection and the gauge. For pressure gauge with taper threads, it will be necessary to use copper washers FT 1201 shown on page ??? of this catalogue (to be requested separately). Equipped with connectors FT 299-24 (see page 103), they also allow the connection with attack of 1/2" Gas (as alternative it is advisable the use of the series FT 290-12). Suitable for pressure up to 400 bar and temperature from -20° to +100° they can be panel mounted by use of log nut (G), supplied on request.

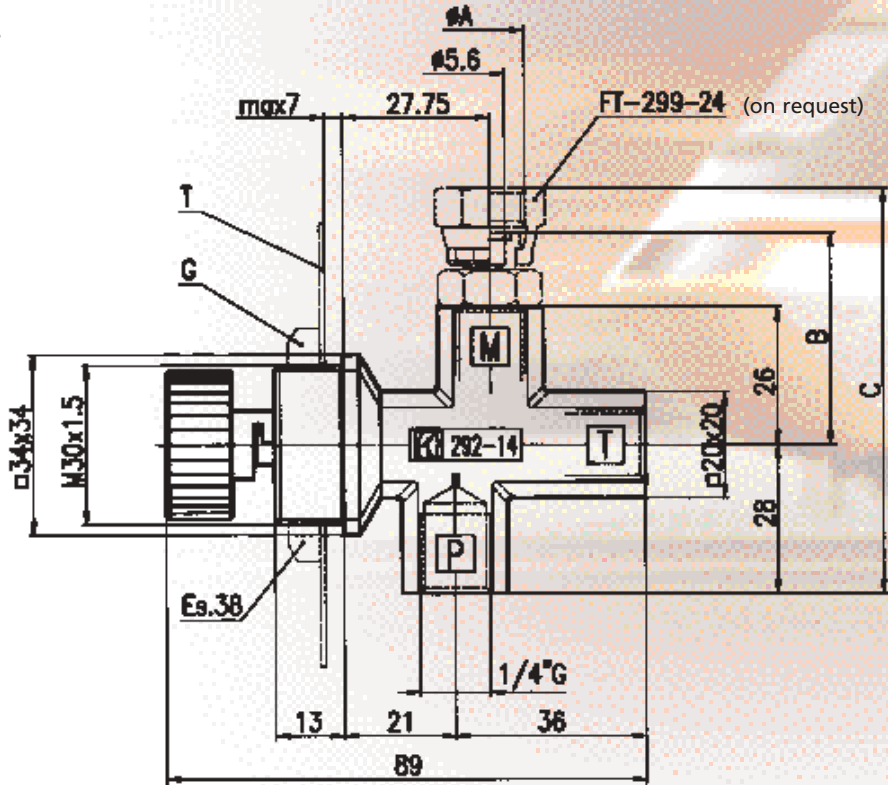


FT 01-291



MATERIALS

BODY	9 S MN Pb 23 - UNI 5105 - PRESS FORG.
NEEDLE	35 S MN Pb 23 - UNI 5105 - HEAT TREATMENT
OR	NYLON 66
ANTIEXTRUSION RING	NITRILE
HANDWHEEL	KG. Ø,265
All components are surface treated and protected	



DIMENSIONS

Ø A	B	C
1/4\"G	45	80
1/2\"G	50	85

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

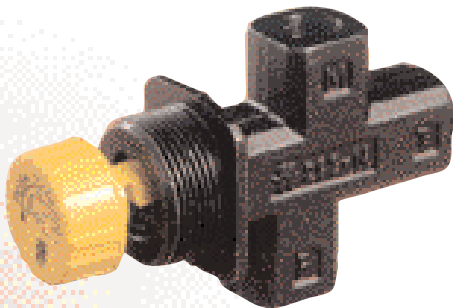
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GAUGE ISOLATOR PUSH-BUTTON VALVES

Gauge isolator push-button valves series FT 292 are normally used to protect the pressure gauge since they have the double function of dampening pressure surge during opening and of isolating the pressure gauge entirely. A reading is obtained by depressing the button. Releasing the button shuts off the flow to the gauge with residual pressure being automatically drained. The button can be locked to give a continuous reading. The maximum release pressure is 50 kg/sq cm. Panel mounting facility. Panel mounting fixtures are supplied only if expressly requested, indicate whether KM or hexagonal. The accurate study of components, of working conditions and of materials has contributed to obtain high quality levels, also confirmed by the results, which they are regularly subjected to. Equipped with connectors FT 299 (see page 180), they also allow full location orientation for ease of reading. They may be used for working pressure up to 400 bar.

- On request
- without lecture block



FT 292

EXAMPLE FOR ORDERING

CODE	PANEL RING NUT	PANEL PLATE
FT 292	G	T

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



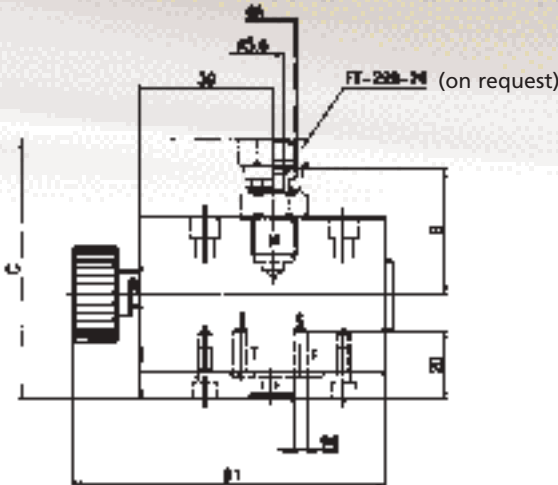
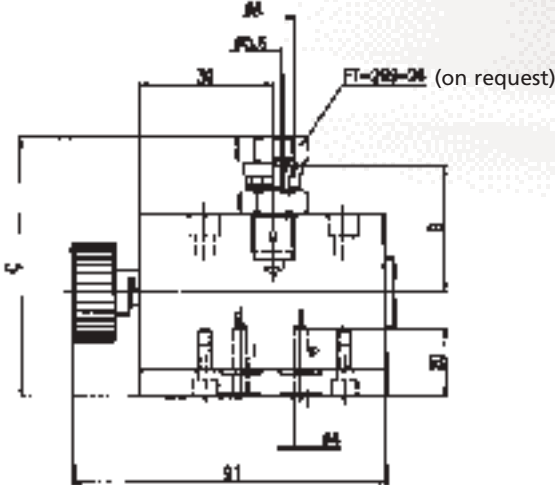
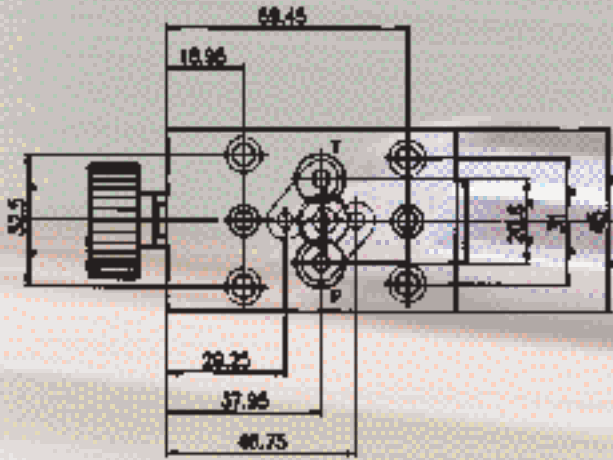
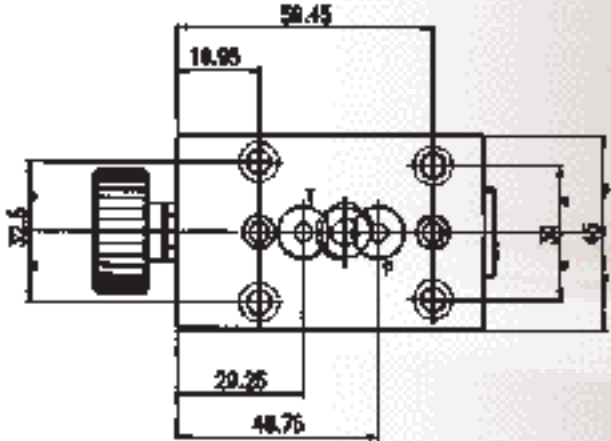
FT 293



MATERIALS	
BODY	9 S MN Pb 23 - UNI 5105 - PRESS FORG.
CURSOR	35 S MN Pb 23 - UNI 5105 HEAT TREATMENT
PUSH BUTTON	NYLON 66
O R	NITRILE
WEIGHT	KG. 0,890
All components are surface treated and protected	

ON REQUEST

CODICE FT 293-03



HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

GAUGE ISOLATOR PUSH-BUTTON VALVES
WITH PLATE INTERFACE

The new gauge isolator push-button valves series FT 293 are normally used to protect the pressure gauge since they have the double function of dampening pressure surge during opening and of isolating the pressure gauge entirely.

A release is obtained by depressing the button. Releasing the button shuts off the flow to the gauge with residual pressure being automatically drained.

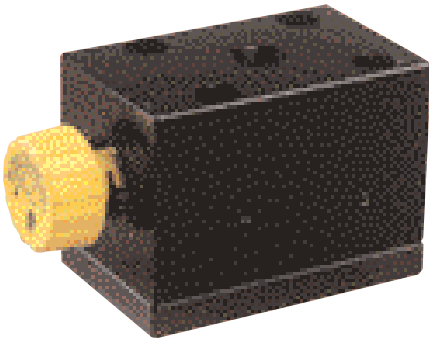
The button can be locked to give a continuous reading.

Locking screws are not supplied.

The accurate study of components, of working conditions and of materials has contributed to obtain high quality levels, also confirmed by the results, which they are regularly subjected to.

Equipped with connectors FT 299 (see page 180), they also allow full location orientation for ease of reading.

They may be used for working pressure up to 400 bar.



FT 293

DIMENSIONS		
Ø A	1/4" G	1/2" G
B	36,5	40,5
C	75,5	82



FT 290 - 291

HOME

PRESENTATION

VALVES INDEX



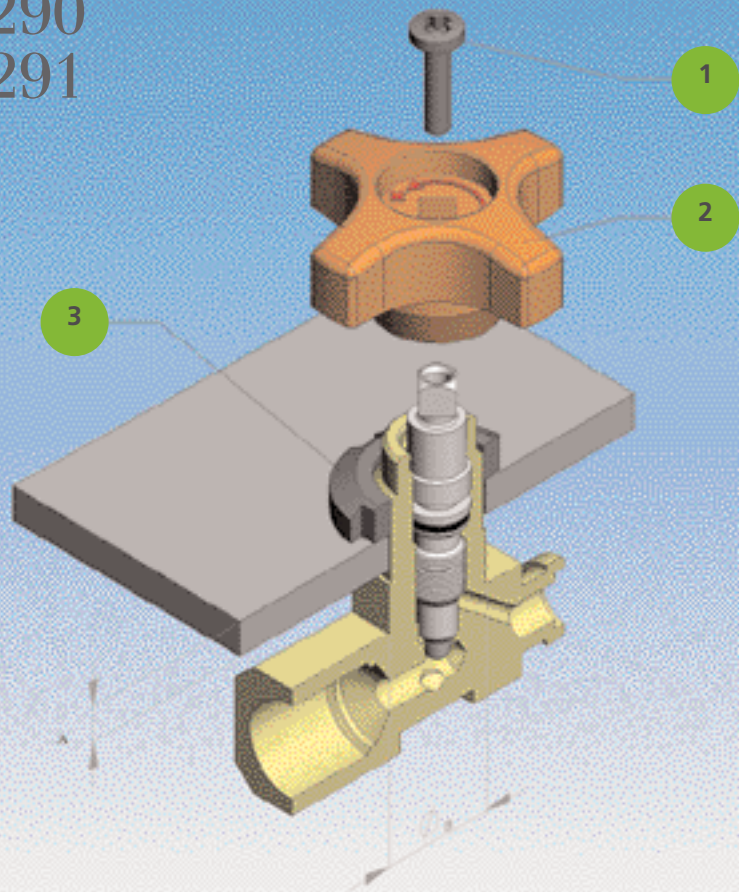
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WHOLE PAGE

PRINT

ESC

FT 290
291





ASSEMBLY INSTRUCTION

1 °	REMOVE SCREW (1)
2 °	PULL OFF HANDWHEEL (2)
3 °	INSERT RING NUT (3) TYPE KM OR HEXAGONAL

PANEL A THICKNESS MAX	PANEL HOLE ØB
5	16

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

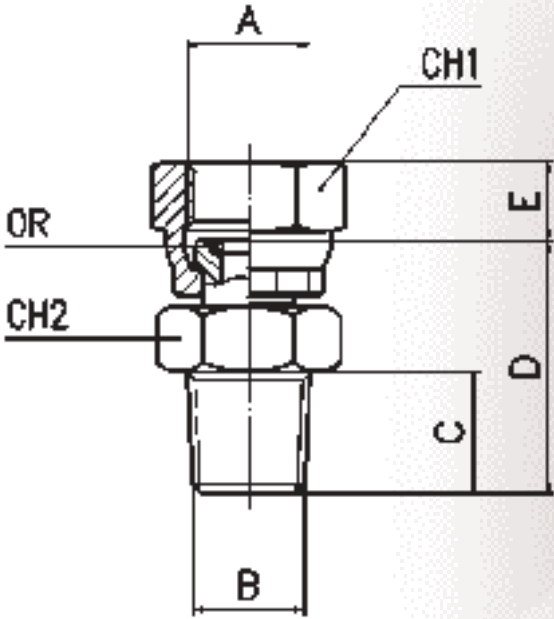
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MATERIALS	
BODY	9 S MN Pb 23 - UNI 5105
NUT	9 S MN Pb 23 - UNI 5105
OR	NITRILE

EXAMPLE FOR ORDERING	
CODE	TYPE
FT 299	44



DIMENSIONS									
TYPE	A UNI 338	B UNI 339	C	D	E	OR	CH 1	CH 2	WEIGHT KG
8 8	1/8" G	1/8" G C	9	22	7,5	2010	14	12	0,021
4 4	1/4" G	1/4" G C	13	27	9,5	2018	18	17	0,040
4 2	1/4" G	1/2" G C	16	31	9,5	2018	18	22	0,068
2 4	1/2" G	1/4" G C	13	31	11	108	27	22	0,090
2 2	1/2" G	1/2" G C	16	34	11	108	27	22	0,100

On request with cilindrical B thread

CONNECTORS

The connectors FT 299 allow the connection of a pressure gauge direct to the system or in addition to the gauge isolator push button valves they allow the locking and the orientation of the pressure gauge or the connection of pressure gauges with attack of 1/2" Gas. They consist of a threaded attack bar hold and a locking nut; they are equipped with an orifice for the oil flow passage. A gasket, supplied as current product and inserted in the rotating nut, prevents any blow-by between fitting and pressure gauge. In case the pressure gauge is provided with a taper thread, it is necessary to use copper washers FT 1201 of the present catalogue, to be requested separately.
Max. working pressure is 400 bar.

On request

- Version in AISI 316 FT 2299



FT 299

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



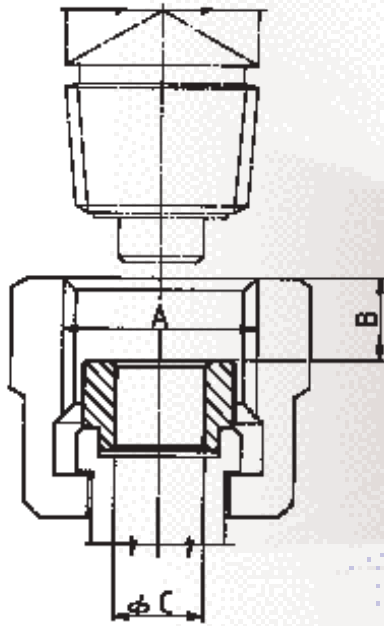
FT 1201



MATERIALS	
Cu - DHP - UNI 5649	

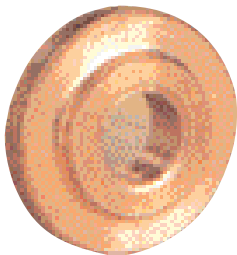
EXAMPLE FOR ORDERING	
CODE	TYPE
FT 1201	14

DIMENSIONS				
TYPE	A UNI 338	B	Ø C	WEIGHT KG X 100 PIECES
1 4	1/4" G	6,5	5,5	0,200
1 2	1/2" G	8	6,5	0,700



COPPER WASHERS

Copper washers FT 1201 are used as replacement of the toroidal sealings, supplied as current product, when the assembling of a pressure gauge or of a conical threaded nipple, with a gauge isolator valve series FT 290, FT 291 or with a connector series FT 299 is requested.
FT 1201




FT 1201

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

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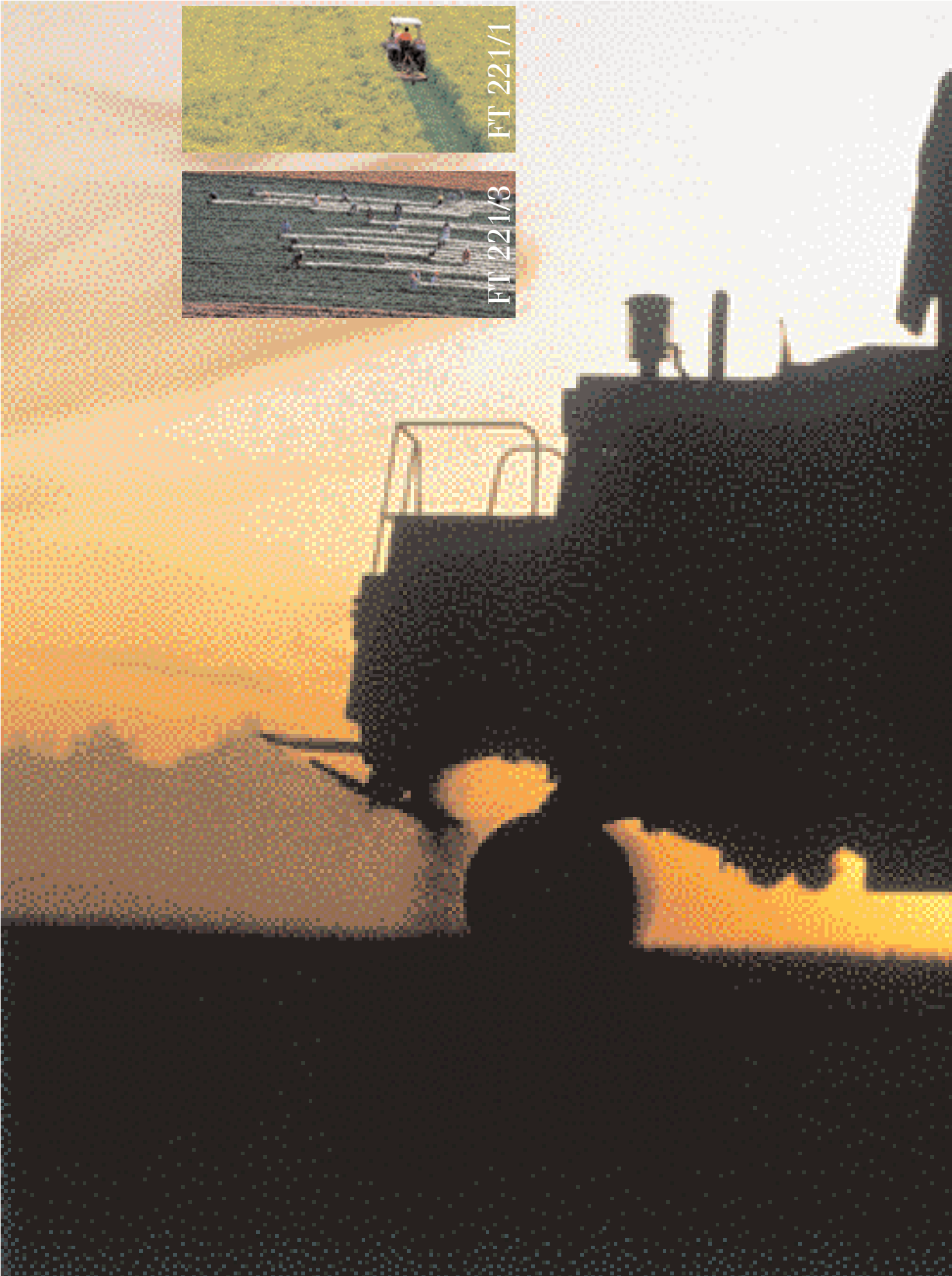
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FT 221/1



FT 221/3



HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

WHOLE PAGE

PRINT

ESC



TWO-WAY AND THREE-WAY BALL VALVES

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



FT 221/1
Two-way ball valves
FT 221/3
Three-way ball valves

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



FT 221/1

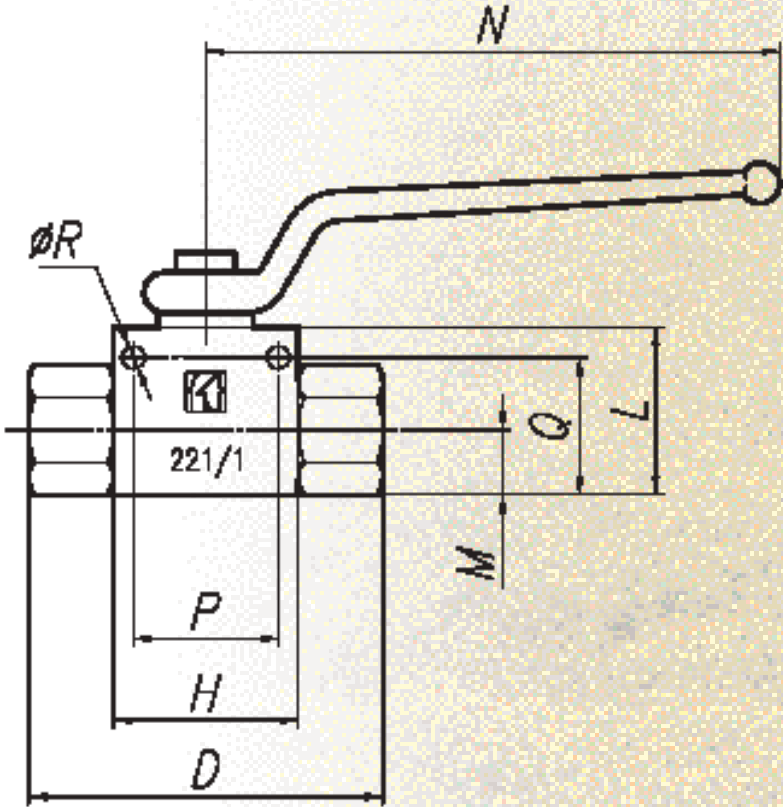


MATERIALS

BODY	CARBON STEEL
CONTROL STEM	CHROME-PLATED STEEL
BALL	CHROME-PLATED STEEL
STEM SEAL	NITRILE
BALL SEAL	PTFE

EXAMPLE FOR ORDERING

CODE	TYPE
FT 221/1	34



HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

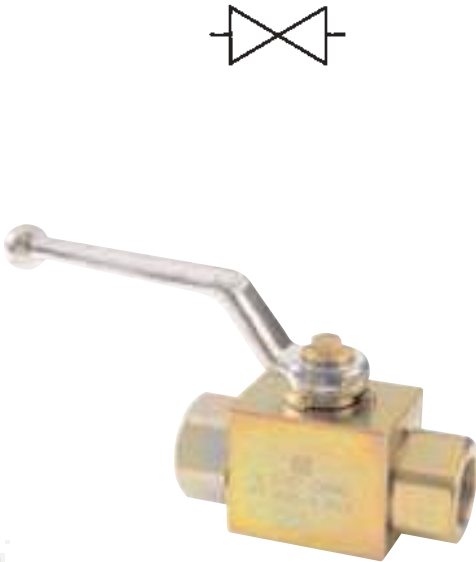
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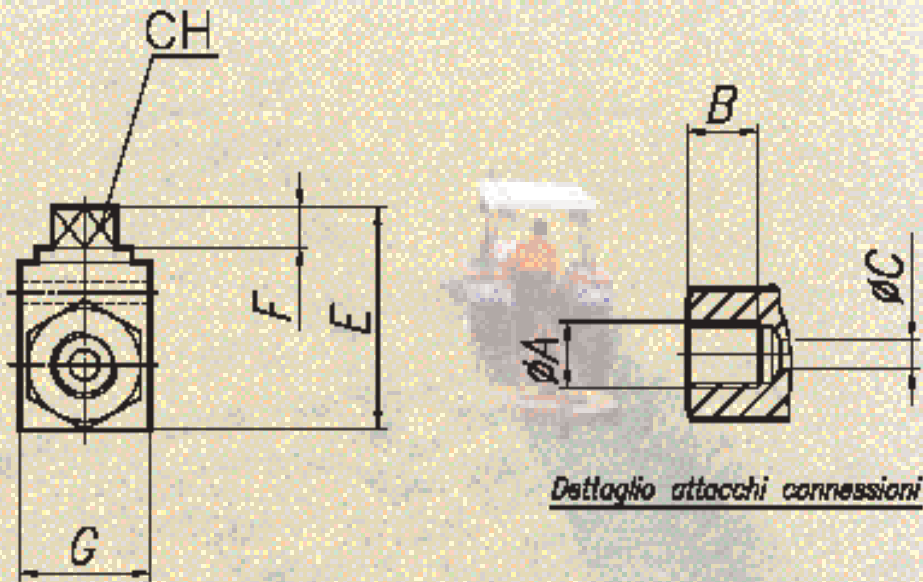
HIGH PRESSURE TWO-WAY BALL VALVES

Used to obtain a quick flow shut-off, avoiding noticeable pressure drop, the FT 221/1 ball valves are designed to obtain perfect sealing, easy and quick operation under high pressure conditions.
Working pressure up to 500 bar and with every kind of fluids, such as: hydraulic oil, fuel, emulsions and liquids in general.

- On request
- Version in AISI 316 FT 2221\1



FT 221/1



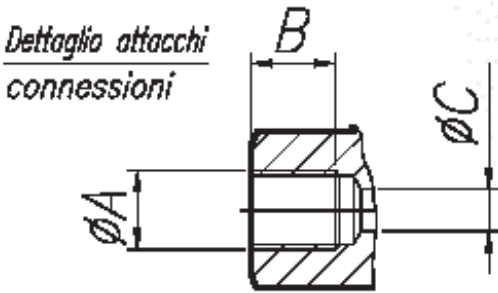
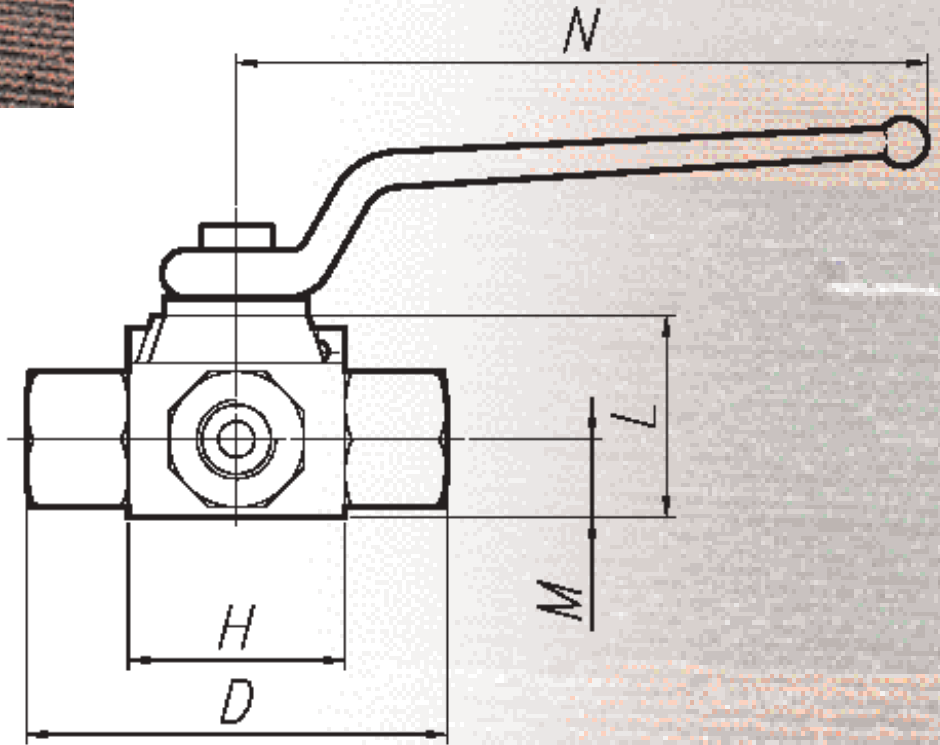
DIMENSIONS

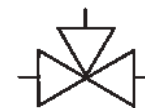
TYPE	DN	PN (BAR)	ØA	B	ØC	D	E	F	G	H	L	M	N	CH	WEIGHT KG	FIXING HOLES ON REQUEST		
																P	Q	Ø R
1 8	4	500	1/8"G	14	5	71	44,5	8	26	37	33,5	13	115	9	0,300	29	27,5	4,5
1 4	6	500	1/4"G	14	6	71	44,5	8	26	37	33,5	13	115	9	0,374	29	27,5	4,5
3 8	10	500	3/8"G	14	10	72	50	8	33	43	39	16,5	115	9	0,559	35	35	5,5
1 2	13	500	1/2"G	16	13	85	51	8	35	48	40	17	115	9	0,655	39	35,5	6,5
3 4	20	320	3/4"G	18	20	97	71,5	11	50	63	57	24	160	14	1,564	50	49,5	6,5
1 00	25	320	1"G	20	24	113	76	11	60	67	60	26,5	160	14	2,082	54	54	6,5
1 1 4	32	320	1 1/4"G	22	32	110	106	20	78	80	85	35	200	17	2,107	BOREST FIX NOT SUPPLIED		
1 1 2	38	320	1 1/2"G	24	38	130	112,5	15	83	85	92	41,5	200	17	3,698	BOREST FIX NOT SUPPLIED		
2 00	48	320	2"G	28	48	140	132	20	100	100	111	50	200	19	6,070	BOREST FIX NOT SUPPLIED		



MATERIALS	
BODY	CARBON STEEL
CONTROL STEM	CHROME-PLATED STEEL
BALL	CHROME-PLATED STEEL
STEM SEAL	NITRILE
BALL SEAL	PTFE

EXAMPLE FOR ORDERING	
CODE	TYPE
FT 221/3	34





THREE-WAY BALL VALVES

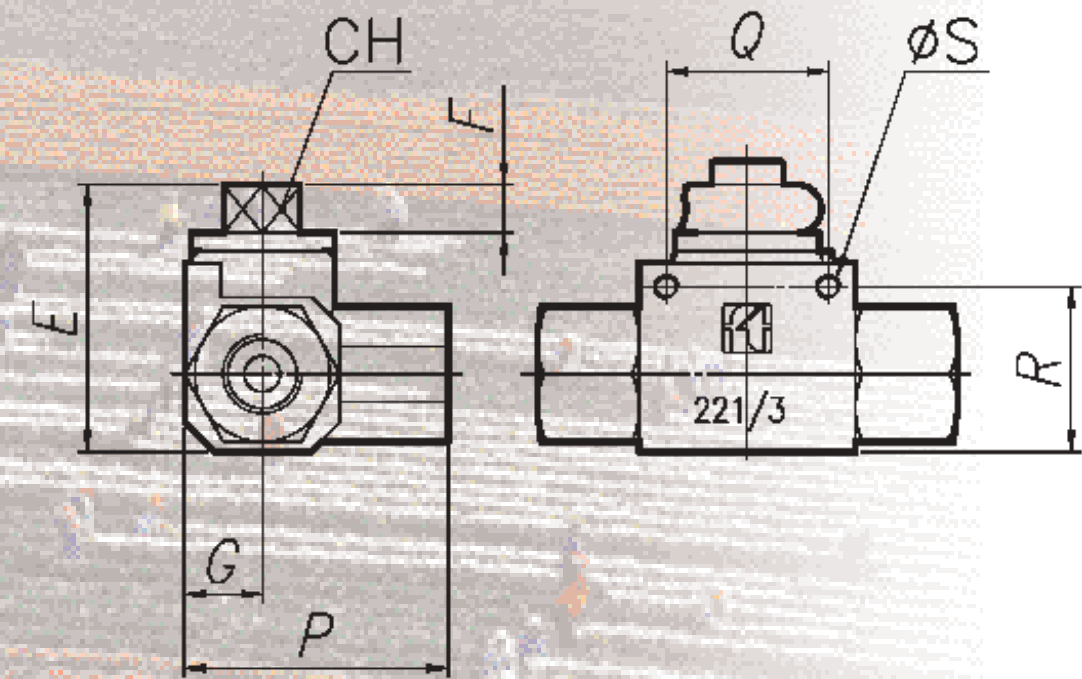
Used to obtain a quick flow shut-off, avoiding noticeable pressure drop, the FT 221/3 ball valves are designed to obtain perfect sealing, easy and quick operation under high pressure conditions. The noticeable solidity, the material selection and the accurate machining allow their use at working pressure up to 315 bar and with every kind of fluids, such as: hydraulic oil, fuel, emulsions and liquids in general.

Standard version: at L
Requested: at T

On request
• Version in AISI 316 FT 2221\3



FT 221/3



DIMENSIONS

TYPE	DN	PN (BAR)	ØA	B	ØC	D	E	F	G	H	L	M	N	P	CH	WEIGHT KG	FIXING HOLES ON REQUEST		
																	Q	R	ØS
1 8	4	500	1/8"G	14	5	71	44,5	8	13	36	33,5	13	115	44	9	0,450	27	27,5	M4
1 4	6	500	1/4"G	14	7	71	44,5	8	13	36	33,5	13	115	44	9	0,400	27	27,5	M4
3 8	10	500	3/8"G	14	10	72	50	8	16,5	43	39	16,5	115	51,5	9	0,600	33	35	M4
1 2	13	500	1/2"G	16	13	85	51,5	8	17,5	48	40,5	17,5	115	55	9	0,650	38	36	M5
3 4	20	320	3/4"G	18	20	97	72	11	24,5	63	56,5	24,5	160	70	14	1,600	50	49,5	M6
1 0 0	25	320	1"G	20	24	113	79,5	11	30	67	63,5	30	160	87,5	14	2,400	54	54	M6



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



FT1237/2



FT1237/5



FT1247/2



FT1251/2-01



FT1251/2-02



FT1252/2-01



FT1252/2-02



FT1251/5-01



FT1253/5



FT1254/5

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

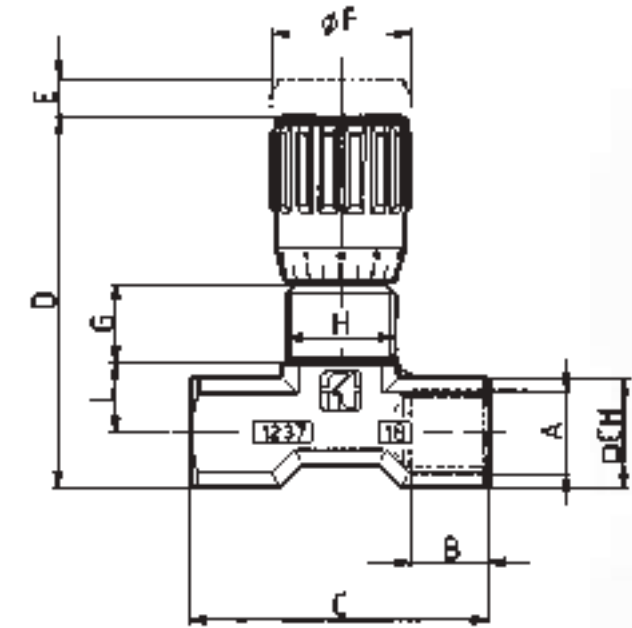
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HYDRAULIC PNEUMATIC CONTROL VALVES



FT 1237/2
Double-acting fine control valves
FT 1237/5
Single-acting fine control valves
FT 1247/2
Double-acting cartridge mounted fine control valves
FT 1251/2-01
Double-acting control valves Female-Female in line
FT 1251/2-02
Double-acting control valves Male-female in line
FT 1252/2-01
Double-acting control valves 90° angle Female-Female
FT 1252/2-02
Double-acting control valves 90° angle Male-Female
FT 1251/5-01
Single-acting control valves Female-Female
FT 1253/5
Single-acting needle control valve in line
FT 1254/5
Single-acting needle control valve 90° angle



MATERIALS

BODY	DT 58 - UNI 5705 - PASSIVATED
NEEDLE	X 10 CR NI S 1809 - UNI 6900
O R	NITRILE
ANTIEXTRUSION RING	PTFE
KNOB	GD AL SI 12 - UNI 5706

EXAMPLE FOR ORDERING

	CODE	TYPE	PANEL RING NUT	VITON SEAL
BRASS	FT 1237/2	18	G	V

DIMENSIONS

TYPE	A UNI 338	B	C	D	E	Ø F	G	H	L	□ CH	WEIGHT KG
18	1/8" G	8	40	55	4	22	12	M15x1	9,5	15	0,105

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

DOUBLE-ACTING FINE CONTROL VALVES IN LINE

It is the solution for application requiring special adjustment of small flow rates. For both hydraulic-pneumatic applications with flow rate up to max. 3 l/min. They can be used also with fluids different from oil, such as: gas and liquids in general.

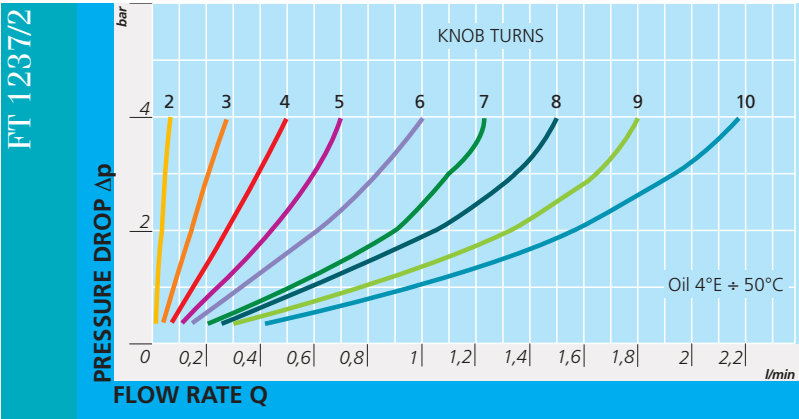
This version has the same characteristics as the series FT 1250 and it maintains its main characteristics:

- metallic sealing;
- provision for panel mounting;
- security against accidental needle withdrawal.

- On request**
- NPT threads
 - Viton (V) seals
 - Version in AISI 316 FT 2237/2



FT 1237/2



TECHNICAL DATA

TYPE	FLOW SQ MM²	MAX WORKING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE µM
1 8	3,14	210	-20°/+100°	25

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



FT 1237/5

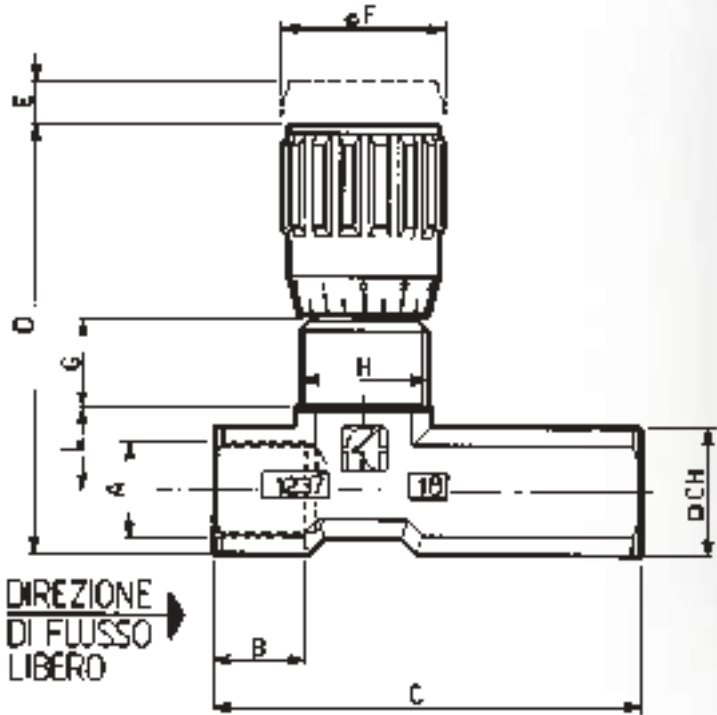


MATERIALS

BODY	DT 58 - UNI 5705 - PASSIVATED
NEEDLE	X 10 CR NI S 1809 - UNI 6900
O R	NITRILE
ANTIEXTRUSION RING	PTFE
KNOB	GD AL SI 12 - UNI 5706
SPRING	AISI 302
BALL	UNI 100 C 6
BALL GUIDE	NYLON 66 + CARBON FIBER

EXAMPLE FOR ORDERING

	CODE	TYPE	PANEL RING NUT	VITON SEAL
BRASS	FT 1237/5	18	G	V



DIMENSIONS

TYPE	A	B	C	D	E	Ø F	G	H	L	CH	WEIGHT KG
UNI 338											
18	1/8" G	8	46,5	55	4	22	12	M15x1	9,5	15	0,110

SINGLE-ACTING FINE CONTROL VALVES IN LINE

It is the solution for application requiring special adjustment of small flow rates. For both hydraulic-pneumatic applications with flow rate up to max. 3 l/min. They can be used also with fluids different from oil, such as: gas and liquids in general.

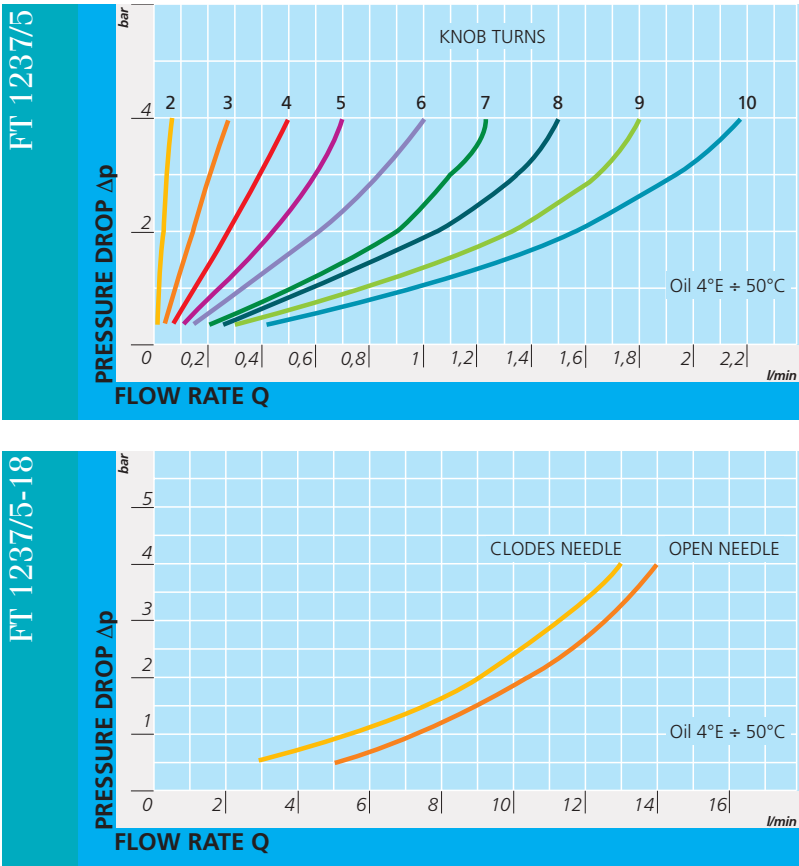
This version has the same characteristics as the series FT 1250 and it maintains its main characteristics:

- metallic sealing;
- provision for panel mounting;
- security against accidental needle withdrawal.

- On request
- NPT threads
 - Viton (V) seals



FT 1237/5



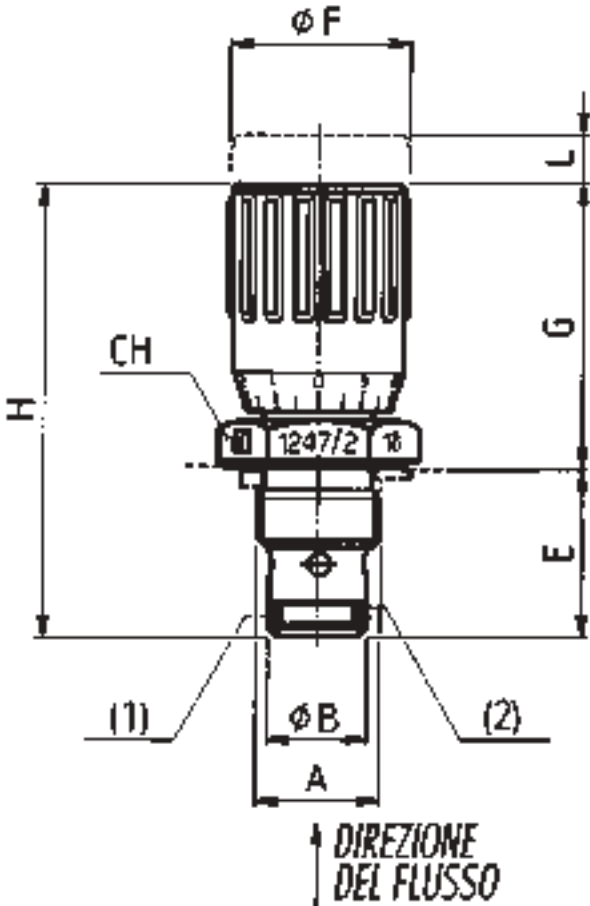
TECHNICAL DATA

TYPE	FLOW SQ MM²	MAX WORKING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE µM
1 8	3,14	210	-20°/+100°	25



MATERIALS	
BODY	QT 58 - UNI 5705 - PASSIVATED
NEEDLE	X 10 CR NI S 1809 - UNI 6900
OR	NITRILE
ANTIEXTRUSION RING	PTFE
KNOB	GD AL SI 12 - UNI 5706

EXAMPLE FOR ORDERING			
	CODE	TYPE	VITON SEAL
	FT 1247/2	18	V
STAINLESS STEEL	FT 2247/2	18	V



DIMENSIONS											
TYPE	UNI	A	Ø B	E	Ø F	G	H	L	CH	WEIGHT KG	(1)OR (2)BK
18	M15x1	4534	12	20,5	22	34,5	55	8	22	0,069	108 108

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

DOUBLE-ACTING CARTRIDGE MOUNTED
FINE CONTROL VALVES

It is the solution for application requiring special adjustment of small flow rates.
For both hydraulic-pneumatic applications with flow rate up to max. 3 l/min.
They can be used also with fluids different from oil, such as: gas and liquids in general.
This version has the same characteristics as the series FT 1250 and it maintains its main characteristics:

- metallic sealing;
- provision for panel mounting;
- security against accidental needle withdrawal.

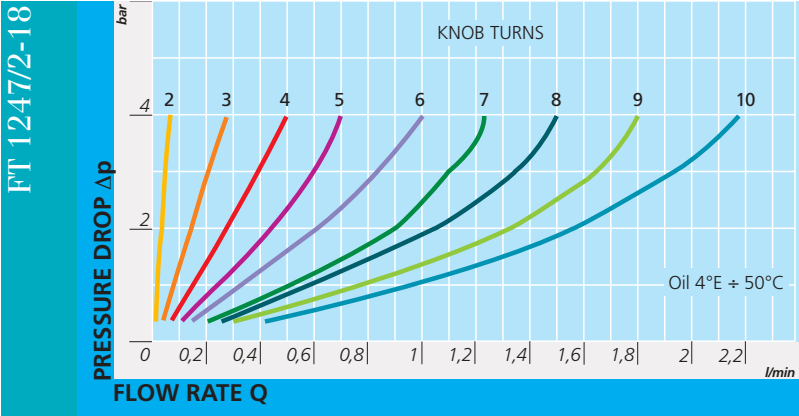
On request

- NPT threads
- Version AISI 316 Code FT 2247/2



TOGNELLA

FT 1247/2



TECHNICAL DATA

TYPE	FLOW SQ MM²	MAX WORKING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE µM
1 8	3,14	210	-20°/+100°	25



FT 267/5

HOME

PRESENTATION

VALVES INDEX

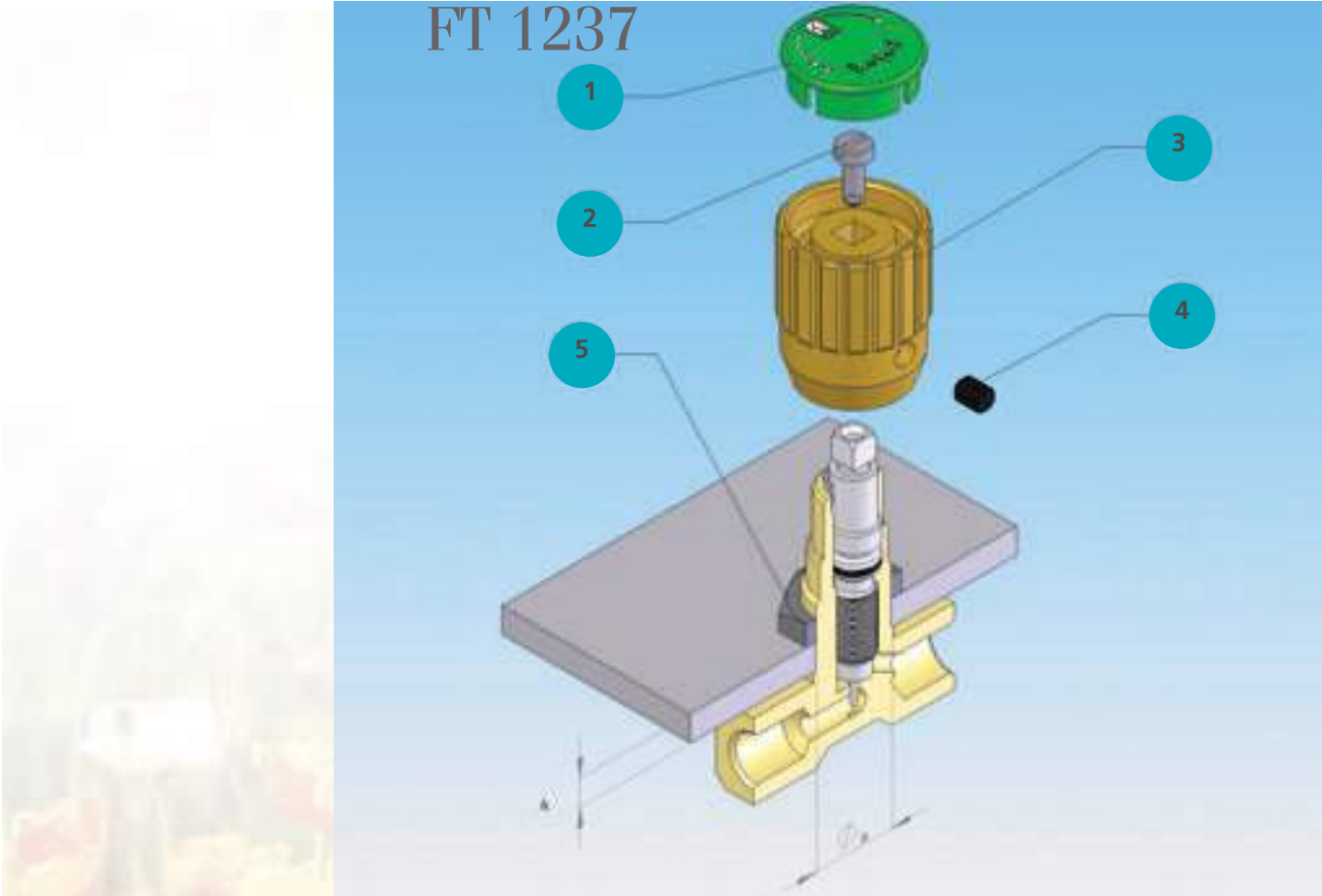


LAST SEEN

WHOLE PAGE

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ESC



PANEL MOUNTING

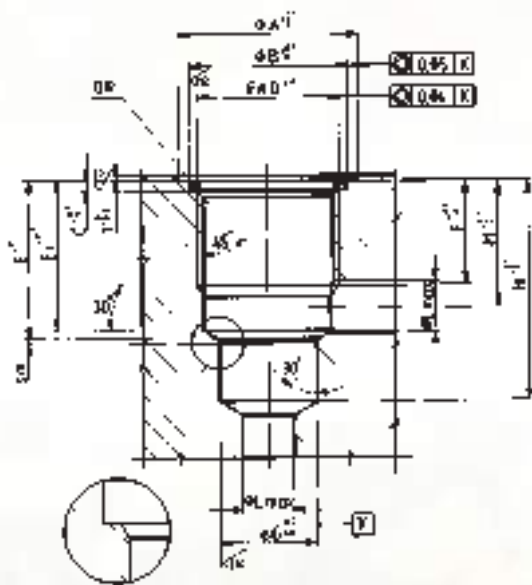
1 °	UNSCREW THE LOCK SCREW (4)
2 °	REMOVE COVER PLATE (1)
3 °	REMOVE SCREW (2)
4 °	PULL OFF KNOB (3)
5 °	INSERT RING NUT (5), ON REQUEST IT IS SUPPLIED WITH THE VALVE

TYPE VALVE	THICKNESS PANEL A MAX	PANEL ORIFICE Ø B
1 8	5	16

MACHINING DIAGRAMS FOR SEATS OF FT 1247/2 CARTRIDGE VALVE

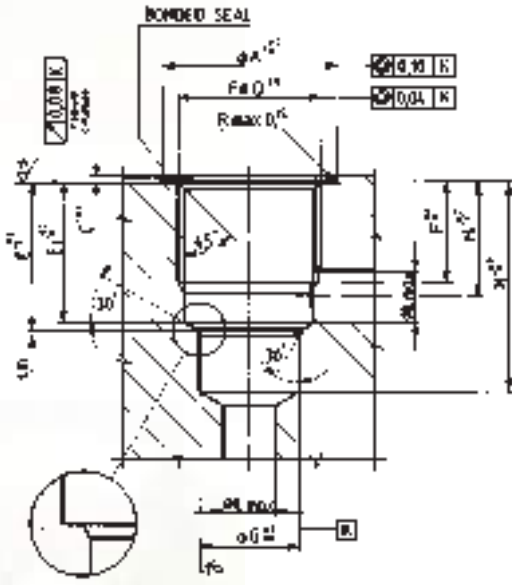


SERIE FT 1237



Detail of machining which may be executed in alternative to the conical one, eliminating dimension E1

FLAT SEA



Detail of machining which may be executed in alternative to the conical one, eliminating

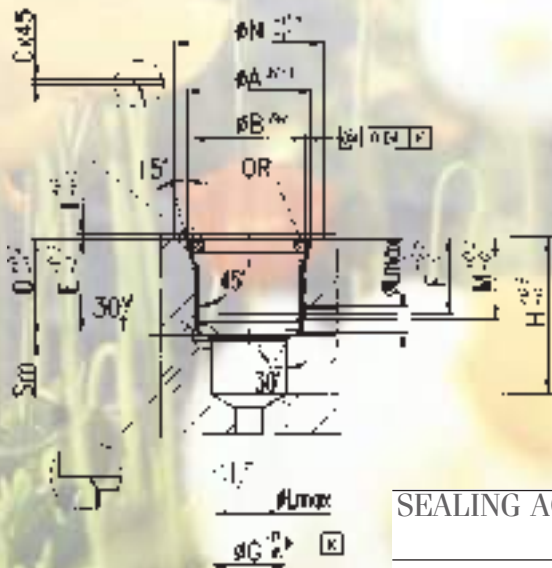
BONDED SEAL

SEALING ACHIEVED WITH O-RING ON FLAT SEAT

TYPE	Ø A	Ø B	C	UNI D 4534	E	E 1	F	Ø G	H	Ø L	M	SM	Ø R
1 8	23	19	2	M15x1	14	13	11	12	21,5	4	11,5	0,5	3056

SEALING ACHIEVED BY BONDED SEALS

TYPE	Ø A	C	UNI D 4534	E	E 1	F	Ø G	H	Ø L	M	SM	BONDED SEAL
1 8	23	1	M15x1	13	12	9	12	20	4	10,3	0,5	400-512



CONICAL SEAT

SEALING ACHIEVED WITH O-RING ON CONICAL SEAT

TIPO	Ø A	UNI B 4534	C	D	E	F	Ø G	H	Ø L	M	SM	Ø R
1 8	16,2	M15x1	0,25	14	13	11	12	21,5	4	11,5	0,5	205

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

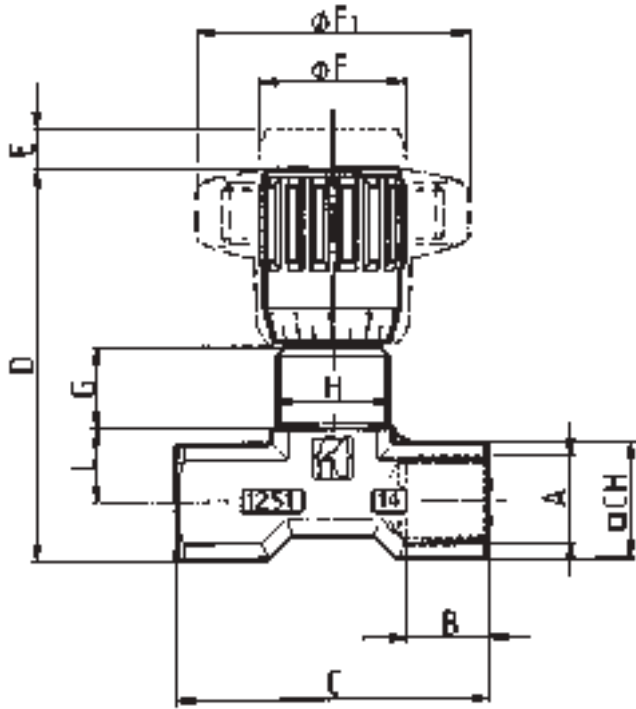
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PRINT

ESC



FT 1251/2-01



DIMENSIONS

TYPE	A UNI 338	B	C	D	E	Ø F	Ø F1	G	H	L	□ CH	WEIGHT KG
1 8	1/8"G	8	40	55	4	22	40	12	M15x1	9,5	15	0,105
1 4	1/4"G	12	46	57	4,5	22	40	11,5	M17x1	11,5	18	0,122
3 8	3/8"G	13	55	69	7	27	50	12,5	M20x1	15	22	0,233
1 2	1/2"G	16	70	82	10	33	70	13	M25x1,5	19	27	0,455
3 4	3/4"G	20	91	100	12	38	80	15	M30x1,5	22	34	0,860

MATERIALS

BODY	DT 58 - UNI 5705 - NICKEL-PLATED
NEEDLE	X 10 CR NI S 1809 - UNI 6900
OR	NITRILE
ANTIEXTRUSION RING	PTFE
KNOB	GD AL SI 12 - UNI 5706
KNOB (MP)	ABS

EXAMPLE FOR ORDERING

ACCESSORIES BY REQUEST					
	CODE	TYPE	PANEL RING NUT	VITON SEAL	KNOB ABS
BRASS	FT 1251/2-01	38	G	V	MP
STAINLESS STEEL	FT 2251/2-01	14	G	V	MP

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

DOUBLE-ACTING CONTROL VALVES FEMALE-FEMALE
IN LINE

They allow the regulation of flow in both directions.
Notable from an aesthetical point of view they are built with materials which are suitable also for applications with fluids different from oil (such as: water, gas and liquids in general).
As an alternative to FT 257/2 (suitable up to 400 bar) where the working pressure does not exceed 210 bar and where ferrous materials cannot be used. They have the same characteristics as the FT 257 series:

- accurate flow regulation;
- efficient metallic sealing;
- simple setting of flow rates;
- secure against accidental needle withdrawal;
- secure needle position with locking screw inserted in the knob;
- provision for panel mounting, for which special lock nut (G) is supplied on request.

For use with pressure up to 210 bar.

- On request
- Versions AISI 316 Code FT 2251/2-01
 - Viton (V) seals
 - NPT threads
 - ABS (mp)Knob
 - Complete with lock nut (G)



FT 1251/2-01

TECHNICAL DATA

TYPE	FLOW SQ MM²	MAX WORKING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE µM
1 8	7,07	210	-20°/+100°	25
1 4	12,57	210	-20°/+100°	25
3 8	19,64	210	-20°/+100°	25
1 2	50,27	210	-20°/+100°	25
3 4	78,54	210	-20°/+100°	25



FT 1251/2-01

HOME

PRESENTATION

VALVES INDEX

+

-



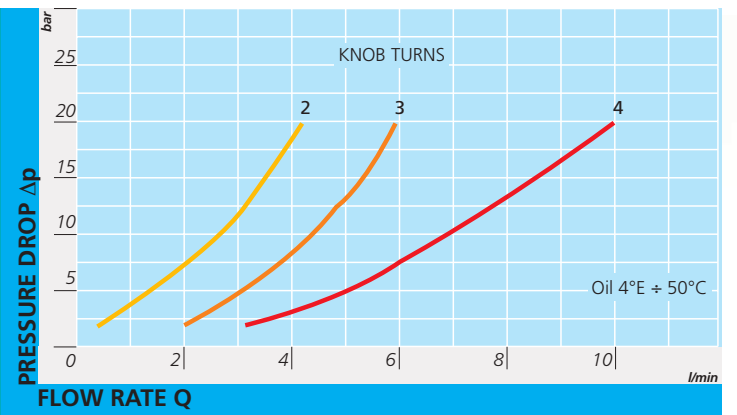
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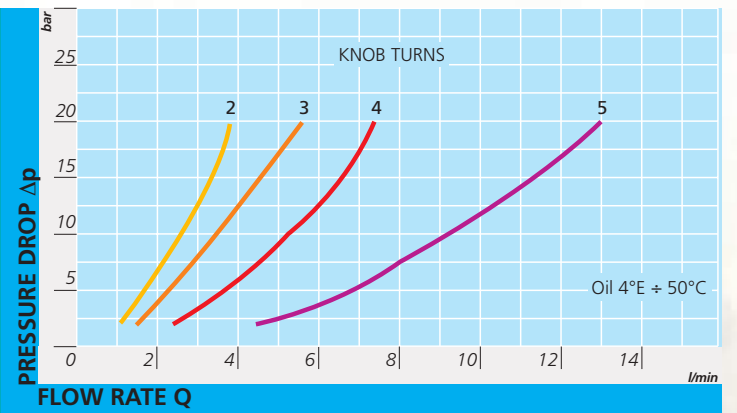
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ESC

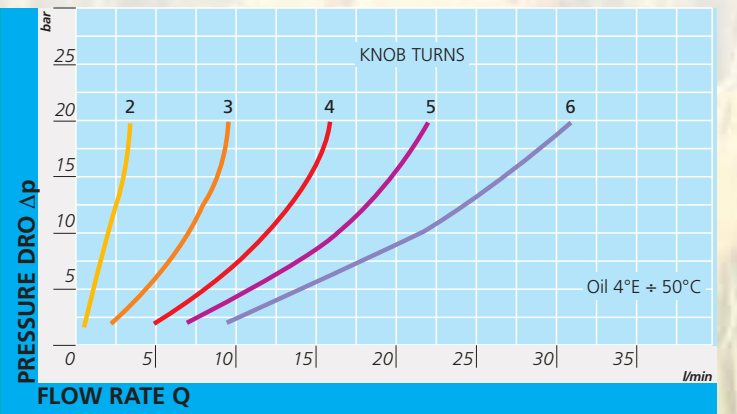
FT 1251/2-01-18



FT 1251/2-01-14



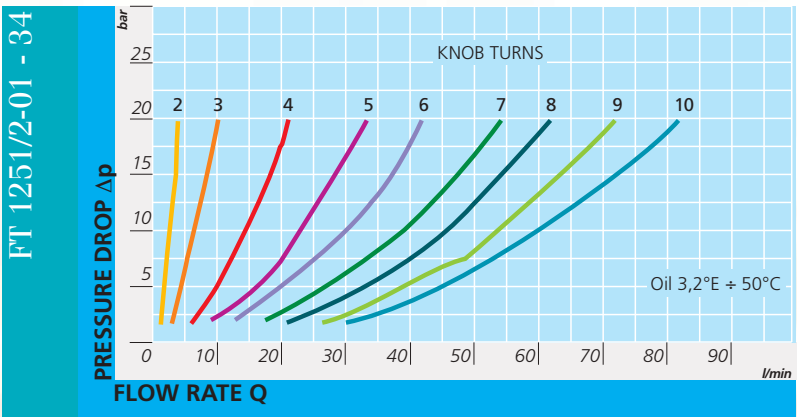
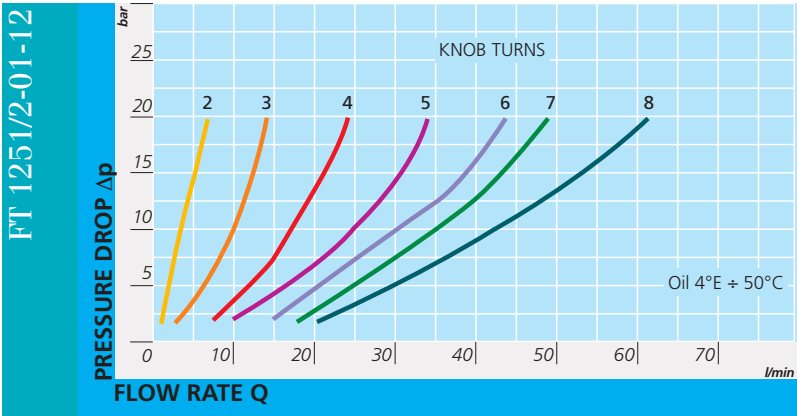
FT 1251/2-01-38



FLOW RATE CURVES



FT 1251/2-01



HOME

PRESENTATION

VALVES INDEX

+

-

LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



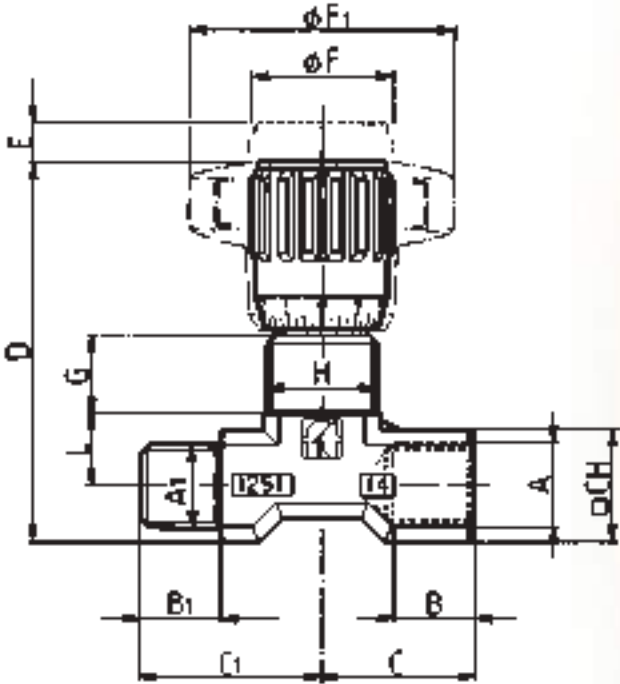
FT 1251/2-02



MATERIALS	
BODY	QT 58 - UNI 5705 - NICKEL PLATED
NEEDLE	X 10 CR NI S 1809 - UNI 6900
O R	NITRILE
ANTIEXTRUSION RING	PTFE
KNOB	GD AL SI 12 - UNI 5706
KNOB (MP)	ABS

EXAMPLE FOR ORDERING

ACCESSORIES ON REQUEST					
	CODE	TYPE	PANEL RING NUT	VITON SEAL	KNOB ABS
BRASS	FT 1251/2-02	12	G	V	MP
STAINLESS STEEL	FT 2251/2-02	14	G	V	MP



DIMENSIONS

TYPE	A UNI338	A1 UNI339	B	B1	C	C1	D	E	ϕF	$\phi F1$	G	H	L	CH	WEIGH KG
1 8	1/8" G	1/8" Gc	8	9	20	24	55	4	22	40	12	M15x1	9,5	15	0,105
1 4	1/4" G	1/4" Gc	12	12	23	27	57	4,5	22	40	11,5	M17x1	11,5	18	0,130
3 8	3/8" G	3/8" Gc	13	13	27,5	32,5	69	7	27	50	12,5	M20x1	15	22	0,246
1 2	1/2" G	1/2" Gc	16	16	35	39,5	82	10	33	70	13	M25x1,5	19	27	0,448
3 4	3/4" G	3/4" Gc	20	20	45,5	49,5	100	12	38	80	15	M30x1,5	22	34	0,845

DOUBLE-ACTING CONTROL VALVES MALE-FEMALE
IN LINE

They allow the regulation of flow in both directions.
Notable from an aesthetical point of view they are built with materials, which are suitable also for applications with fluids different from oil (such as: water, gas and liquids in general).
As an alternative to FT 257/2 (suitable up to 400 bar) where the working pressure does not exceed 210 bar and where ferrous materials cannot be used.
They have the same characteristics as the FT 257 series:

- accurate flow regulation;
- efficient metallic sealing;
- simple setting of flow rates;
- secure against accidental needle withdrawal;
- secure needle position with locking screw inserted in the knob;
- provision for panel mounting, for which special lock nut (G) is supplied on request.

For use with pressure up to 210 bar.

- On request
- Versions AISI 316 Code FT 2251/2-01
 - Viton (V) seals
 - NPT threads
 - ABS (mp)Knob
 - Complete with lock nut (G)



FT 1251/2-02

TECHNICAL DATA

TYPE	FLOW SQ MM²	MAX WORKING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE µM
1 8	7,07	210	-20°/+100°	25
1 4	12,57	210	-20°/+100°	25
3 8	19,64	210	-20°/+100°	25
1 2	50,27	210	-20°/+100°	25
3 4	78,54	210	-20°/+100°	25

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

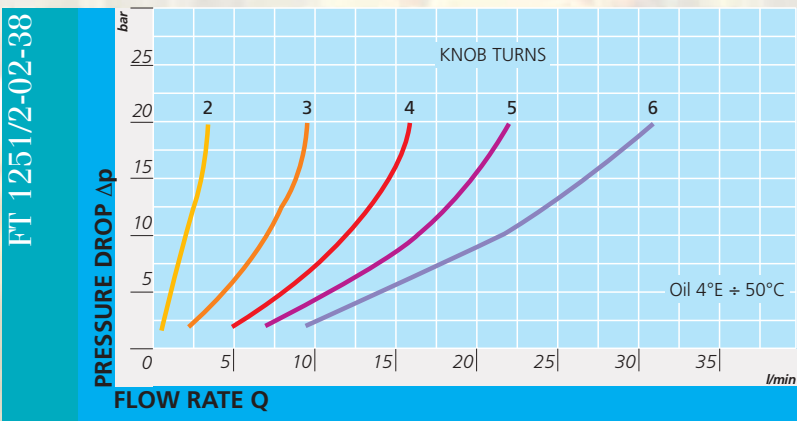
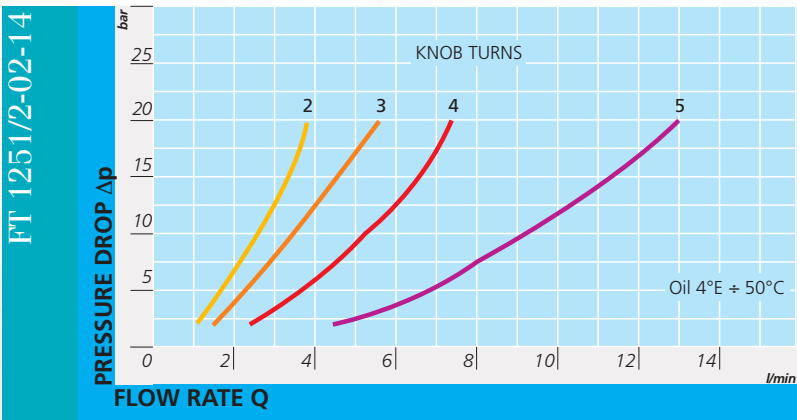
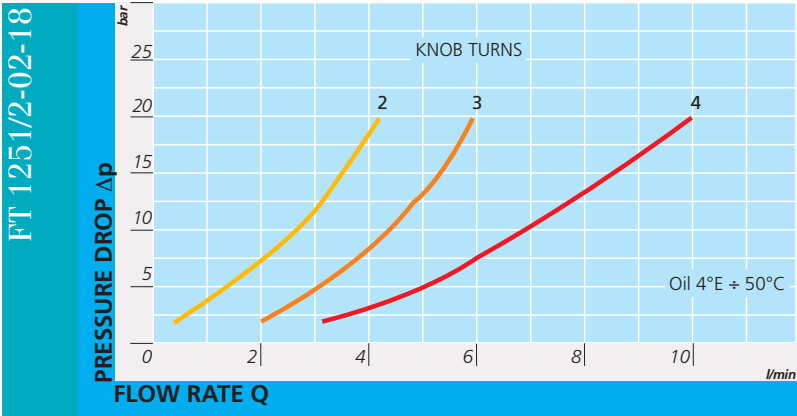
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ESC



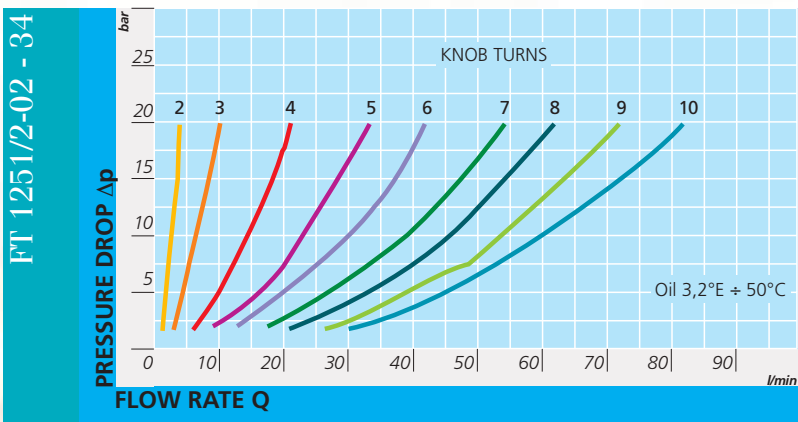
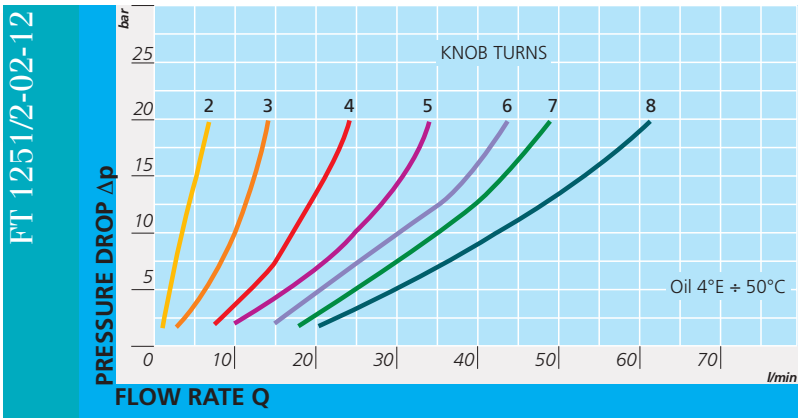
FT 1251/2-02



FLOW RATE CURVES



FT 1251/2-02



HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

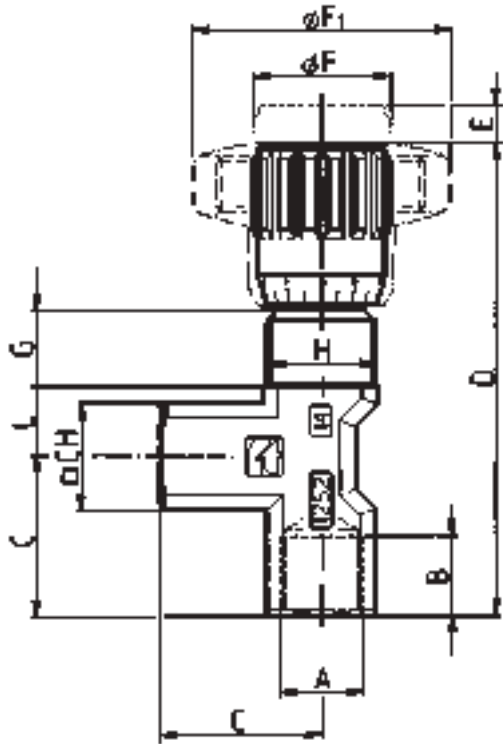
WHOLE PAGE

PRINT

ESC



FT 1252/2-01



MATERIALS

BODY	QT 58 - UNI 5705 - NICKEL PLATED
NEEDLE	X 10 CR NI S 1809 - UNI 6900
OR	NITRILE
ANTIEXTRUSION RING	PTFE
KNOB	GD AL SI 12 - UNI 5706
KNOB (MP)	ABS

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ACCESSORIES ON REQUEST					
	CODE	TYPE	PANEL RING NUT	VITON SEAL	KNOB ABS
BRASS	FT 1252/2-01	38	G	V	MP



DIMENSIONS

TYPE	UNI	A	B	C	D	E	Ø F	Ø F1	G	H	L	CH	WEIGHT KG
1 8	1/8"G	3	8	21	69	4	22	40	12	M15x1	9,5	15	0,105
1 4	1/4"G	3	12	25	74	4,5	22	40	11	M17x1	11,5	18	0,136
3 8	3/8"G	3	13	29,5	88	7	27	50	12,5	M20x1	15	22	0,248
1 2	1/2"G	3	16	36	105	10	33	70	13	M25x1,5	19	27	0,454

DOUBLE-ACTING CONTROL VALVES 90° ANGLE
FEMALE-FEMALE

They allow the regulation of flow in both directions.
Notable from an aesthetical point of view they are built with materials, which are suitable also for applications with fluids different from oil (such as: water, gas and liquids in general).
As an alternative to FT 257/2 (suitable up to 400 bar) where the working pressure does not exceed 210 bar and where ferrous materials cannot be used.
They have the same characteristics as the FT 257 series:

- accurate flow regulation;
- efficient metallic sealing;
- simple setting of flow rates;
- secure against accidental needle withdrawal;
- secure needle position with locking screw inserted in the knob;
- provision for panel mounting, for which special lock nut (G) is supplied on request.

For use with pressure up to 210 bar

- On request
- Viton (V) seals
 - NPT threads
 - ABS (mp)Knob
 - Complete with lock nut (G)



FT 1252/2-01

TECHNICAL DATA

TYPE	FLOW SQ MM²	MAX WORKING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE µM
1 8	7,07	210	-20°/+100°	25
1 4	12,57	210	-20°/+100°	25
3 8	19,64	210	-20°/+100°	25
1 2	50,27	210	-20°/+100°	25

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

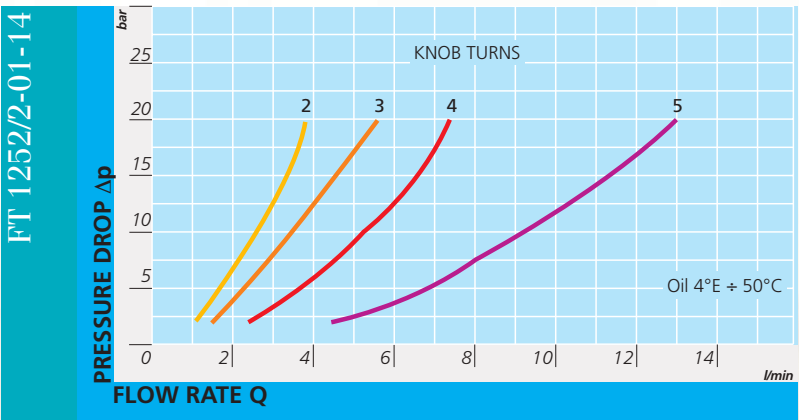
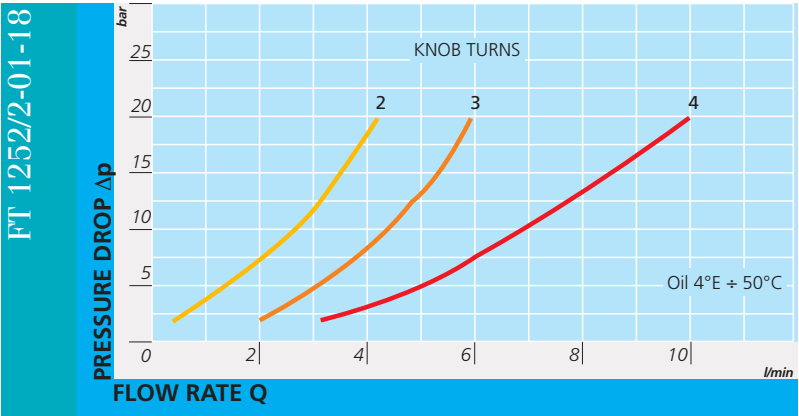
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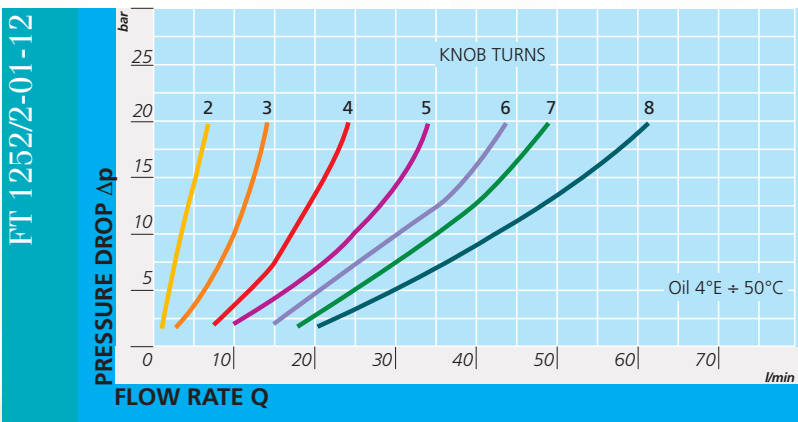
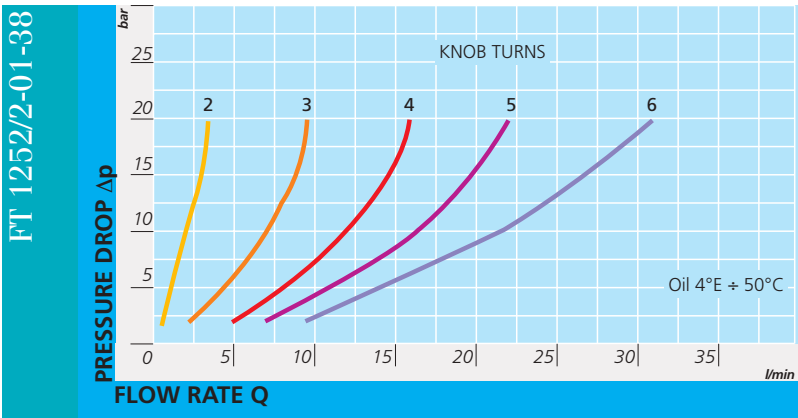
FT 1252/2-01



FLOW RATE CURVES



FT 1252/2-01



HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

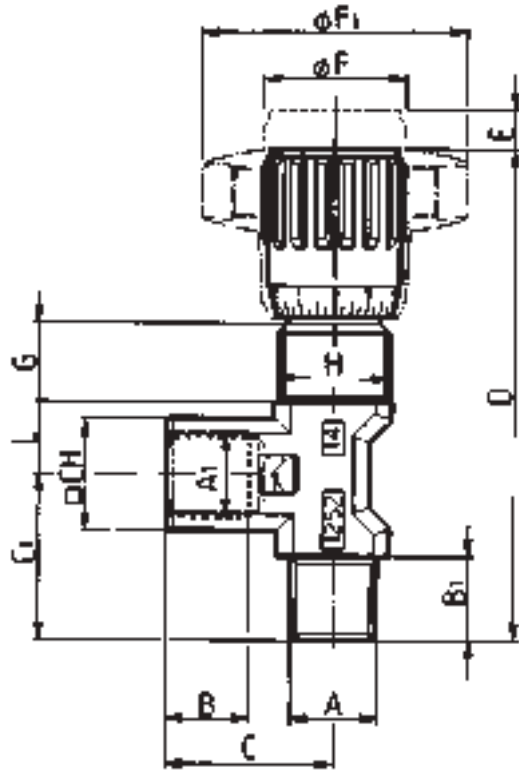
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ESC



FT 1252/2-02



DIMENSIONS

TYPE	A UNI 339	A 1 UNI 338	B 1	B	C	C 1	D	E	Ø F	F 1	G	H	L	CH	WEIGHT KG
1 8	1/8"G	1/8"G	9	8	21	21	70	4	22	40	12	M15x1	9,5	15	0,102
1 4	1/4"G	1/4"G	12	12	25	25	74	4,5	22	40	11	M17x1	11,5	18	0,132
3 8	3/8"G	3/8"G	13	13	29,5	29,5	88	7	27	50	12,5	M20x1	15	22	0,245
1 2	1/2"G	1/2"G	16	16	36	36	105	10	33	70	13	M25x1,5	19	27	0,440

MATERIALS

BODY	QT 58 - UNI 5705 NICKEL PLATED
NEEDLE	X 10 CR NI S 1809 - UNI 6900
OR	NITRILE
ANTIEXTRUSION RING	PTFE
KNOB	GD AL SI 12 - UNI 5706
KNOB (MP)	ABS

EXAMPLE FOR ORDERING

ACCESSORIES ON REQUEST					
	CODE	TYPE	PANEL RING NUT	VITON SEAL	KNOB ABS
BRASS	FT 1252/2-02	12	G	V	MP

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

DOUBLE-ACTING CONTROL VALVES 90° ANGLE
MALE-FEMALE

They allow the regulation of flow in both directions.
Notable from an aesthetical point of view they are built with materials, which are suitable also for applications with fluids different from oil (such as: water, gas and liquids in general).
As an alternative to FT 257/2 (suitable up to 400 bar) where the working pressure does not exceed 210 bar and where ferrous materials cannot be used.
They have the same characteristics as the FT 257 series:

- accurate flow regulation;
- efficient metallic sealing;
- simple setting of flow rates;
- secure against accidental needle withdrawal;
- secure needle position with locking screw inserted in the knob;
- provision for panel mounting, for which special lock nut (G) is supplied on request.

For use with pressure up to 210 bar

- On request**
- Viton (V) seals
 - NPT threads
 - ABS (mp)Knob
 - Complete with lock nut (G)



FT 1252/2-02

TECHNICAL DATA

TYPE	FLOW SQ MM ²	MAX WORKING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE μM
1 8	7,07	210	-20°/+100°	25
1 4	12,57	210	-20°/+100°	25
3 8	19,64	210	-20°/+100°	25
1 2	50,27	210	-20°/+100°	25

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

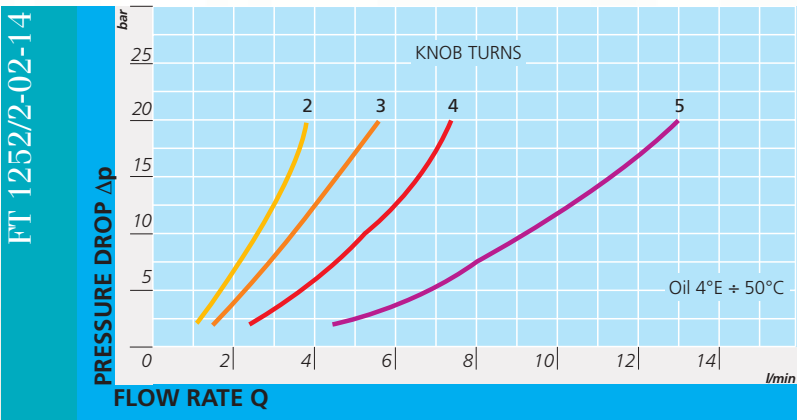
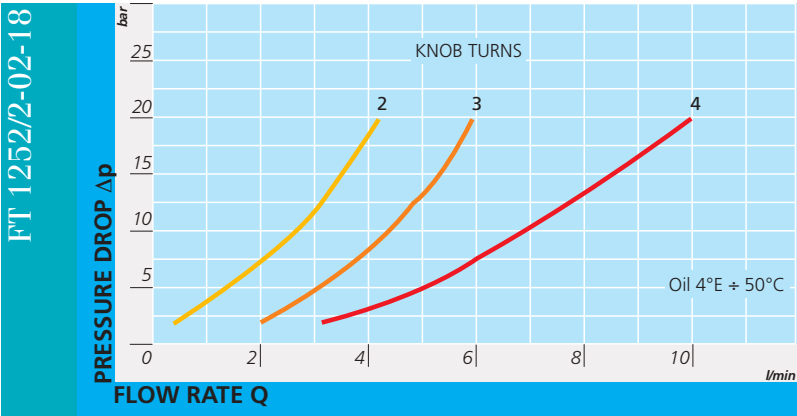
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ESC



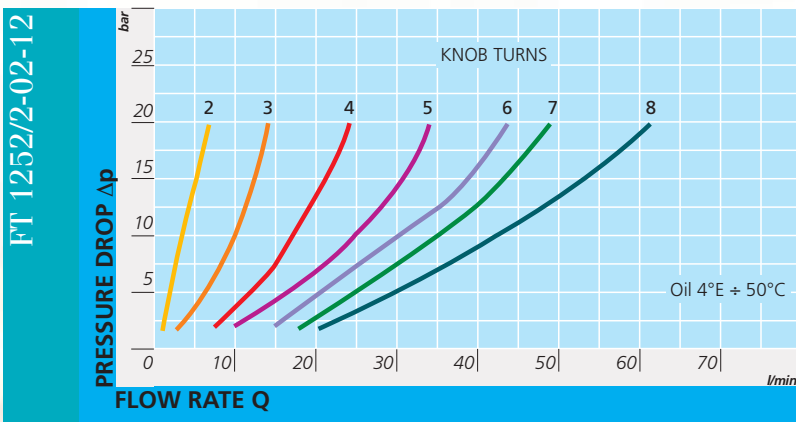
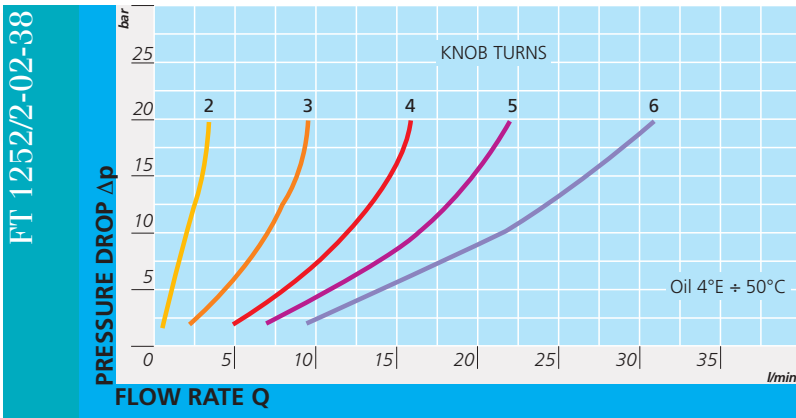
FT 1252/2-02



FLOW RATE CURVES



FT 1252/2-02



HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

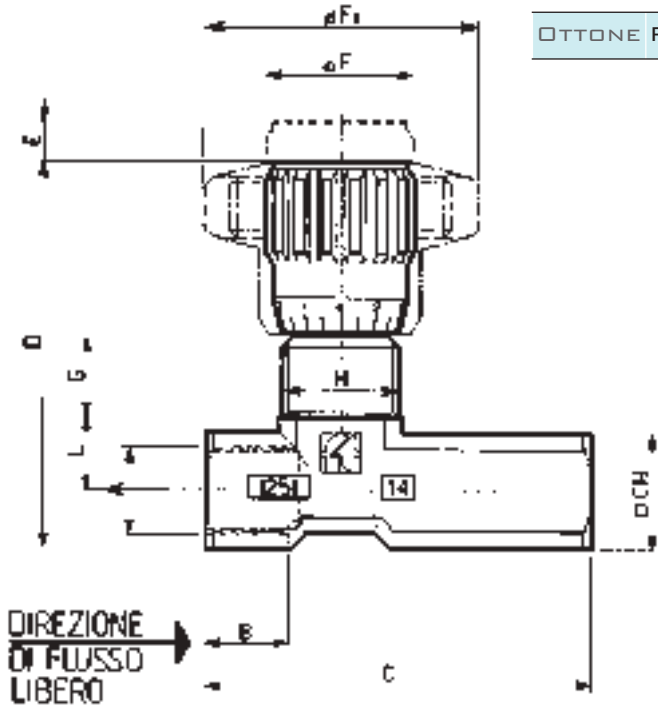
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ESC



FT 1251/5-01



DIMENSIONS

TYPE	A UNI 338	B	C	D	E	Ø F	Ø F1	G	H	L	CH	WEIGHT KG
1 4	1/4"G	12	56	57	4,5	22	40	11	M17x1	11,5	18	0,138
3 8	3/8"G	13	64,5	69	7	27	50	12,5	M20x1	15	22	0,259
1 2	1/2"G	16	87	82	10	33	70	13	M25x1,5	19	27	0,499
3 4	3/4"G	20	115	100	12	38	80	15	M30x1,5	22	34	0,975

MATERIALS

BODY	QT 58 - UNI 5705 NICKEL PLATED
NEEDLE	X 10 CR NI S 1809 - UNI 6900
OR	NITRILE
ANTIEXTRUSION RING	PTFE
KNOB	GD AL SI 12 - UNI 5706
SPRING	ABS
BALL	AISI 302
BALL GUIDE	UNI 100 C 6
GUIDA SFERA	NYLON 66 + CARBON FIBER

EXAMPLE FOR ORDERING

ACCESSORIES ON REQUEST					
	CODE	TYPE	PANEL RING NUT	VITON SEAL	KNOB ABS
OTTONE	FT 1251/5-01	38	G	V	MP

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

SINGLE-ACTING CONTROL VALVES FEMALE-FEMALE
IN LINE

They allow regulation of flow in one direction and full free flow in opposite direction thanks to the single-acting unit of ball type with guide cage they are equipped with.

As an alternative to FT 257/5 (suitable up to 400 bar) where the working pressure does not exceed 210 bar and where ferrous materials cannot be used.

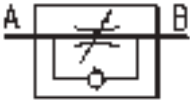
They have the same characteristics as the FT 257 series:

- accurate flow regulation;
- efficient metallic sealing;
- simple setting of flow rates;
- secure against accidental needle withdrawal;
- secure needle position with locking screw inserted in the knob;
- provision for panel mounting, for which special lock nut (G) is supplied on request.

For use with pressure up to 210 bar

On request

- Viton (V) seals
- NPT threads
- ABS (mp)Knob
- Complete with lock nut (G)



FT 1251/5-01

TECHNICAL DATA

TYPE	FLOW SQ MM²	MAX WORKING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE µM
1 4	12,57	210	-20°/+100°	25
3 8	19,64	210	-20°/+100°	25
1 2	50,27	210	-20°/+100°	25
3 4	78,54	210	-20°/+100°	25



FT 1251/5-01

HOME

PRESENTATION

VALVES INDEX

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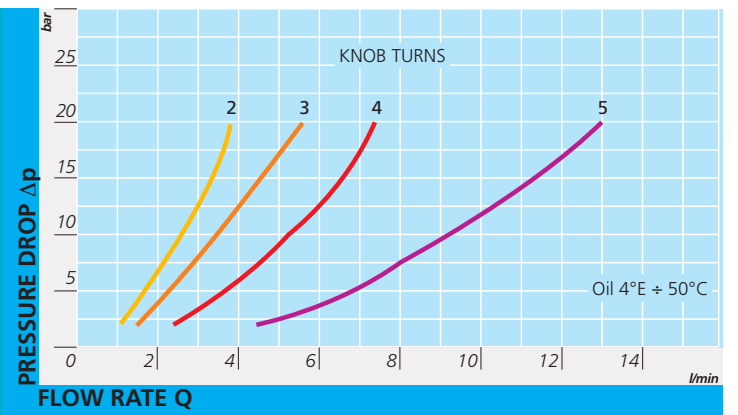
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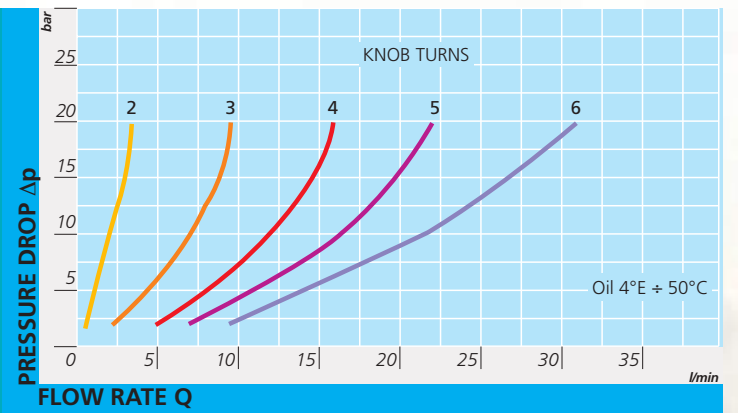
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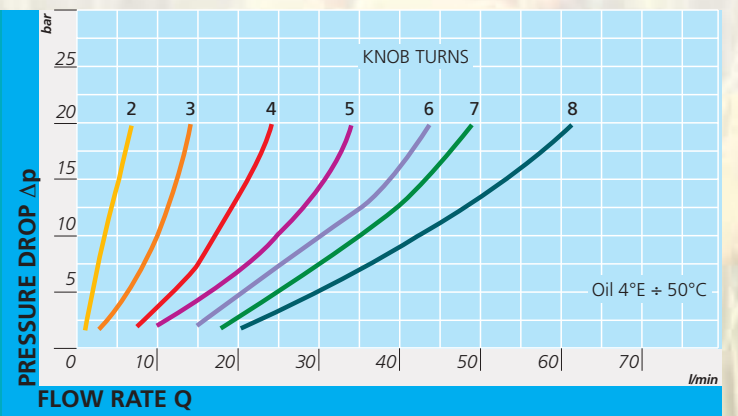
FT 1251/5-01-14



FT 1251/5-01-38



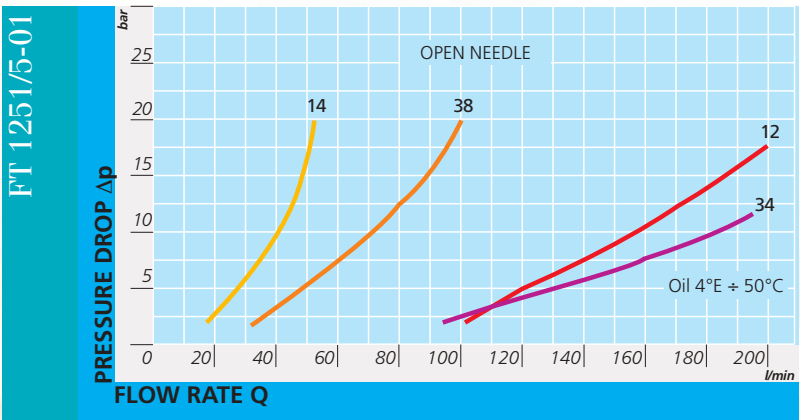
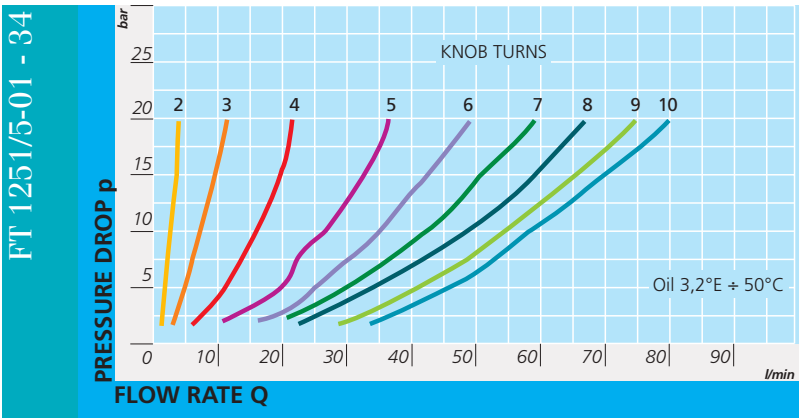
FT 1251/5-01-12



FLOW RATE CURVES



FT 1251/5-01



HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



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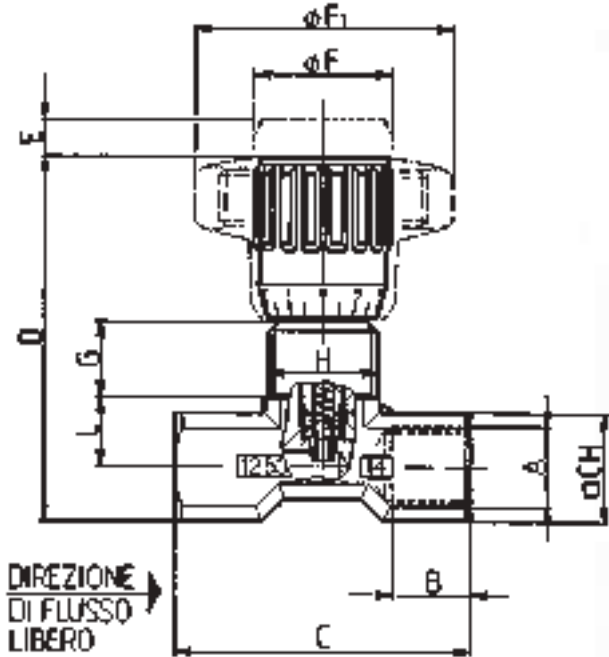
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FT 1253/5



DIMENSIONS

TYPE	A UNI 338	B	C	D	E	Ø F	Ø F1	G	H	L	□CH	WEIGHT KG
1 8	1/8"G	8	40	55	4	22	40	12	M15x1	9,5	15	0,105
1 4	1/4"G	12	46	57	4,5	22	40	11,5	M17x1	11,5	18	0,135
3 8	3/8"G	13	55	69	7	27	50	12,5	M20x1	15	22	0,250
1 2	1/2"G	16	70	82	10	33	70	13	M25x1,5	19	27	0,460
3 4	3/4"G	20	91	100	12	38	80	15	M30x1,5	22	34	0,860

MATERIALS

BODY	DT 58 - UNI 5705 - NICKEL PLATED
NEEDLE	X 10 CR NI S 1809 - UNI 6900
OR	NITRILE
ANTIEXTRUSION RING	PTFE
KNOB	GD AL SI 12 - UNI 5706
KNOB (MP)	ABS

EXAMPLE FOR ORDERING

ACCESSORIES ON REQUEST					
	CODE	TYPE	PANEL RING NUT	VITON SEAL	KNOB ABS
BRASS	FT 1253/5-02	12	G	V	MP
STAINLESS STEEL	FT 2253/5-02	18	G	V	MP

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

SINGLE-ACTING NEEDLE CONTROL VALVE IN LINE

Derived from the pressing of series **FT 1251/2** they allow regulation of flow in one direction and full free flow in opposite direction thanks to the needle unit with incorporated ball they are equipped with.
As an alternative to FT 257/5 (suitable up to 400 bar) where the working pressure does not exceed 210 bar and where ferrous materials cannot be used. They have the same characteristics as the FT 257 series:

- accurate flow regulation;
 - efficient metallic sealing;
 - simple setting of flow rates;
 - secure against accidental needle withdrawal;
 - secure needle position;
 - provision for panel mounting, for which special lock nut (G) is supplied on request.
- For use with pressure up to 210 bar

On request

- Versions AISI 316 Code FT 2253/5
- Viton (V) seals
- NPT threads
- ABS (mp)Knob
- Complete with lock nut (G)





FT 1253/5

TECHNICAL DATA

TYPE	FLOW SQ MM ²	MAX WORKING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE μm
1 8	7,07	210	-20°/+100°	25
1 4	12,57	210	-20°/+100°	25
3 8	19,64	210	-20°/+100°	25
1 2	50,27	210	-20°/+100°	25
3 4	78,54	210	-20°/+100°	25



FT 1253/5

HOME

PRESENTATION

VALVES INDEX

+

-



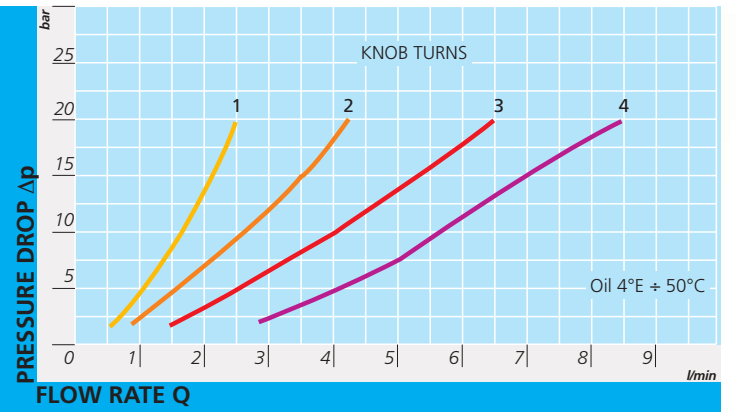
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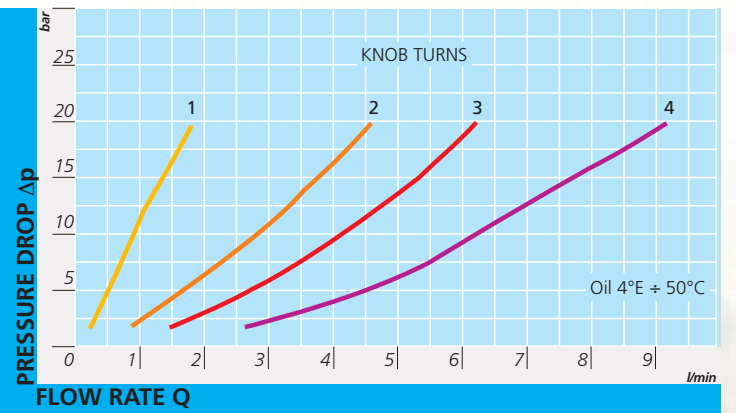
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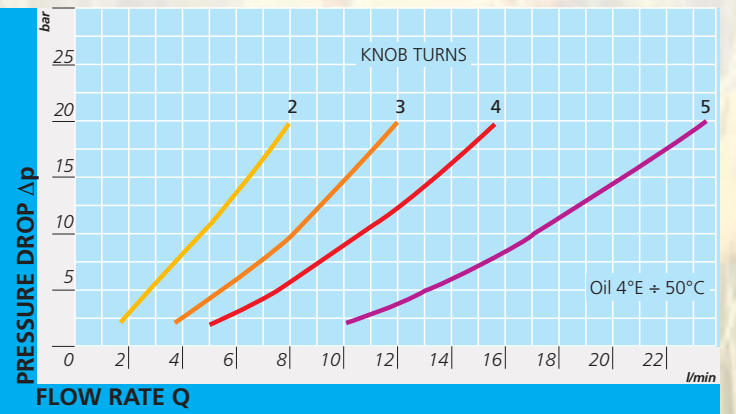
FT 1253/5-18



FT 1253/5-14



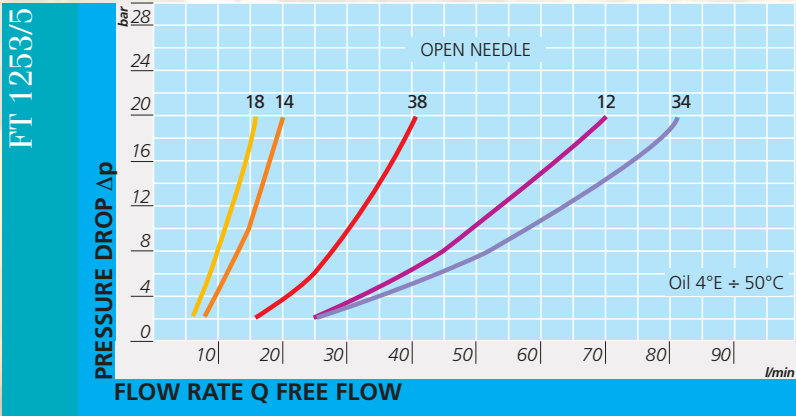
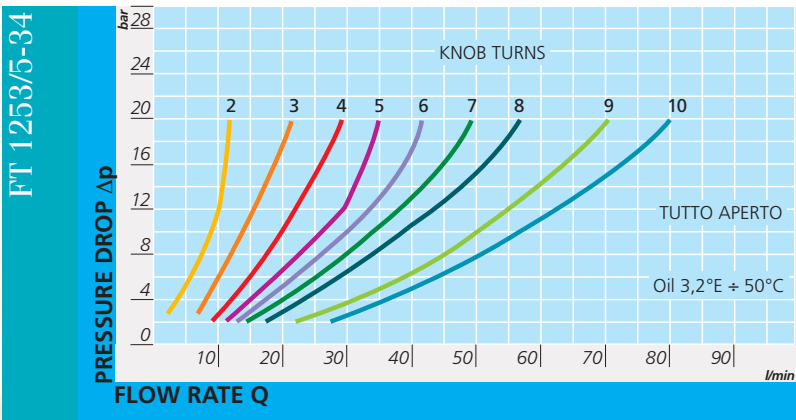
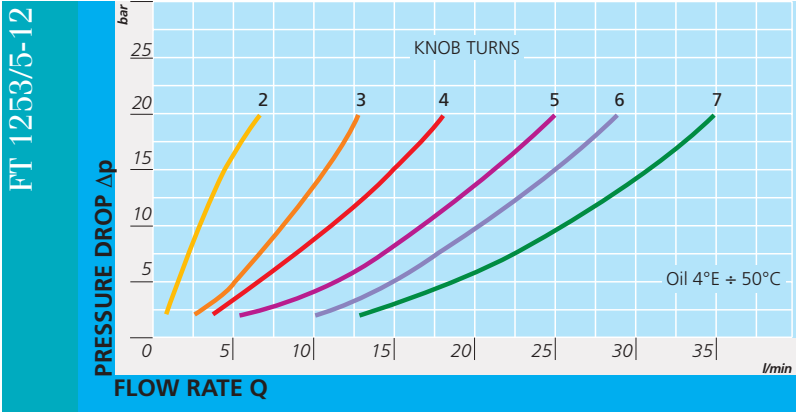
FT 1253/5-38



FLOW RATE CURVES



FT 1253/5



HOME

PRESENTATION

VALVES INDEX

+

-

LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

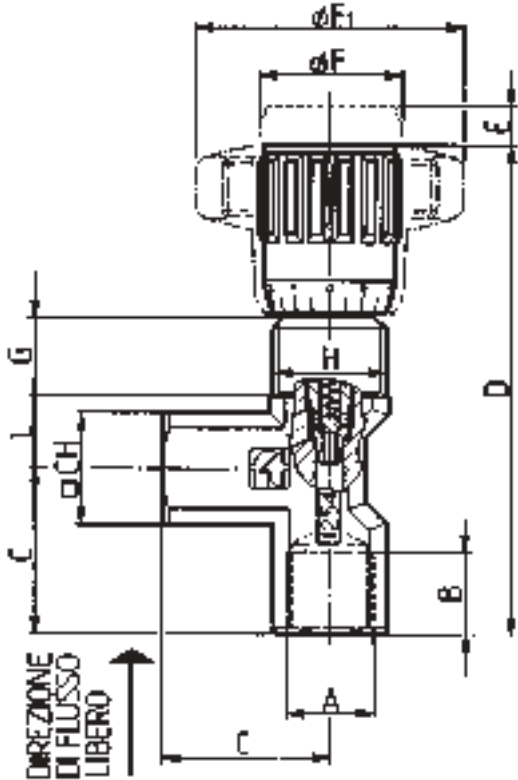
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ESC



FT 1254/5-01



DIMENSIONS

TYPE	A UNI 338	B	C	D	E	Ø F	Ø F1	G	H	L	CH	WEIGHT KG
1 8	1/8"G	8	21	69	4	22	40	12	M15x1	9,5	15	0,105
1 4	1/4"G	12	25	74	4,5	22	40	11	M17x1	11,5	18	0,137
3 8	3/8"G	13	29,5	88	7	27	50	12,5	M20x1	15	22	0,251
1 2	1/2"G	16	36	105	10	33	70	13	M25x1,5	19	27	0,450

MATERIALS

BODY	DT 58 - UNI 5705 - NICKEL PLATED
NEEDLE	X 10 CR NI S 1809 - UNI 6900
OR	NITRILE
ANTIEXTRUSION RING	PTFE
KNOB	GD AL SI 12 - UNI 5706
KNOB (MP)	ABS

EXAMPLE FOR ORDERING

ACCESSORIES ON REQUEST					
	CODE	TYPE	PANEL RING NUT	VITON SEAL	KNOB ABS
BRASS	FT 1254/5-02	38	G	V	MP

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC



SINGLE-ACTING NEEDLE CONTROL VALVE 90° ANGLE

Derived from the pressing of series FT 1252/2 they allow regulation of flow in one direction and full free flow in opposite direction thanks to the needle unit with incorporated ball they are equipped with.
As an alternative to FT 257/5 (suitable up to 400 bar) where the working pressure does not exceed 210 bar and where ferrous materials cannot be used. They have the same characteristics as the FT 257 series:

- accurate flow regulation;
 - efficient metallic sealing;
 - simple setting of flow rates;
 - secure against accidental needle withdrawal;
 - secure needle position;
 - provision for panel mounting, for which special lock nut (G) is supplied on request.
- For use with pressure up to 210 bar

On request

- Viton (V) seals
- NPT threads
- ABS (mp)Knob
- Complete with lock nut (G)



FT 1254/5-01

TOGNETTA

TECHNICAL DATA

TYPE	FLOW SQ MM²	MAX WORKING PRESSURE BAR	WORKING TEMPERATURE °C	FILTRATION GRADE µM
1 8	7,07	210	-20°/+100°	25
1 4	12,57	210	-20°/+100°	25
3 8	19,64	210	-20°/+100°	25
1 2	50,27	210	-20°/+100°	25



FT 1254/5-01

HOME

PRESENTATION

VALVES INDEX

+

-



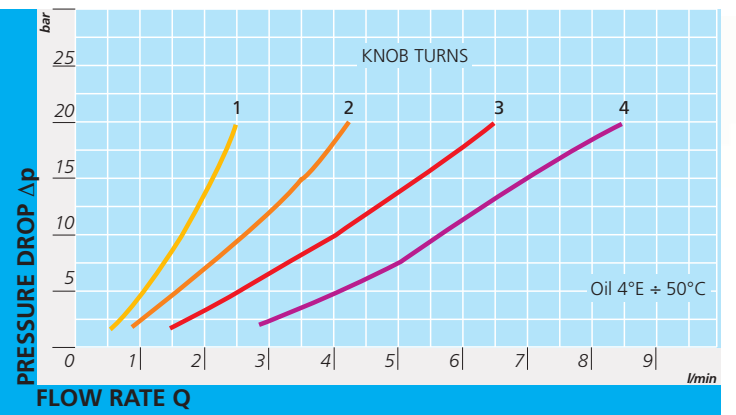
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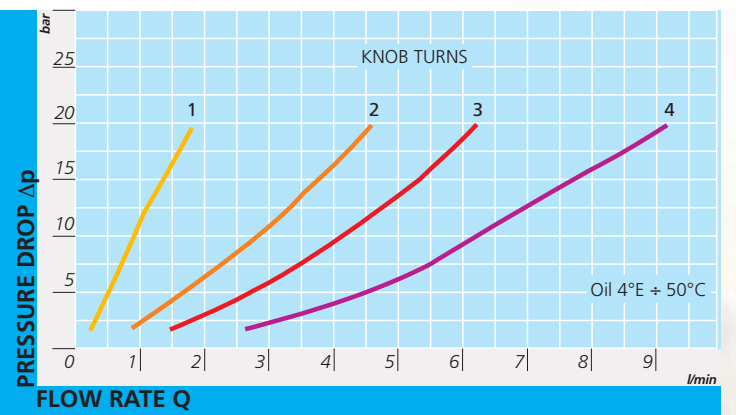
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FT 1254/5-01-18



FT 1254/5-01-14



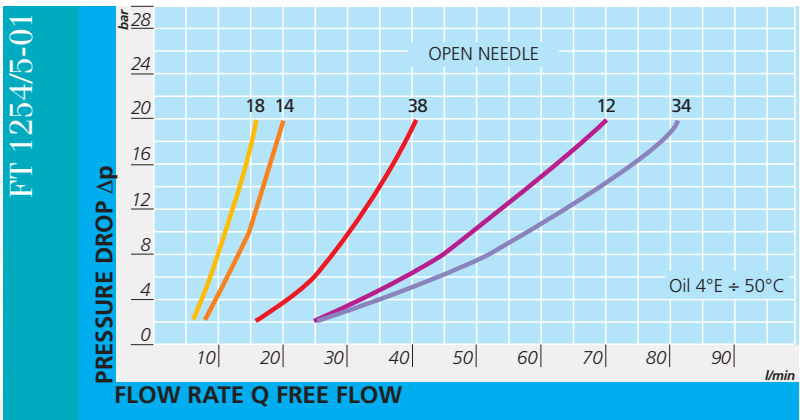
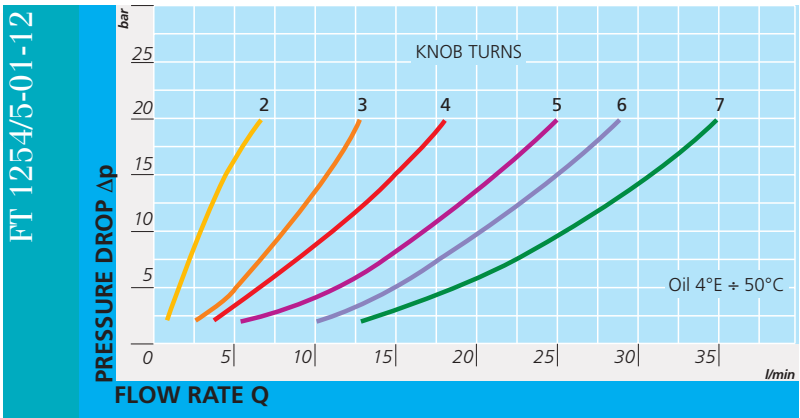
FT 1254/5-01-38



FLOW RATE CURVES



FT 1254/5-01



HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

WHOLE PAGE

PRINT

ESC



FT 1250

HOME

PRESENTATION

VALVES INDEX

+

-



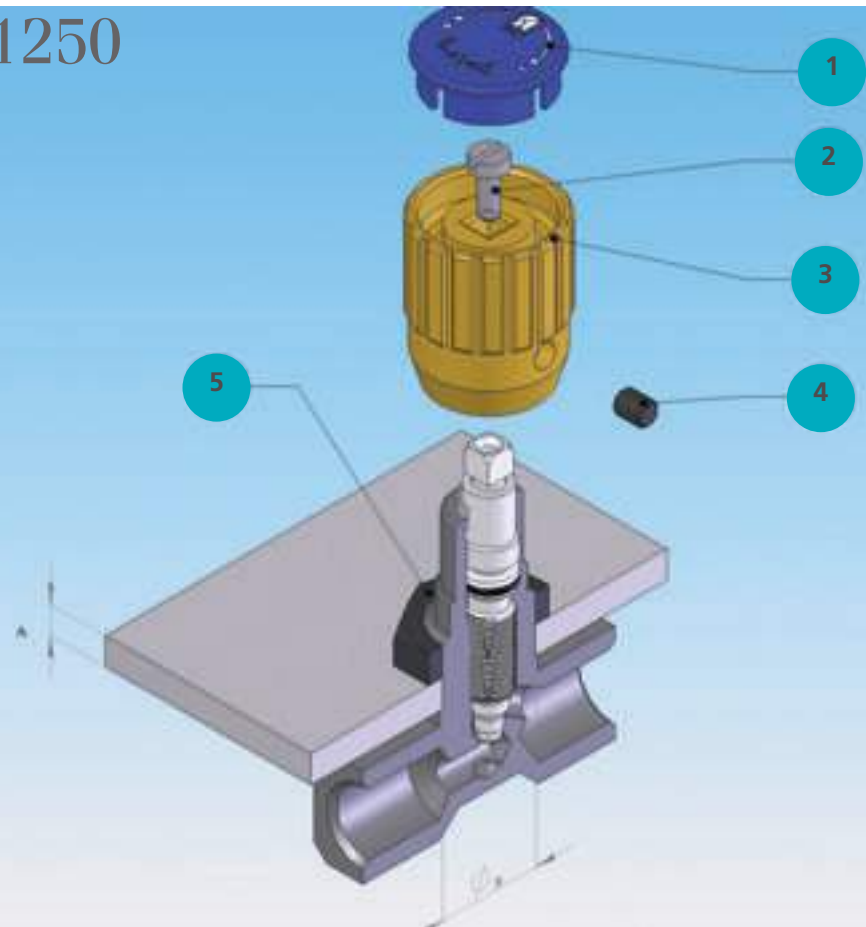
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WHOLE PAGE

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ESC

FT 1250





ASSEMBLY INSTRUCTION

1 °	LOOSEN SCREW PRESSURE DOWEL (4)
2 °	REMOVE PLUG (1)
3 °	REMOVE SCREW (2)
4 °	PULL OFF KNOB (3)
5 °	INSERT RING NUT (5), ON REQUEST IT IS SUPPLIED WITH THE VALVE
(A)	MAX. THICKNESS
(B)	PANEL HOLE Ø

TYPE VALVE	THICKNESS PANEL A MAX	PANEL HOLE Ø B
1 8	5	16
1 4	5	18
3 8	5	21
1 2	6	26
3 4	6	31

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

VALVES SOLENOID





New generation of solenoid valves devise
with the purpose to meet all the
technical problems about machines tool,
moving and agricultural machines.

The estimated manufacture is with 5
chambers with the tight spool in different points,
so it is possible to: stand better
the hydraulic thrusts, be more steady,
be less exposed to mechanic wear
and tear on the regulating edge, in this way
the hydraulic working turn out much more reliable.

Besides the inside passages arrange
the addressing of the fluid so that
the negative effect of the hydrodynamic force
is reduced at minimum.

The last generation of solenoid has
two main characteristic:
the magnetic part has a big diameter
so that it hasn't a too much high magnetic
flux density;
the supplied solenoids are interchangeable
in the different versions:
12/24/110/115/230 Volt.

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

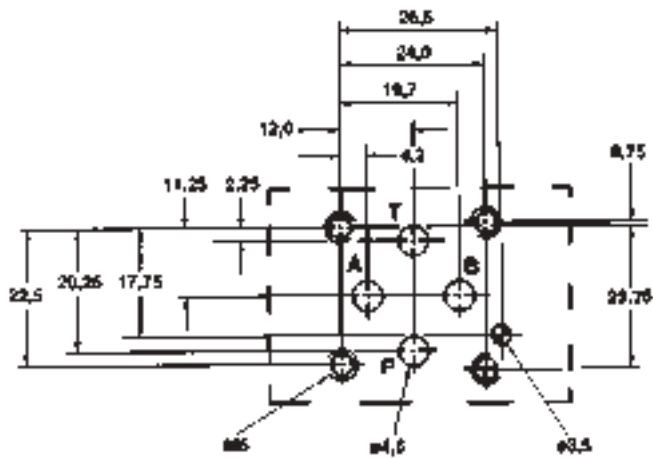
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FT2 ES*



ISO 4401-02



HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

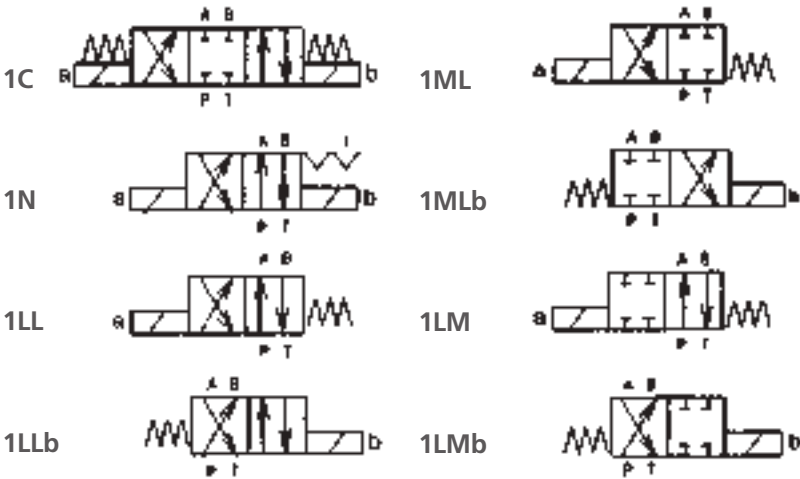
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ESC

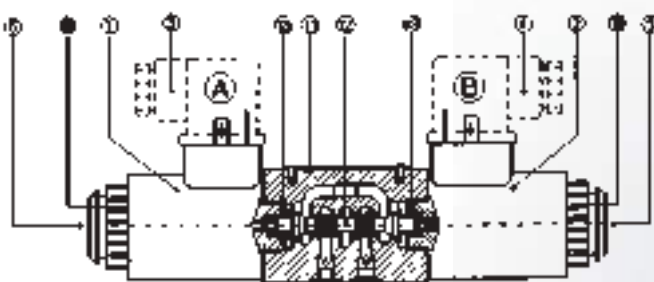
1 HOW TO READ THE MODEL CODE FOR VALVES FT2 - ES - *						
FT2 - ES - (1) (C) - * - (024C) / 11						
1	2	3	4	5	6	7
1		FT2	4-way directional control valve Cetop 02 - Pressure 32 Mpa (320 bar)			
2		ES	electrically controlled, standard			
3		(1)	spool type (see 7)			
4		(C)	solenoid(s) and spring(s) arrangement, see also functional symbols 2 C 2 sol., spool is spring centered (3 positions) N 2 sol., spool is detented (2 positions) LL 1 sol. (a), spool is spring offset (2 positions, end to end) ML 1 sol. (a), spool is spring offset (2 positions, middle to end) LM 1 sol. (a), spool is spring offset (2 positions, end to middle)			
5		*	Code reserved for option and variants b only for version LL, ML, LM sol. b installed (instead of sol. a) K protruding emergency pins, protected by rubber caps (see 13) S* calibrated orifice on P port (see 14)			
6		(024C)	Electric voltage and standard solenoid coils 0000 no coil(s) 012C coil(s) for V12DC 024C coil(s) for V24DC 110RAC coil(s) for V110/50 - V115/60 AC 220RAC coil(s) for V220/50 - V230/60 AC AMP solenoid coils with electric terminals according to AMP-Timer (see 15)			
7			Design number (progressive) of the valves			

2 FUNCTIONAL SYMBOLS





FT2 ES*

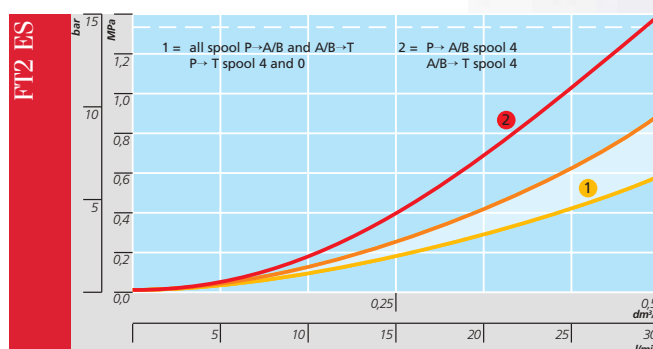


3 DESCRIPTION

DIRECTIONAL CONTROL VALVES SOLENOID OPERATED - CETOP 02 TYPE FT2 - ES - *

The spool ⑫ shifts in to valves body ⑪ subject to the action of springs ⑬ and solenoids ① and ②. Spool ⑫, depending from its shape and its position in the valves body ⑪, opens and/or closes passages between P, A, B, T ports, thus controlling the direction of the hydraulic flow. Solenoids ① and ② are energized by electric current flowing in through connectors ③ and ④; in case of electrical cut-offs, the spool can be manually shifted by acting on the emergency pins ⑤, located at the end of the solenoids and accessible through the retaining nuts ⑩.

4 TYPICAL DIAGRAMS



Typical Δp -Q curves for valves FT2 - ES - *, in standard configuration, with mineral oil at $v = 36 \text{ mm}^2/\text{s}$ and $t = 50^\circ \text{ C}$.

5 TECHNICAL DATA

maximum nominal flow	0,5 dm ³ /s (30 l/min)
maximum rec. flow rate	see 9
maximum nominal pressure (P, A, B)	32 MPa (320 bar)
maximum pressure at T port	16 MPa (160 bar)
pressure drops	see 4
electric characteristics	see 6
protection to DIN 40050	IP 65
duty cycle	100%
service life	≥ 107 cycles
dimensions	see 10
installation	see 11
mass	approx 1,0/1,4 kg

7 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSISTORIES

0C		
1C		
3C		
4C		
55C		
7C		

8C		
1N		
2N		
OLL		
1LL		
1LLb		

6 ELECTRIC CHARACTERISTICS

Valves type FT2 - ES - * are operated by solenoid that are energized:

- Directly from a D.C. voltage supply:
V12DC = 012 C
V24DC = 024 C
- By the use of coils that incorporate a full wave bridge rectifier, from A.C. voltage supply:
V110/50 (V115/60) = 110 RAC
V220//50 (V230/60) = 220 RAC

All standard valves are to be fitted with connectors conform to ISO 4400 (DIN 43650) and alectric circuitry must be able to carry the following rated current values:

V12DC = 2,4 A

V24DC = 1.2 A

V110/50 = 0,30 A

V220/50 = 0,15 A

Permissible supply voltage variation:

+ 5% - 10%

8 FUNCTIONAL SYMBOLS

Spools, springs and solenoids combination permit to obtain almost every type of ports (P, A, B, T) connection and sequence.

For almost all types of solenoids/springs combination and for all type of spools (with the exception of spool 4), when solenoid "a" is energized, hydraulic connections are P → B and A → T; to obtain P → A and B → T solenoid "b" must be energized.

The hydraulic connections that are obtained in the "central" (neutral) position when solenoids are not energized is the characteristic mark of the spool shape and from it derives its identification number:

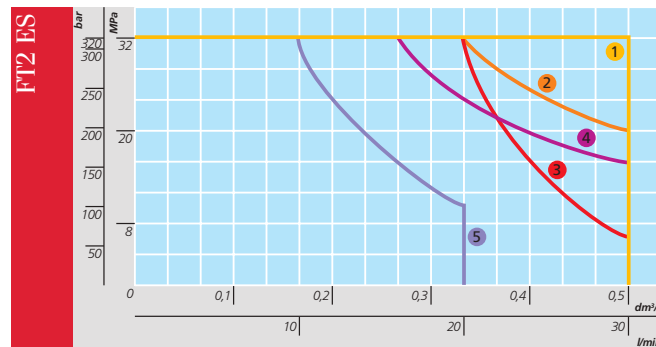
0 = P, A, B, T connected

1 = P, A, B, T closed

3 = P closed, A, B, T connected

For other type see 7

9 HYDRAULIC LIMITS OF USE



① = FT2 - ES - 0C; - 1C; - 1N; - 3C; - 8C; - 0ML; - 1LL; - 1ML; - 3ML; - 8ML

② = FT2 - ES - 2N; - 7C

③ = FT2 - ES - 0LL

④ = FT2 - ES - 4C; - 4ML

⑤ = FT2 - ES - 55C; - 2LL

P/Q characteristic limits for safe use of FT2 - ES - * solenoid operated valves.

Limit curves apply to solenoid valves energized with rated voltage - 5% and flushed with hydraulic fluid with properties according to 12

2LL



OML



1ML



3ML



4ML

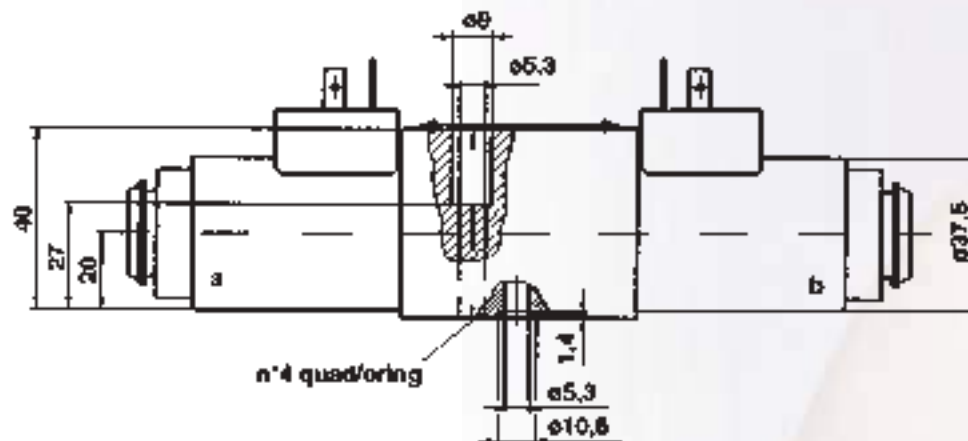
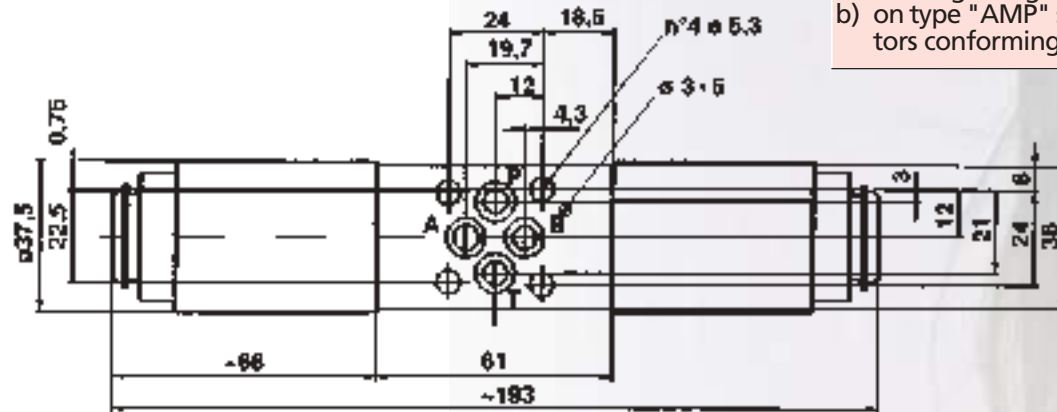
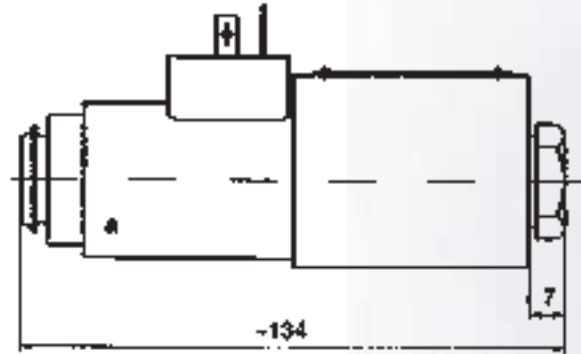


8ML



*
ES
FT2 ES

All dimensions are mm



All valves FT2 - * conform with ISO and CETOP specifications for mounting surface dimensions and for valves height. When assembled to its mounting plate valve FT2 - * must be fastened with 4 bolts M5 x 35 mm (or M5 x ** according to the number of modules) tightened at 8 Nm torque. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of QUAD/O Ring type.

a) on standard solenoid coils by standard 3-PIN connectors, according to ISO 4400 (DIN 43650).

Connectors can be with different cable exit size (PG9, PG11) and beside of the plain connecting function they may incorporate various features like

- signal led
 - voltage surge suppressor, etc.
- b) on type "AMP" solenoid coils, by connectors conforming to AMP-Timer (see 15).

12 HYDRAULIC FLUID

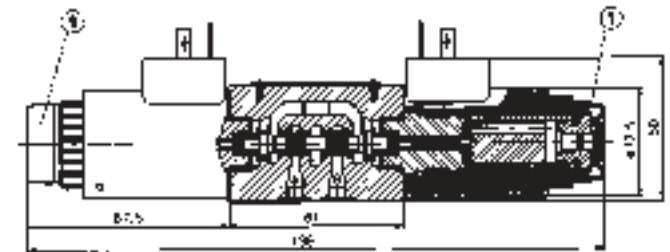
Seals and materials used on standard valves FT2 - * are fully compatible with hydraulic fluids of mineral oil base, upgraded with antifoaming and antioxidizing agents.

The hydraulic fluid must be kept clean and filtered to ISO 4406 class 19/17/14, or better, and used in a recommended viscosity range from 10 cSt to 60 cSt.

13 VERSION "K": EXTENDED EMERGENCY PIN

Solenoid valves according to "K" version have extended emergency actuator pins protruding from the solenoid shape, that permit a quick and easy "hand operation" of the valves, without the need of any tool.

The actuator pin and the end solenoid are protected by a flexible rubber cap 1 that makes easy operation and protects from moisture and water splashes.



14 VERSION "S": CALIBRATED ORIFICE ON P PORT

Option "S" is represented by elements 2, suitably shaped to be inserted on P port of the solenoid valve, having a calibrated orifice (of various sizes) able to restrict, at the requested P value, the flow rate entering the solenoid valve.

Those elements have following orifice diameter:

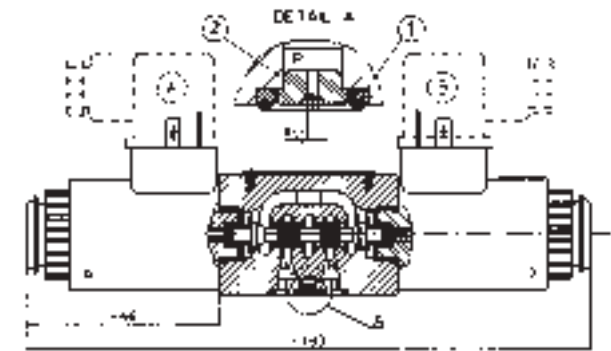
2S - 08 $\rightarrow D = 0,8$ mm

2S - 10 $\rightarrow D = 1$ mm

2S - 12 $\rightarrow D = 1,2$ mm

2S - 15 $\rightarrow D = 1,5$ mm

and are kept sealed on the P port of the valve by an OR 1 of 7,65 x 1,78 mm size (example =R 107-2031).



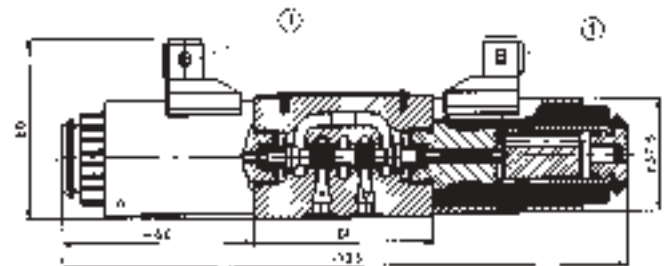
15 VERSION "AMP": SOLENOID COILS WITH AMP-TIMER PINS

Coils of this type have 2 electric pins 1 conforming for AMP-Timer connectors.

They are typically used on DC mobile application and they are available for the following voltages:

B02 - 012 C AMP = V 12 DC

B02 - 024 C AMP = V 24 DC



HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

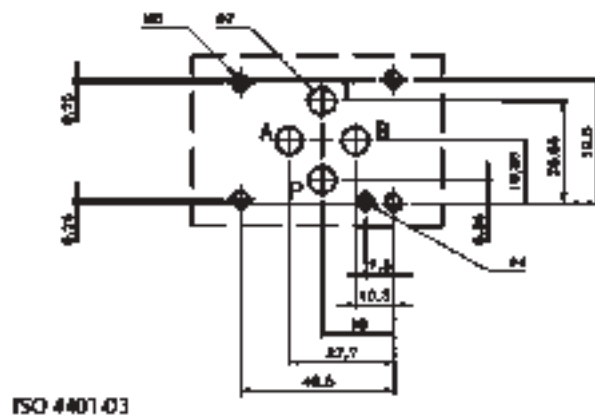
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FT3 E2*



The series FT3-E2 is characterized

by the following peculiarities unlike
the series FT3-ES:

- the flow rate is almost the same
of the series CETOP 2;
- the maximum working pressure is 250 Bar;
- the body is practically the same
of the series CETOP 3;
- the coil is the same of the series CETOP 2;
- dimensions, technical peculiarities,
performances, all has been designed
with the purpose to reach the aim
of the maximum rationalization of use.

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

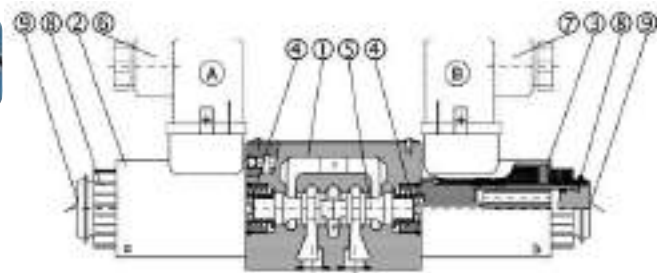
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1 HOW TO READ THE MODEL CODE FOR VALVES FT3 - E2 - *						
FT3 - E2 - (1) (C) - * - (024C) / 20						
1	2	3	4	5	6	7
1		FT3	4-way directional control valve CETOP 03 - Pressure 25 Mpa (250 bar)			
2		E2	electrically controlled,			
3		(1)	spool type (see 4)			
4		(C)	solenoid(s) and spring(s) arrangement (see 4) C 2 solenoidas, spool is spring centered (3 position) LL 1 solenoidas, spool is offset (2 position) ML 1 solenoidas, spool is spring offset (2 position)			
5		*	Code reserved for option and variants S-* calibrated orifice on P (see 13) K water proof caps on emergency pin (see 12) ZT zinc plated valve (see 14)			
6		(024C)	Electric voltage and solenoid coils 0000 no coil(s) 012C coil(s) for V12DC 024C coil(s) for V24DC 115A coil(s) for V110/50 - V115/60 AC 230A coil(s) for V220/50 - V 230/60 AC			
7		Design number (progressive) of the valves				



FT3 E2*



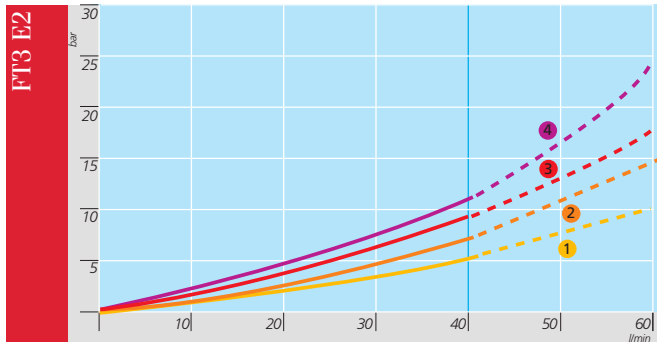
2 DESCRIPTION

DIRECTIONAL CONTROL VALVES SOLENOID OPERATED - CETOP 05 TYPE FT3 - E2 - *

The spool ⑤ shifts in to the valves body ① subject to the action of springs ④ and solenoids ⑨.

Spool ⑤, depending from its shape and its position in the valves body ①, opens and/or closes passages between P, A, B, and T ports, thus controlling the direction of the hydraulic flow.

3 TYPICAL DIAGRAMS



Typical Δp -Q curves for valves FT3 - E2 - *, in standard configuration, with mineral oil at $v = 32 \text{ mm}^2/\text{s}$ and $t = 40^\circ \text{ C}$.

Configuration	P-A	P-B	A-T	B-T	P-T
1C	2	2	2	2	
4C	4	4	4	4	2
0C	2	2	3	3	2
3C	2	2	3	3	
1LL	3	3	4	4	
1LLb	3	3	4	4	
1ML		2	2		
4ML	4			4	2
0ML	2			3	2
3ML	2			2	

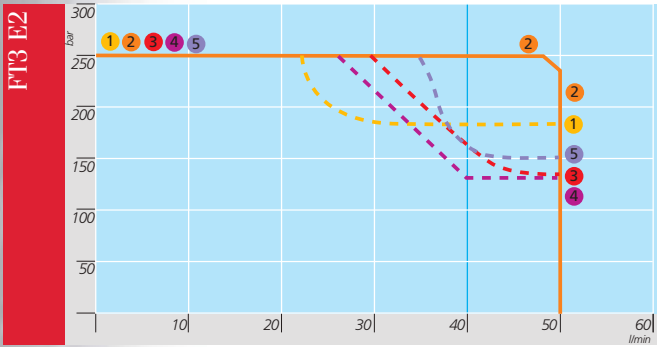
4 SPOOL IDENTIFICATION AND INTERMEDIATE POSITION TRANSISTORIES

Functional symbols

Designation	Symbol	Interposition	Designation	Symbol	Interposition
1C			1ML		
4C			0ML		
0C			1MLb		
3C			1LLb		
1LL			4MLb		
3ML			0MLb		
4ML			3MLb		

5 TECHNICAL DATA	
Maximum nominal flow	40 l/min
Maximum rec. flow rate	see 7
Maximum nominal pressure (P, A, B)	25 Mpa (250 bar)
Maximum pressure at T port	21 Mpa (210 bar)
Pressure drops	see 3
Electric characteristics	see 6
Protection to DIN 40050	IP 65
Duty cycle	100%
Dimensions	see 11
Installation	see 8
Mass	1,4/1,6 kg

6 ELECTRIC CHARACTERISTICS	
Valves type FT3 - E2 - * are operated by solenoid that are energized:	
• directly from a D.C. voltage supply:	
V12 DC	= 012 C
V24 DC	= 024 C
• by the use of coils that incorporate a full wave bridge rectifier, from A.C. voltage supply:	
V 110/50-V 115/60	= 115 A
V 220/50-V 230/60	= 230 A
All connectors must conform to ISO 4400 (DIN 43650) and electric circuitry must be able to carry the following rated current values:	
V 12 DC = 2,4 A	V 115/50 = 0,26 A
V 24 DC = 1,2 A	V 230/50 = 0,14 A
Coils with 2 electric pins, conforming with AMP connectors, are only available for DC supply (example of code: B02 - 012C AMP).	
Permissible supply voltage variation (10%	

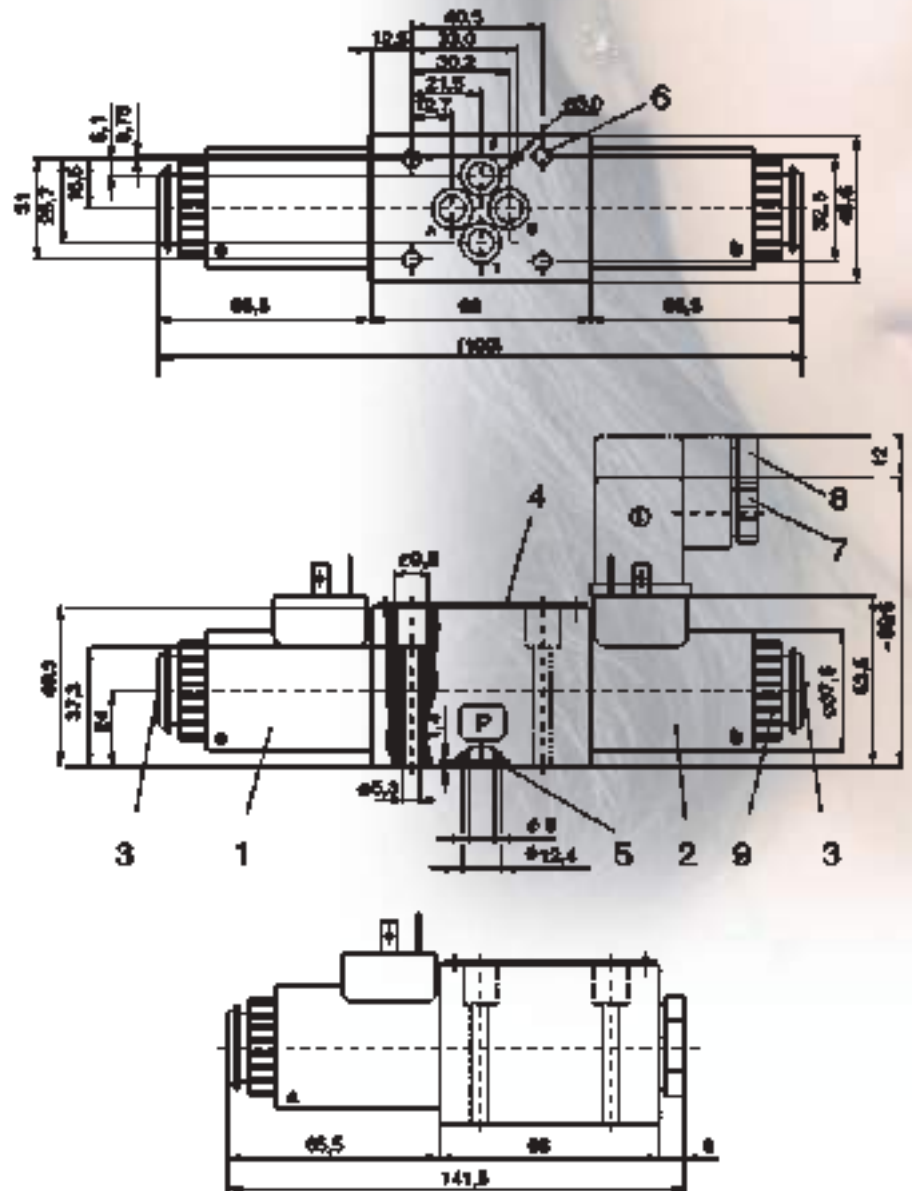
7 HYDRAULIC LIMITS OF USE	
	1C
	4C
	0C
	3C
	1LL
	3ML
	4ML
	1ML
	0ML
	1MLb
	1LLb
	4MLb
	0MLb
	3MLb
	2
	5
	1
	3
	4
	3
	5
	2
	1
	4
	5
	1
	3

p-Q characteristics limits for safe of FT3 - E2 - * solenoid operated valves. Measured at v=32 mm_/s and t=40°C

Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of Quad/O-Ring type 9,25 x 1,68 x 1,68.

The hydraulic fluid must be kept clean and filtered to ISO 4406 class 19/19/14, or better, and used in a recommended viscosity range from 10 cSt to 60 cSt.

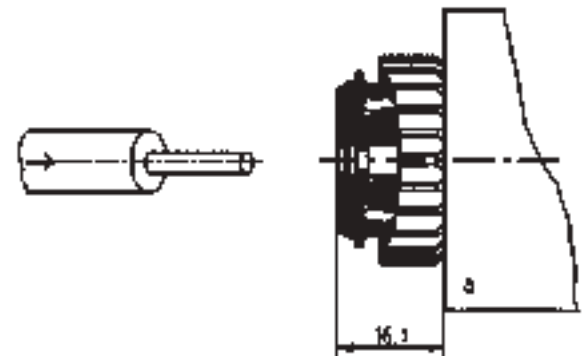
- Signal led
- Voltage surge suppressor, etc.



12 MANUAL OVERRIDE

In case of electric cut-offs, the spool can be manually shifted by acting on the emergency pins, located at the end of the solenoids and accessible through the retaining nuts.

Solenoids valves according to "K" version have extended emergency actuator pins protruding from the solenoids shape, that permit a quick and easy "hand operation" of the valves, without the need of any tool. The actuator pin and the end of the solenoid are protected by a flexible rubber cap that makes easy operation and protects from moisture and water splashes.



Standard model of the standard override

13 VERSION "S": CALIBRATED ORIFICE ON P PORT

Option "S" is represented by element ②, suitably to be inserted on P port of the solenoid valve, having a calibrated orifice (of various sizes) able to restrict, depending on the Δp value, the flow rate entering the solenoid valve.

Those elements have the following orifice diameters:

- 3S-10 $\rightarrow D = 1 \text{ mm}$
- 3S-20 $\rightarrow D = 2 \text{ mm}$
- 3S-25 $\rightarrow D = 0,25 \text{ mm}$

and are kept sealed on the P port of the valve by an OR of 9,25x1,78 mm sizes (example OR 110-2037)

14 VERSION "ZT": ZINC PLATED VALVES

Solenoids valves according to "ZT" version are completely (body, solenoid tubes and coils) zinc trivalent plated protected against corrosion due to saline ambience or other aggressive chemicals.

Zinc thickness are:

on the valve body	10-15 μm ;
on the solenoids tubes	8-12 μm ;
on the solenoid coils	8-12 μm .

HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

WHOLE PAGE

PRINT

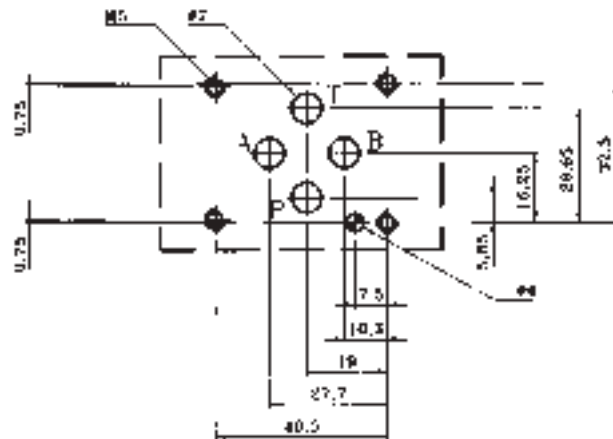
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FT3 E2*



ESC



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

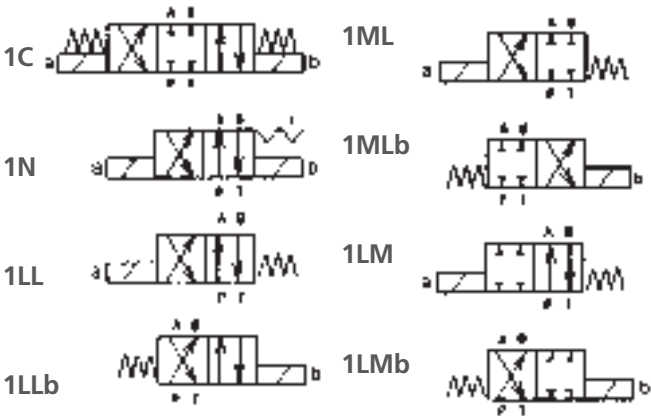
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ESC

1 HOW TO READ THE MODEL CODE FOR VALVES FT3 - ES - *						
FT3 - ES - (1) (C) - * - (024C) / 10						
1	2	3	4	5	6	7
1		FT3	4-way directional control valve Cetop 03 - Pressure 32 Mpa (320 bar)			
2		ES	electrically controlled, standard			
3		(1)	spool type (see 7)			
4		(C)	solenoid(s) and spring(s) arrangement, see also functional symbols 2 C 2 sol., spool is spring centered (3 position) N 2 sol., spool is detented(2 position) see 13 LL 1 sol. (a), spool is spring offset (2 position, end to end) ML 1 sol. (a), spool is spring offset (2 position, middle to end) LM 1 sol. (a), spool is spring offset (2 position, end to middle)			
5		*	Code reserved for option and variants b only for version LL, ML, LM sol. b installed (instead of sol. a) T soft shifting device, see 14 S-** calibrated orifice on P port, see 15 K water proof caps on emergency pin, see 16 ZC zinc plated valve, see 17			
6		(024C)	Electric voltage and solenoid coils 0000 no coil(s) 012C coil(s) for V12DC 024C coil(s) for V24DC 115A coil(s) for V110/50 - V 115/60 AC 230A coil(s) for V220/50 - V 230/60 AC See also electric characteristics 6			
7			Design number (progressive) of the valves			

2 FUNCTIONAL SYMBOLS



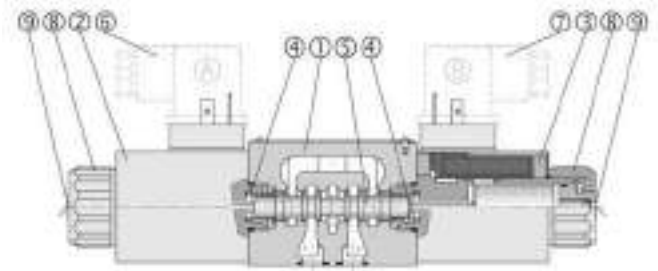
3 DESCRIPTION

DIRECTIONAL CONTROL VALVES SOLENOID OPERATED - CETOP 03 TYPE FT3 - ES - *

The spool ② shifts in to the valves body ① subject to the action of springs ⑬ and solenoids ① ②.

Spool ②, depending from its shape and its position in the valves body ①, opens and/or closes passages between P, A, B, T ports, thus controlling the direction of the hydraulic flow.

Solenoids ① and ② are energized by electric current flowing-in through connectors ③ and ④; in case of electric cut-offs, the spool can be manually shifted by acting on the emergency pins ⑤, located at the end of the solenoids and accessible through the retaining nuts ⑩.





FT3 ES*

HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

WHOLE PAGE

PRINT

ESC

4 SPOOL TYPE AND INTERMEDIATE POSITION TRANSITORIES

0C			0LL		
1C			1LL		
3C			1LLb		
4C			2LL		
55C			0ML		
7C			1ML		
8C			3ML		
1N			4ML		
2N			8ML		
19C			18ML		
42C			13ML		
56C			56ML		
38C			56MLb		

5 TECHNICAL DATA

Maximum nominal flow	1dm ³ /s (60 l/min)
Maximum rec. flow rate	see 9
Maximum nominal pressure (P, A, B)	32 Mpa (320 bar)
Maximum pressure at T port	16 Mpa (160 bar)
Pressure drops	see 4
Electric characteristics	see 6
Protection to DIN 40050	IP 65
Duty cycle	100%
Service life	≥ 107 cycles
Dimensions	see 10
Installation	see 11
Mass	approx. 1,6/2,1 kg

6 INSTALLATION

All valves FT3 - * conform ISO and CETOP specifications for mounting surface dimensions (see also front page) and for valves height. When assembled to its mounting plate valve FT3 - * must be fastened with 4 bolts M5 x 45 mm (or M5 x ** according to the number of modules) tightened at 8 Nm torque. Leakage between valve and mounting surface is prevented by the positive compression on their seats of 4 seals of QUAD/O Ring type 9,25x1,68x1,68. Solenoid valves can be supplied without electric coils, as FT3 - ES - ** - 0000 - . Coils are supplied separately; standard, 3 electric pins, coils are BO3 - 012C, BO3 - 024C, BO3 - 115A and BO3 - 230A. Connections to the electric supply is made by standard 3-PIN connectors, according to ISO 4400 (DIN 43650). Connectors can be with different cable exit size (PG9, PG11) and beside of the plain connecting function they may incorporate various features like

- signal led
- voltage surge suppressor, etc.



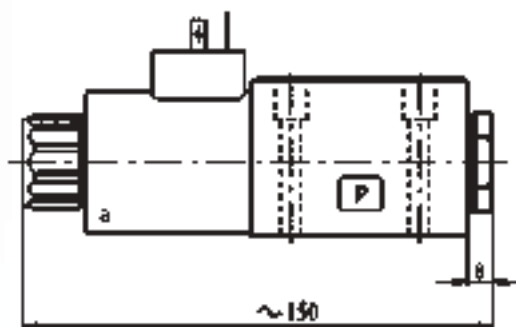
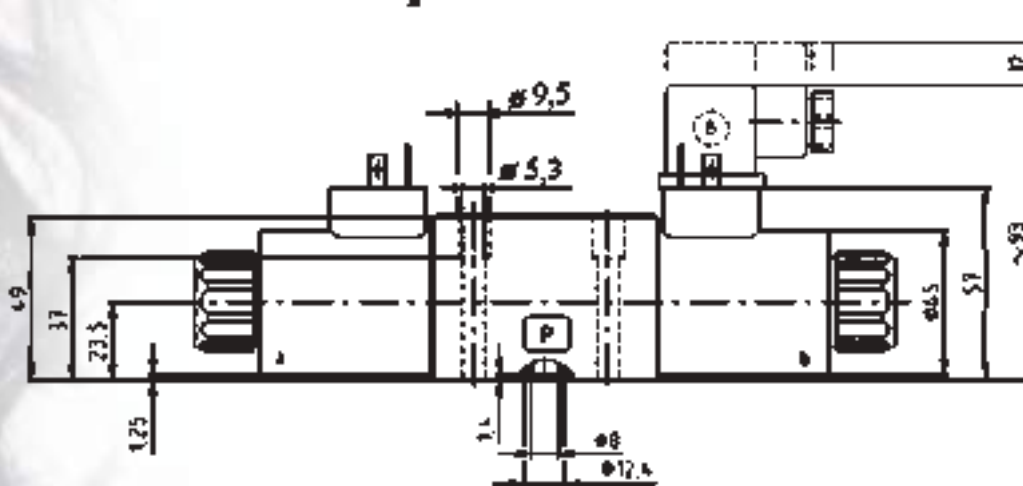
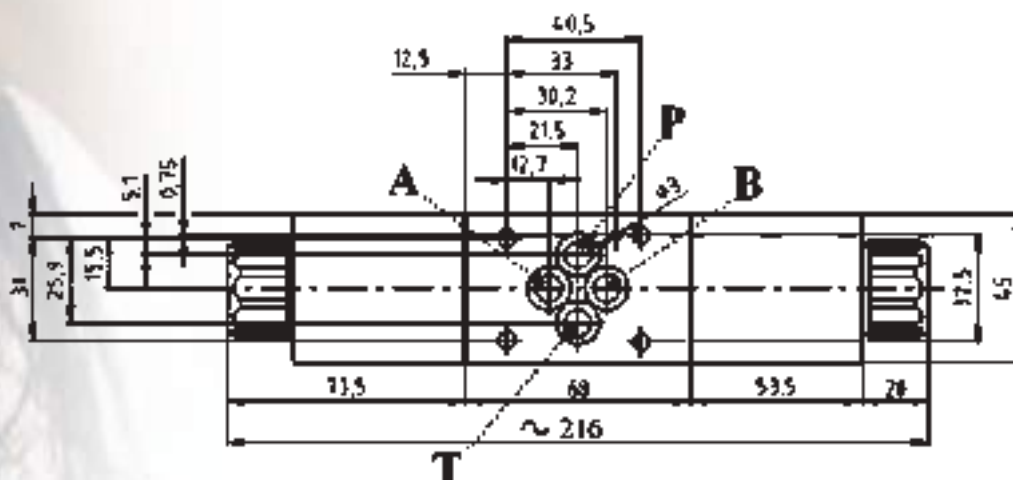
7 HYDRAULIC FLUIDS

Seals and materials used on standard valves FT3 - * are fully compatible with hydraulics fluids of mineral oil base, upgrade with antifoaming and antioxidant agents.

The hydraulic fluid must be kept clean and filtered to ISO 4406 class 19/17/14, or better, and used in a recommended viscosity range from 10 cSt to 60 cSt.

8 INSTALLATION DIMENSIONS

All dimensions are mm



HOME

PRESENTATION

VALVES INDEX



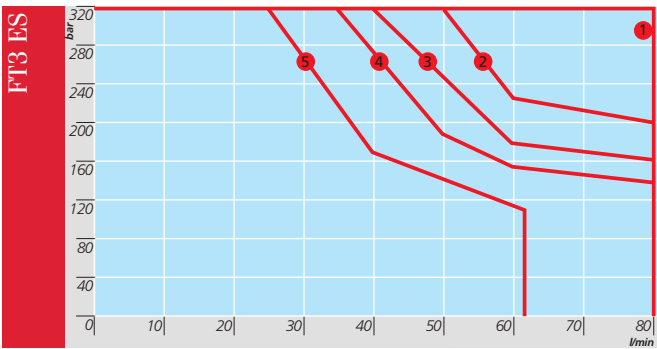
LAST SEEN

WHOLE PAGE

PRINT

ESC

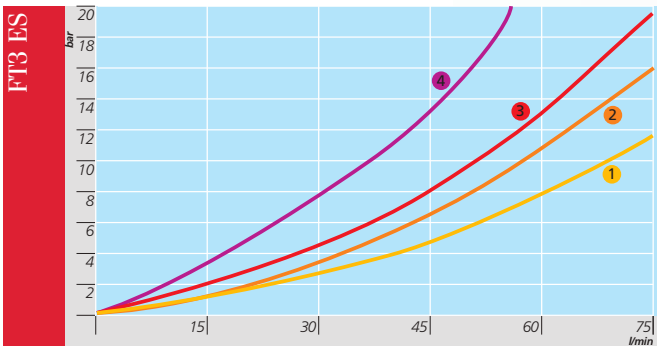
9 HYDRAULIC LIMITS OF USE



P/Q characteristics limits for safe use of FT3 - ES - * solenoid operated valves.
Limit curves apply to sol. valves energized with rated voltage - 5% and flush

- 1 = FT3 - ES - 0C; - 1C; - 1N; - 1ML; - 8C
- 2 = FT3 - ES - 3C; - 2
- 3 = FT3 - ES - 1LL; - 1LLb
- 4 = FT3 - ES - 0LL
- 5 = FT3 - ES - 4C

10 TYPICAL DIAGRAMS



Typical Δp-Q curves for valves HD3-ES in standard configuration with mineral oil at $\nu=32\text{mm}^2/\text{s}$ and $t=40^\circ\text{C}$.

Spool	P-A	P-B	A-T	B-T	P-T
0C	1	1	2	2	1
0LL	1	1	2	2	-
0ML	-	1	2	-	1
1C	1	1	2	2	-
1LL	1	1	2	2	-
1LLb	1	1	2	2	-
1ML	-	1	2	-	-
1N	1	1	2	2	-
3C	1	1	2	2	-
4C	3	3	4	4	1
8C	1	1	2	2	-

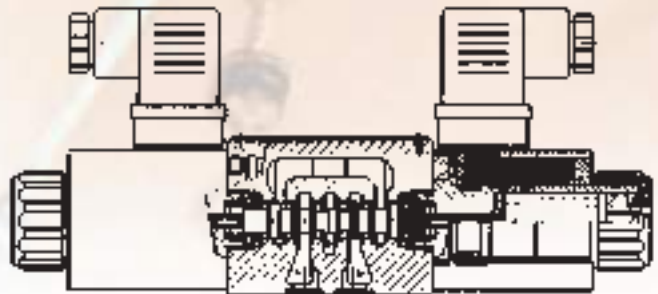
11 SOLENOIDS

Solenoid valves can be supplied without electric coils, as HD3-ES-* -0000.
Coils are supplied separately ; standard, 3 electric pins, coils are :
BO3 - 012 C
BO3 - 024C
BO3 - 115A
BO3 - 230A

Connections to the electric supply is made by standard 3-PIN connectors, according to ISO 4400 (DIN 43650).
Connectors can be with different cable exit size (PG9, PG11) and beside of the plain connecting function they may incorporate various features like :
- Signal led
- Voltage surge suppressor, etc...

12 VERSION "N":
MECHANICAL DETENT ON SPOOL

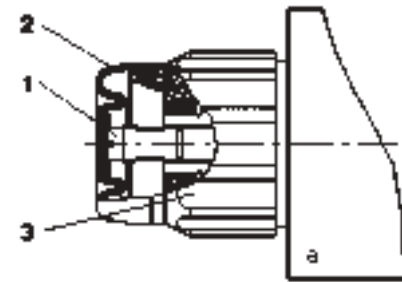
Solenoid valves with detent typically are 2 position, 2 solenoid, no-spring valve where the spool is kept at the extreme ends of its stroke by a mechanical device. This permits that solenoids are energized by its position regardless of forces due to hydrodynamics or gravitation/inertial effects (vibrations).



13 VERSION "T": SOFT SHIFTING

Solenoid valves with "soft shifting" devices are 2 or 3 position valves controlled by solenoids A and C which incorporate calibrated orifices in the armature plungers.

The hydraulic controls on the shifting speed of the plunger, and therefore of the spool (129 in the valve's body, permit progressive transitories, thus reducing, thus reducing or eliminating water hammer effects in the circuit. Typically the shifting time of a "T" version solenoid valve is, when energized, in the order of 300_500 ms (versus 30_50 ms of a standard valve) provided that the armature plunger properly works in the bleeding the air from the solenoid acting on purge's valve O, which is protected by cover (15), and by assuring a minimum counter pressure on T line.



14 VERSION "S": CALIBRATED ORIFICE ON P PORT

Option "S*" is represented by elements ②, suitably shaped to be inserted on p port of the solenoid valve, having a calibrated orifice (of various sizes) able to restrict, at the requested ΔP value, the flow rate entering the solenoid valve.

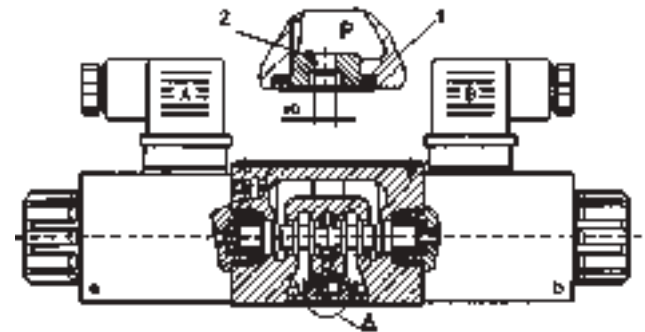
Those elements have following orifice diameter:

3S - 10 $\rightarrow D = 1$ mm

3S - 20 $\rightarrow D = 2$ mm

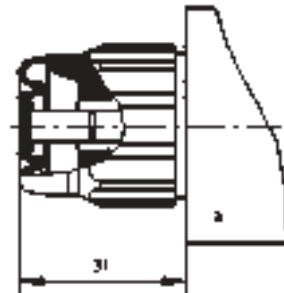
3S - 25 $\rightarrow D = 2,5$ mm

and are kept sealed on the P port of the valve by an OR ① of 9,25x1,78 mm sizes (example OR 110 - 2037).



15 VERSION "K": EXTENDED EMERGENCY PIN

Solenoid valves according to "K" version have extended emergency actuator pins protruding from the solenoid shape, that permit a quick and easy "hand operation" of the valves, without the need of any tool. The actuator pin and the end of the solenoid are protected by a flexible rubber cap that makes easy operation and protects from moisture and water splashes.



16 ANTICORROSION OPTIONS

On HD3-ES-* standard valves the body is phosphate coated, the solenoid tubes are not treated and coils mantel and irons are zinc trivalent plated.

To increase the resistance to corrosive agents different variants are available :

ZT Body, solenoid tubes and coils irons are zinc trivalent plated

ZL Body is coated with special TEMADUR 40 zinc painting

Solenoids have 8-12 μm zinc plating

ZK Body is coated with special TEMADUR 40 zinc painting

Solenoids tube and coils irons are "zinc-nickel" plated

HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

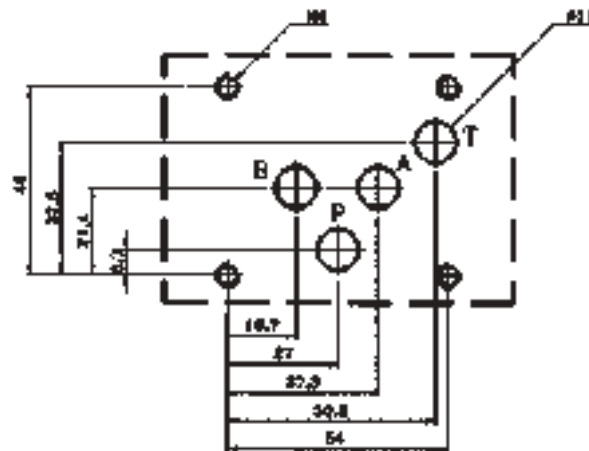
WHOLE PAGE

PRINT

ESC



FT5 ES*



HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

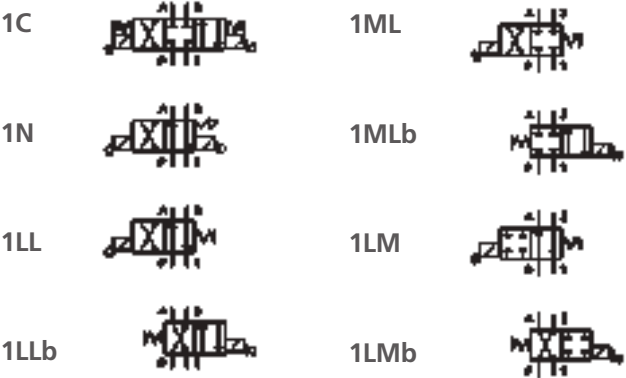
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PRINT

ESC

1 HOW TO READ THE MODEL CODE FOR VALVES FT5 - ES - *						
FT5 - ES - (1) (C) - * - (024C) / 20						
1	2	3	4	5	6	7
1		FT5	4-way directional control valve Cetop 05 - Pressure 32 Mpa (320 bar)			
2		ES	electrically controlled, standard			
3		(1)	spool type (see 4)			
4		(C)	solenoid(s) and spring(s) arrangement, see also functional symbols 2 C 2 sol., spool is spring centered (3 position) N 2 sol., spool is detented(2 position) LL 1 sol. (a), spool is spring offset (2 position, end to end) ML 1 sol. (a), spool is spring offset (2 position, middle to end) LM 1 sol. (a), spool is spring offset (2 position, end to middle)			
5		*	Code reserved for option and variants b only for version LL, ML, LM sol. b installed (instead of a) T* soft shifting device (see 14 and 15) K water proof caps on override pin (see 16) Z* anti corrosion variants (see 17) DR solenoid (s)9 chamber draining (see 17)			
6		(024C)	Electric voltage and solenoid coils (see 10, 11 and 12)			
7			Design number (progressive) of the valves			

2 FUNCTIONAL SYMBOLS



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

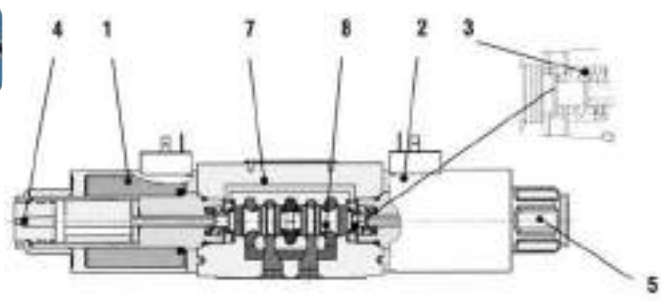
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ESC



FT5 ES*



3 DESCRIPTION

DIRECTIONAL CONTROL VALVES SOLENOID OPERATED - CETOP 05 TYPE FT5 - ES - *

The spool ⑧ shifts in to the valves body ⑦ subject to the action of springs ③ and solenoids ①②.
Spool ⑧, depending from its shape and its position in the valves body ⑦, opens and/or closes passages between P, A, B, T ports, thus controlling the direction of the hydraulic flow.
In case of electric cut-offs, the spool can be manually shifted by acting on the override pins ④, located at the end of the solenoids and accessible through the retaining nuts ⑤.

4 SPOOL TYPE AND INTERMEDIATE POSITION TRANSITORIES

0C		
1C		
3C		
4C		
55C		
7C		
8C		
1N		
2N		

0LL		
1LL		
1LLb		
2LL		
0ML		
1ML		
3ML		
4ML		
8ML		

5 TECHNICAL DATA

Nominal flow	120 l/min
Maximum rec. flow	see
Nominal pressure (P, A, B)	32 Mpa (320 bar)
Maximum rec. pressure (P, A, B)	35 Mpa (350 bar)
Maximum rec. pressure at T port	21 Mpa (210 bar)
Pressure drops	see
Protection to DIN 40050	IP 65
Duty cycle	100%
Service life	≥ 107 cycles
Mass	1 sol. 3,9 kg 2 sol. 5,4 kg

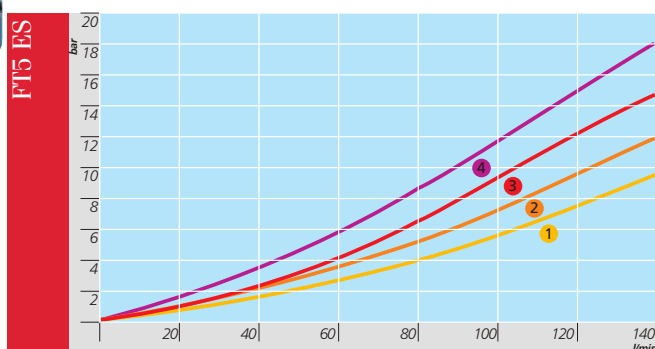
6 INSTALLATION

All valves FT5 - ES - * conform with ISO and CETOP specifications for mounting surface dimensions and for valves height.
When assembled to its mounting plate valve FT5 - ES - * must be fastened with 4 bolts M6x40 mm (or M6 x * according to the number of modules) tightened at 12 Nm torque.
Leakage between valve and mounting surface is prevented by the positive compression on their seats o 5 seals of Quad-Ring type 12,42 x 1,68 x 1,68 mm.



FT5 ES*

9 TYPICAL DIAGRAMS



Typical Δp curves for valves FT5 - ES - *, with mineral oil at $v = 32$ mm²/s and $t = 40^\circ$ C, for flow P→A/B, A/B→T and P→T

Spool type	P-A	P-B	A-T	B-T	P-T
OC	1	1	2	2	1
1C	1	1	2	2	-
3C	1	1	2	2	-
4C	3	3	4	4	1
55C	1	1	1	2	2
7C	1	1	2	2	-
8C	1	1	2	2	-
1N	1	1	2	3	-
2N	1	1	-	-	-
OLL	1	1	1	3	-
1LL	1	1	2	2	-
1LLb	1	1	2	2	-
2LL	1	1	-	-	-
0ML	-	1	2	-	1
1ML	-	1	2	-	-
3ML	-	1	2	-	-
4ML	3	-	-	4	1
8ML	-	1	2	-	-

10 SOLENOID COILS, WITH STANDARD ELECTRIC CONNECTION TO ISO 4400/DIN 43650, FOR DC SUPPLY

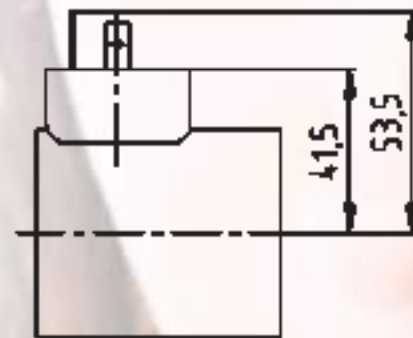
Standard valves type FT5 - ES - * are operated by solenoid that are energized directly from a D.C. voltage supply. Solenoid valves can be supplied without electric coils as FT5 - ES - * - 0000 and coils can be supplied separately as B05 - ***C

DIRECTLY FROM D.C. SUPPLY

Voltage	Valve code	Coil code	Nominal current (A)
V12 DC	FT5 - ES - * - * - 012C	B05-012C	3,17
V24 DC	FT5 - ES - * - * - 024C	B05- 024C	1,73

Permissible supply voltage variation: +5% -10%

Special voltages available: V 48 DC, V 106 DC, V 205 DC



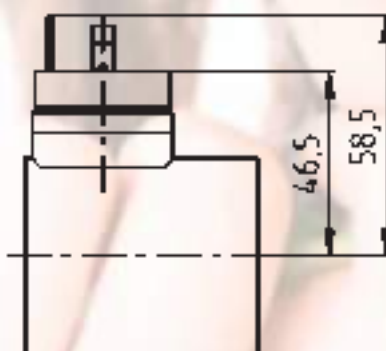
11 SOLENOID COILS, WITH STANDARD ELECTRIC CONNECTION TO ISO 4400/DIN 43650, FOR AC SUPPLY

Valves type FT5 - ES - * can be operated from A.C. supply by the use of coils that incorporate a full wave bridge rectifier. Coils with rectifier can be supplied separately as B05 - ***A.

DIRECTLY D.C. SUPPLY

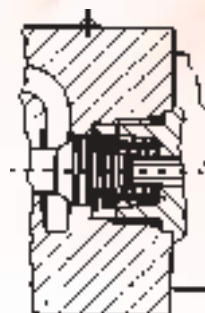
Voltage	Valve code	Coil code	Nominal Current (A)
V115 AC/50(60) Hz	FT5-ES-*-* - 115A	B05-115A	0,40
V230 AC/50(60) Hz	FT5-ES-*-* - 230A	B05- 230A	0,20

Permissible supply voltage variation: +5% -10%



12 VERSION "N": MECHANICAL DETENT ON SPOOL

Solenoids valves with detent typically are 2 positions, 2 solenoid, no-spring valves where the spool is kept at the extreme ends of its stroke by a mechanical device. This permits that solenoids are energized by short time current pulses and the spool remains at its position regardless of forces due to hydrodynamics or gravitational/inertia effects (vibrations).



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

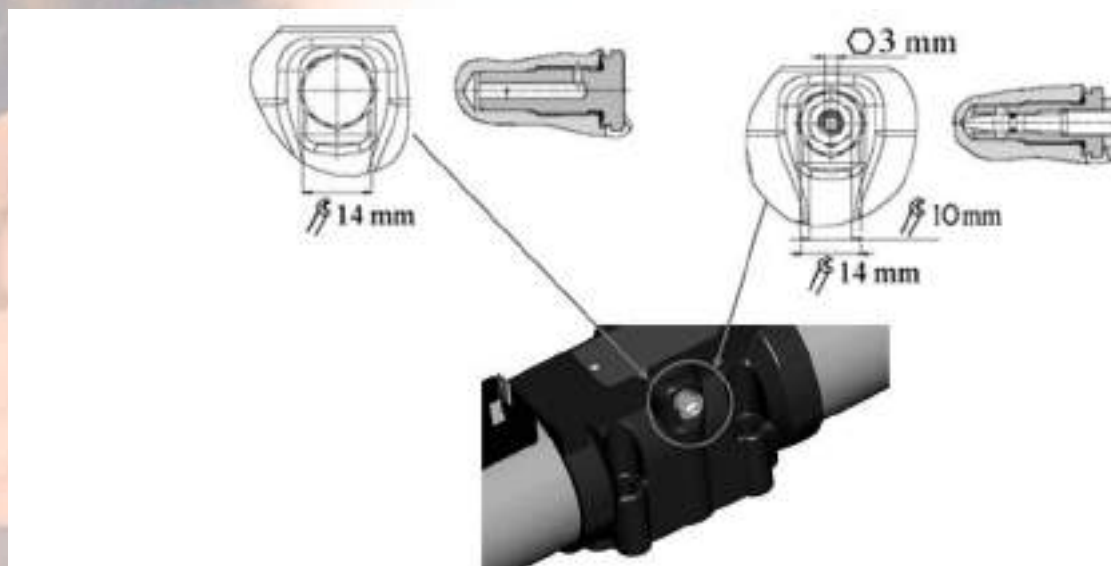
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13 VERSION "T": SOFT SHIFTING

Solenoid valves with soft shifting devices are 2 or 3 positions valves, controlled by 2 solenoids, which incorporated a fixed throttling orifice ($\varnothing 0,6$) on the channel that connects the extreme hydraulic chambers of the valve. The throttling effect control the spool shifting time, therefore eliminating unwanted hydraulic shocks.

14 VERSION "TR": ADJUSTABLE SOFT SHIFTING

In version "TR" valves, the fixed orifice is replaced by an adjustable, variable throttle valve that permit a fine precise adjustment of the spool shifting time. To increase the throttling (and therefore the shifting time) turn clock-wise the adjusting screw, after having unlocked its retaining nut.



15 VERSION "K": EXTENDED OVERRIDE PIN

Solenoid valves according to "K" version have extended override actuator pins that permit a quick and easy "hand operation" of the valves, without the need of any tool. The actuator pin and the end of the solenoid are protected by a flexible rubber cap that makes operation and protects from moisture and water splashes.



16 ANTICORROSION PROTECTION

On FT5 - ES - * standard valves the body is phosphate coated, the solenoid tubes are treated and coils mantel and irons are zinc trivalent plated. To increase the resistance to corrosive agents different variants are available:

- ZT • body, solenoid tubes and coils irons are zinc trivalent plated
- ZL • body is coated with special TEMADUR 40 zinc painting
• solenoids have 8-12 μm zinc plating
- ZK • body is coated with special TEMADUR 40 zinc painting
• solenoid tube and coils irons are "zinc-nickel" plated



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

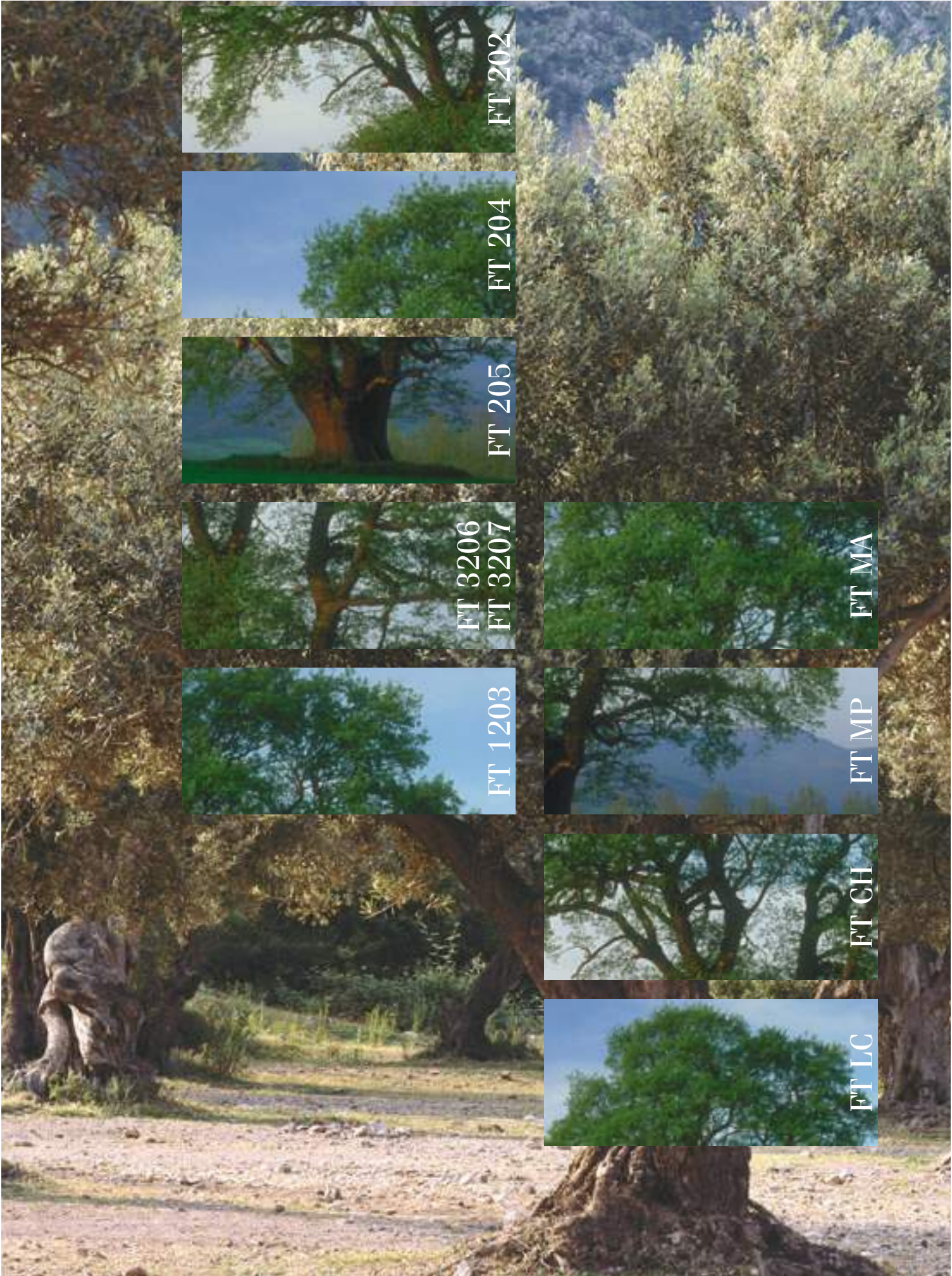
WHOLE PAGE

PRINT

ESC



*
ES
FT5



FT 202



FT 204



FT 205



FT 3206
FT 3207



FT MA



FT 1203



FT MP



FT CH



FT LC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

ACCESSORIES AND SPARE PARTS

FT 202
KM ring nut for valves series FT 257
FT 204
Steel hexagonal ring nut for gauge isolator series FT 292
FT 205
Steel hexagonal ring nut for gauge isolators series FT 290 and FT 291
FT 3206 - FT 3207
Panel plate for gauge isolator series FT 292
FT 1203
Brass hexagonal ring nut for valve series FT 1250
FT MA
Aluminium handwheel for valves series FT 257 and FT 1250
FT MP
ABS handwheel for valves series FT 257 and FT 1250
FT CH
Handwheel with key
FT LC
Handwheel with padlock



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



ACCESSORIES



FT 202

NUT FT 202		VALVE TYPE	DIMENSIONS
FT 202	KM 2	SERIES FT 290-FT 291	14
FT 202/2	KM 2	SERIES FT 1237	18
FT 202/3	KM 3	SERIES FT 257-FT258	18
FT 202/4	KM 4	SERIES FT 257-FT258	14
		SERIES FT 270	14
FT 202/5	KM 5	SERIES FT 257-FT 258	38
		SERIES FT 270	38
FT 202/6	KM 6	SERIES FT 257-FT 258	12
		SERIES FT 270	12
		SERIES FT 277-FT 287-FT 297	14
FT 202/7	KM7	SERIES FT277-FT 287-FT 297	38
FT 202/8	KM8	SERIES FT 257-FT 258	34
		SERIES FT 270	34
		SERIES FT 277-FT 287-FT 297	12
FT 202/10	KM10	SERIES FT 257-FT 258	100
		SERIES FT 270	100
		SERIES FT 277-FT 287-FT 297	34
	KM11	SERIES FT 257	112
	KM13	SERIES FT 257	200



FT 204

NUT FT 204		VALVE TYPE
FT 204		SERIE FT 292



FT 205

NUT FT 205		VALVE TYPE
FT 205	EXAGON TYPE	SERIES FT 290-FT 291

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

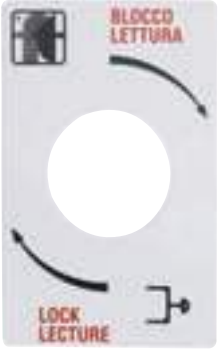
GHIERE FT 1253	VALVE TYPE	DIMENSIONS
FT 1203/18	SERIES FT 1250	18
FT 1203/14	SERIES FT 1250	14
FT 1203/38	SERIES FT 1250	38
FT 1203/12	SERIES FT 1250	12
FT 1203/34	SERIES FT 1250	34

On request
Version AISI 316 code FT 2251-016



ACCESSORIES AND SPARE PARTS

FT 3206
FT 3207
Panel plate for gauge
isolator series
FT 292 FT 293



FT 1203





ACCESSORIES



FT MA

Aluminium handwheel
for valves series FT 257
and FT 1250



FT MP

ABS handwheel
for valves series FT 257
and FT 1250



FT CH

Handwheel with key



FT LC

Handwheel with padlock

HOME

PRESENTATION

VALVES INDEX

+

-



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX

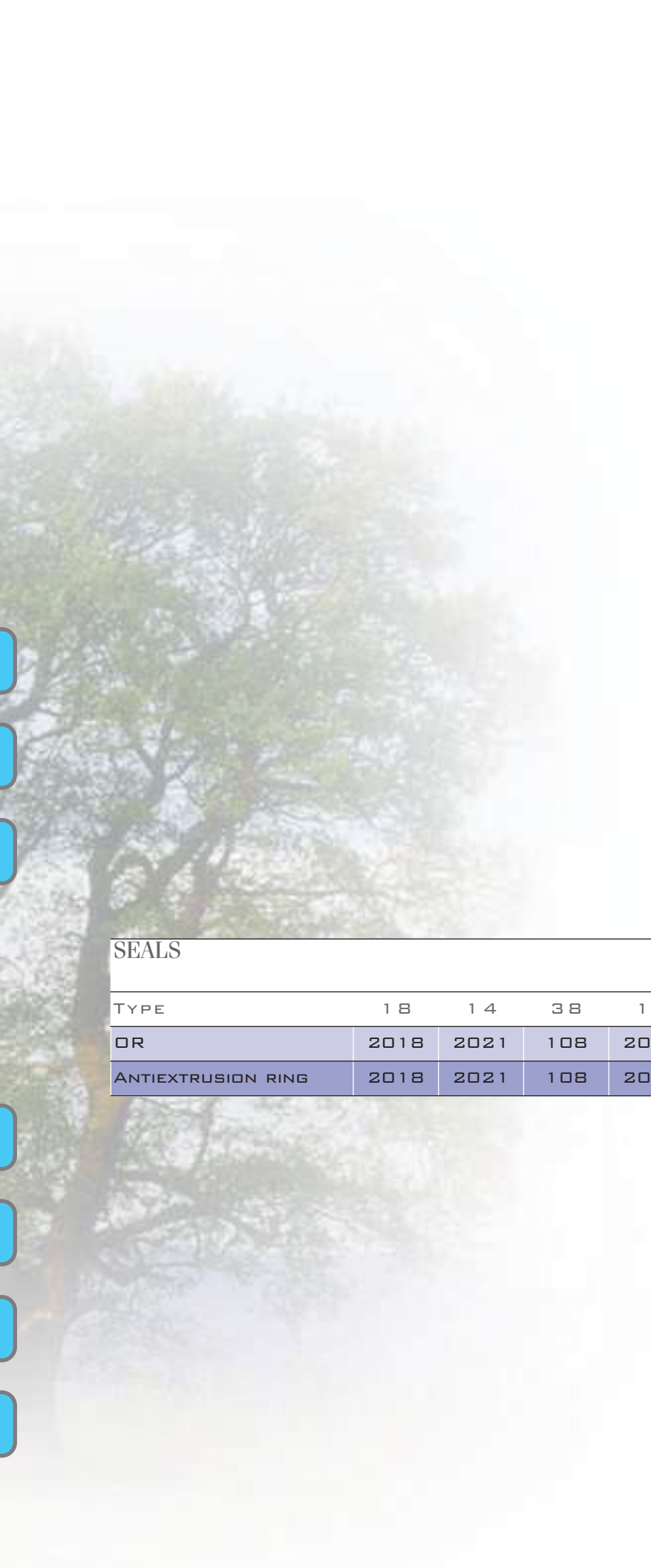


LAST SEEN

WHOLE PAGE

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ESC



SEALS

TYPE	1 8	1 4	3 8	1 2	3 4	1 0 0	1 1 4	1 1 2	2 0 0
OR	2018	2021	108	2043	115	123	123	128	3106
ANTIEXTRUSION RING	2018	2021	108	2043	115	123	123	128	3106





HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

FORMULAS CALCULATION



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



FLOW RATE CALCULATION IN FUNCTION OF THE VALVE KV COEFFICIENT

1) LOW VISCOSITY LIQUIDS

$$Q = K_v \cdot \sqrt{\frac{\Delta P}{\gamma}}$$

FORMULA TO OBTAIN THE VALVE FLOWRATE

$\Delta P = P_1 - P_2$	Difference between downstream and upstream valve pressure (bar)
γ	Relative water density
K_v	Valve coefficient depending on inner valve geometry. This value is obtained experimentally.

EXAMPLE
To determine the water flow rate in L/min with a valve FT 1 25 1/2-1 2 with Kv = 15.4

$K_v = 15.4 \cdot \frac{L}{min} \cdot \frac{1}{\sqrt{bar}}$	Valve coefficient L/min
$P_1 = 8 \text{ . bar}$	Downstream pressure
$P_2 = 5 \text{ . bar}$	Upstream pressure
$\Delta P = (P_1 - P_2)$	Pressure difference
$\gamma_{water} = 1$	Relative water density
$Q = K_v \cdot \sqrt{\frac{\Delta P}{\gamma_{acqua}}}$	Portata in L/min

$$Q = 26.674 \cdot \frac{L}{min}$$

2) VISCOUS LIQUIDS

Il coefficiente Kv della valvola deve essere moltiplicato per un fattore F>1 quando siamo in presenza di un liquido viscoso. F viene ricavato in funzione di un parametro Z.

$$Z = \frac{2100 \cdot Q}{v \cdot \sqrt{K_v}}$$

Z PARAMETER

v	Kinematic viscosity in centistokes
Q	Valve flow rate in mc/h
K_v	Valve coefficient in mc/h

EXAMPLE
To determine the suitable valve to let in 80 l/min oil with 2 bar ΔP

$v = 23 \text{ . centistokes}$	Kinematic viscosity in centistokes
$\gamma_{water} = 1 \text{ Kg/dm}^3$	Water density
$\Delta P = 2 \text{ . bar}$	Pressure difference between downstream and upstream
$Q = 80 \cdot \frac{L}{min} = 4.8 \text{ m}^3/h$	Requested valve flowrate
$K_{v1} = \frac{Q}{\sqrt{\frac{\Delta P}{\gamma_{acqua}}}}$	Valve coefficient for low viscosity liquids expressed in L/min
$K_{v2} = K_{v1}$	Valve coefficient expressed in mc/h
$Z = \frac{2100 \cdot Q}{v \cdot \sqrt{K_{v2}}}$	Z parameter

$$K_{v1} = 56.57 \cdot \frac{L}{min} \cdot \frac{1}{\sqrt{bar}}$$
$$K_{v2} = 3.39 \cdot \frac{m^3}{h} \cdot \frac{1}{\sqrt{bar}}$$

$$z = 238$$

CALCULATION FORMULAS

From the graphic it is possible to obtain F value:

$F = 1.25$

Corrective factor

Then the suitable Kv is obtained by multiplying Kv1 by F:

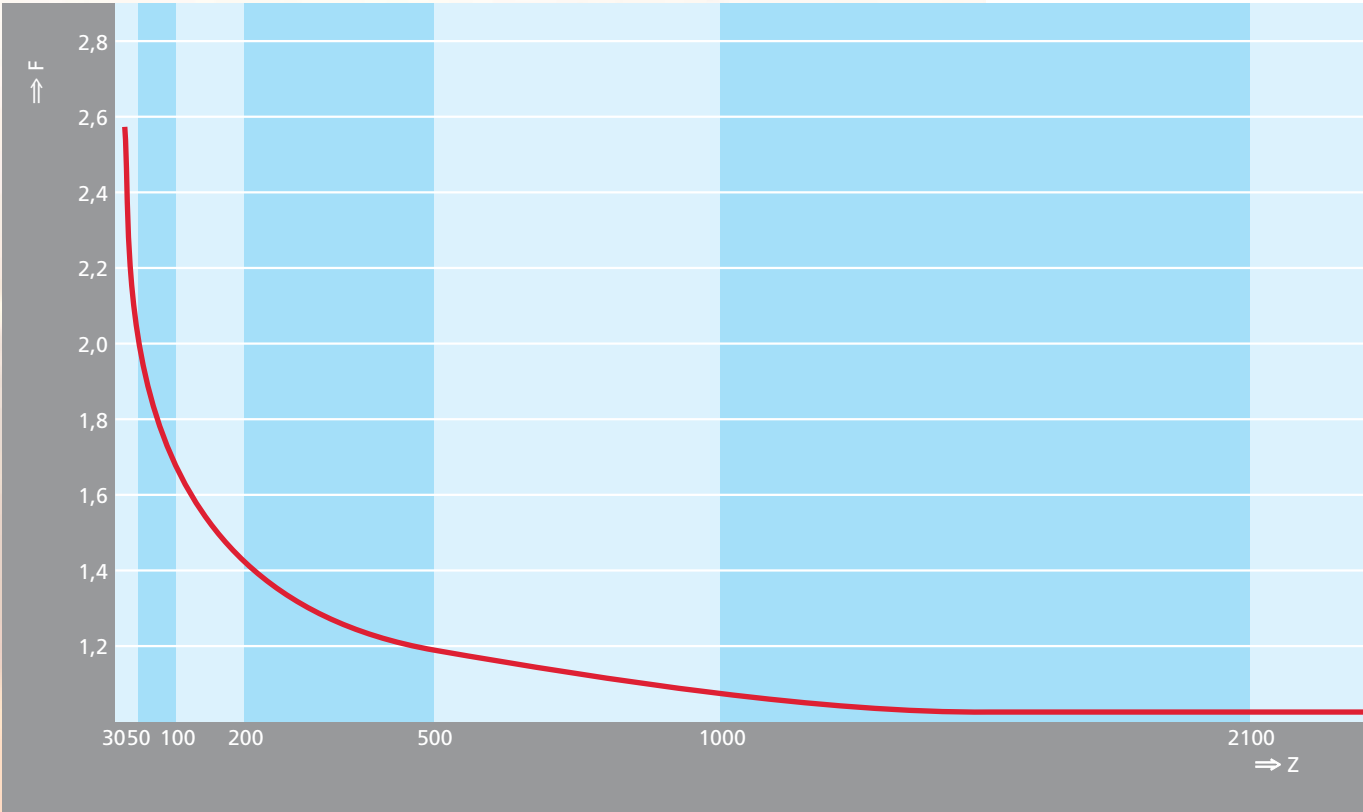
$K_v = F \cdot K_{v1}$

$$K_v = 65.192 \cdot \frac{L}{min} \cdot \frac{1}{\sqrt{bar}}$$

Coefficient of the valve suitable to 1e 80 l/min oil
with $\nu = 23$ centistokes in presence of 2 bar ΔP



CORRECTIVE F FACTOR IN FUNCTION OF Z PARAMETER



FLOW RATE CALCULATION IN FUNCTION OF THE VALVE KV COEFFICIENT

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



FLOW RATE CALCULATION IN FUNCTION OF THE VALVE KV COEFFICIENT

3) GAS

FORMULA TO OBTAIN THE STANDARD VALVE FLOW RATE (N-LITER/MIN)

$$Q_n = 28.81 \cdot K_v \cdot \sqrt{\frac{P_1 - P_2}{\gamma_{relat.}}} \cdot \sqrt{\frac{P_2}{T_1}}$$

The formula is valid till the ratio P2/P1 does not go under the value P2crit./P1, corresponding to the sonic flow.
For ratio of P2/P1 inferior to such a value, flow remains constant.
As the value P2crit./P1 is about 0.5: the formula of the max. flow rate for gas is obtained through the following formula

FORMULA PER RICAWARE LA PORTATA MASSIMA DELLA VALVOLA (N-LITRI/MIN)

$$Q_{nmax} = 14.41 \cdot K_v \cdot P_1 \cdot \sqrt{\frac{1}{\gamma_{relat.} \cdot T_1}}$$

ΔP = P1 - P2

Difference between downstream and upstream valve pressure (bar)

T1

Absolute gas temperature upstream the valve

γ

Gas density

γ air

Air density

γ relat.

Relative gas/air density

EXAMPLE

To determine nitrogen flow rate at 20 °C with P1 = 7 bar and P2 = 5 bar on the valve FT 1 2 5 1 / 2 - 1 2

$$K_v = 15.4 \cdot L \cdot \frac{\sqrt{K}}{\text{min} \cdot \text{bar}}$$

Valve coefficient

$$T_1 = 273 \cdot K + t$$

$$T_1 = 293 \cdot K$$

Absolute temperature

$$\gamma_{nitrogen} = 1.1451 \cdot \frac{\text{kg}}{\text{m}^3}$$

Nitrogen density

$$\gamma_{air} = 1.1839 \cdot \frac{\text{kg}}{\text{m}^3}$$

Air density

$$\gamma_{relat.} = \frac{\gamma_{nitrogen}}{\gamma_{air}}$$

$$\gamma_{relat.} = 0.967$$

Relative density

$$P_{crit.} = \frac{P_2}{P_1}$$

$$P_{crit.} = 0.714$$

Critical pressure (for values superior to 0.5 use the following formula)

$$Q_n = 28.81 \cdot K_v \cdot \sqrt{\frac{P_1 - P_2}{\gamma_{relat.}}} \cdot \sqrt{\frac{P_2}{T_1}}$$

$$Q_n = 83.342 \cdot \frac{L}{\text{min}}$$

Flow rate in NL/min

$$Q_{n1} = Q_n \times 60/1000 = \text{Nmc/h}$$

$$Q_{n1} = 5 \cdot \frac{\text{Nmc}}{\text{h}}$$

Flow rate in Nmc/h

MASS FLOW RATE

FORMULA TO DETERMINE THE VALVE MASS FLOW RATE

$$G = Q_{n1} \cdot \gamma$$

So we obtain

$$G = Q_{n1} \cdot \gamma_{nitrogen}$$

$$G = 5.726 \cdot \frac{\text{kg}}{\text{h}}$$

Valve flow rate kg/h

AIR DENSITY UNDER RSA

RSA = REFERENCE STANDARD ATMOSPHERE ACCORDING TO UNI - ISO 8778

$P = 1 \cdot \text{bar}$	Pressure
$T_a = 293 \cdot \text{K}$	Absolute temperature
$\tau = 0.65$	Relative humidity
$\gamma_{\text{air}} = 1.1839 \cdot \frac{\text{kg}}{\text{m}^3}$	Air density under RSA conditions

GAS DENOMINATION	CHEMICAL FORMULA	DENSITY KG/M ³	RELATIVE DENSITY
ACETYLENE	C ₂ H ₂	1.0721	0.9056
AMMONIA	NH ₃	0.7058	0.5962
CARBON DIOXIDE	CO ₂	1.8092	1.5282
SULPHUR DIOXIDE	SO ₂	2.68	2.2637
AIR		1.1839	1
NITROGEN	N ₂	1.1451	0.9672
STANDARD BUTANE	C ₄ H ₁₀	2.4473	2.0672
CHLORINE	CL ₂	2.9455	2.488
HELIUM	HE	0.1634	0.138
HYDROGEN	H ₂	0.0823	0.0695
METHANE	CH ₄	0.6565	0.5545
NEON	NE	0.8242	0.6962
CARBON MONOXIDE	CO	1.1445	0.9667
OXYGEN	O ₂	1.3083	1.1051
OZONE	O ₃	2.0326	1.7169
PROPANE	C ₃ H ₈	1.8495	1.5622

MIDDLE SPECIFIC GRAVITY OF SOME LIQUIDS AT A PRESSURE OF KG/CM2

SUBSTANCE	SPECIFIC GRAVITY	GRADES CENTRIGRADE
ACETONE	0.79	20
HYDROCHLORIC HCl	1.05	15
NITRIC ACID HNO ₃	1.15	15
SULPHURIC ACID H ₂ SO ₄	1.05	15
SEA WATER	1.03	15
GASOLINE	0.7	15
BENZOL	0.9	0
ETHYL ETHER	0.74	0
PURE GLYCERINE	1.26	0
OIL	0.76	19
WINE	0.98	15



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

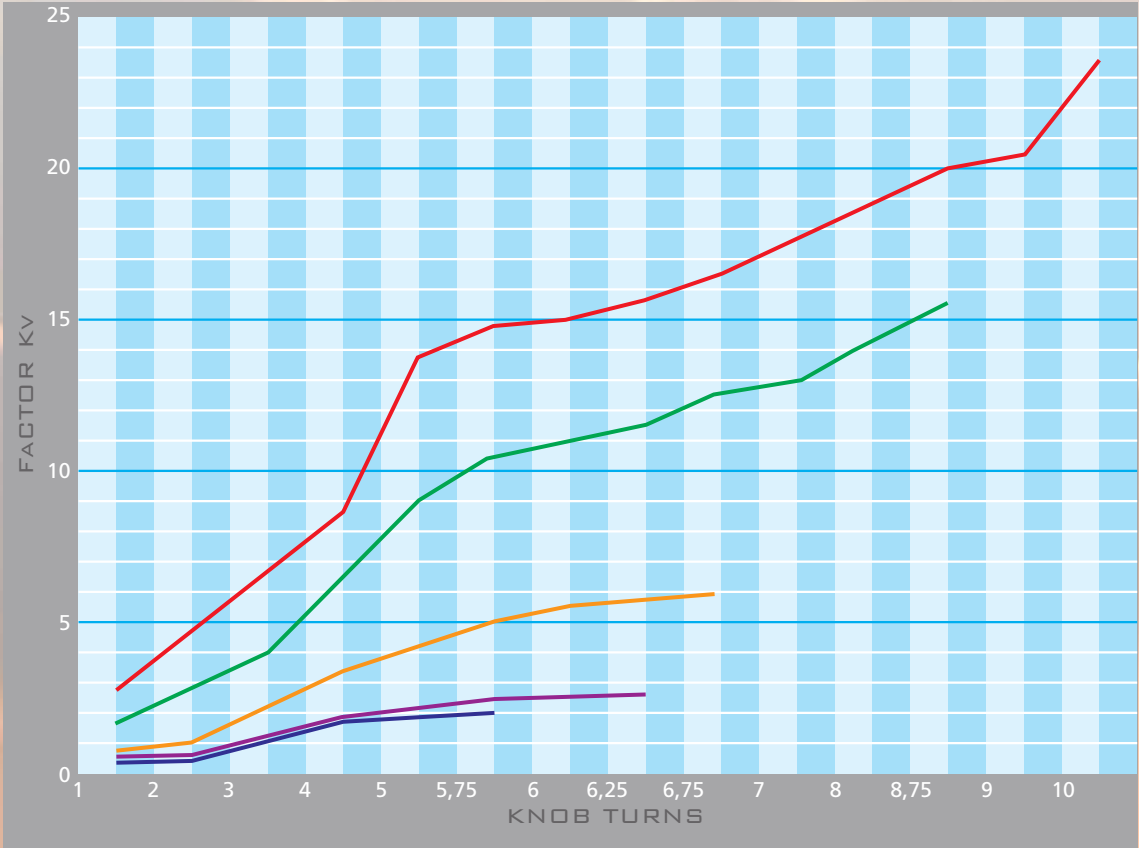


FLOW RATE CALCULATION IN FUNCTION OF THE VALVE KV COEFFICIENT

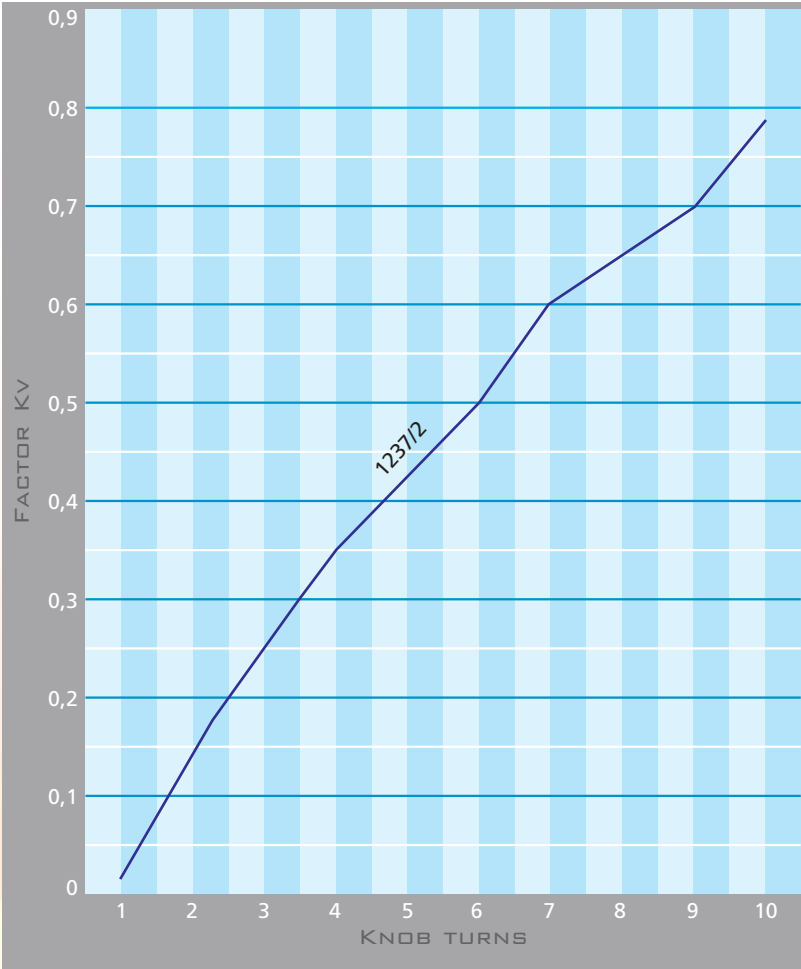
KV GRAPHIC FOR VALVES FT 1251/2 FT 1251/5					
Knob Turns	Type 18	Type 14	Type 38	Type 12	Type 34
1	0.447	0.45	0.585	1.48	2.7
2	0.767	0.87	1.02	2.7	4.5
3	1.145	1.26	2.25	4.11	6.42
4	1.43	1.65	3.33	6.48	8.76
5	1.8	1.95	3.81	9.06	13.5
5.75	2.05	2.265	5	10.365	14.62
6		2.37	5.4	10.8	15
6.25		2.58	5.5	11.37	15.6
6.75			5.7	12.51	16.8
7				13.08	17.4
8				14.52	18.48
8.75				15.6	19.92
9					20.4
10				23.7	

KV FACTOR FREE FLOW FOR VALVE FT 1251/5	
Type	Kv
14	10.8
38	20.72
12	43.97
34	53.94

- Type 18
- Type 14
- Type 38
- Type 12
- Type 34



KV GRAPHIC FOR VALVES FT 1237/2 MICROFINE	
Knob Turns	1 237/2
1	0.01
2	0.136
3	0.245
4	0.35
5	0.431
6	0.512
7	0.6
8	0.642
9	0.693
10	0.775



FLOW RATE CALCULATION IN FUNCTION OF THE VALVE KV COEFFICIENT

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

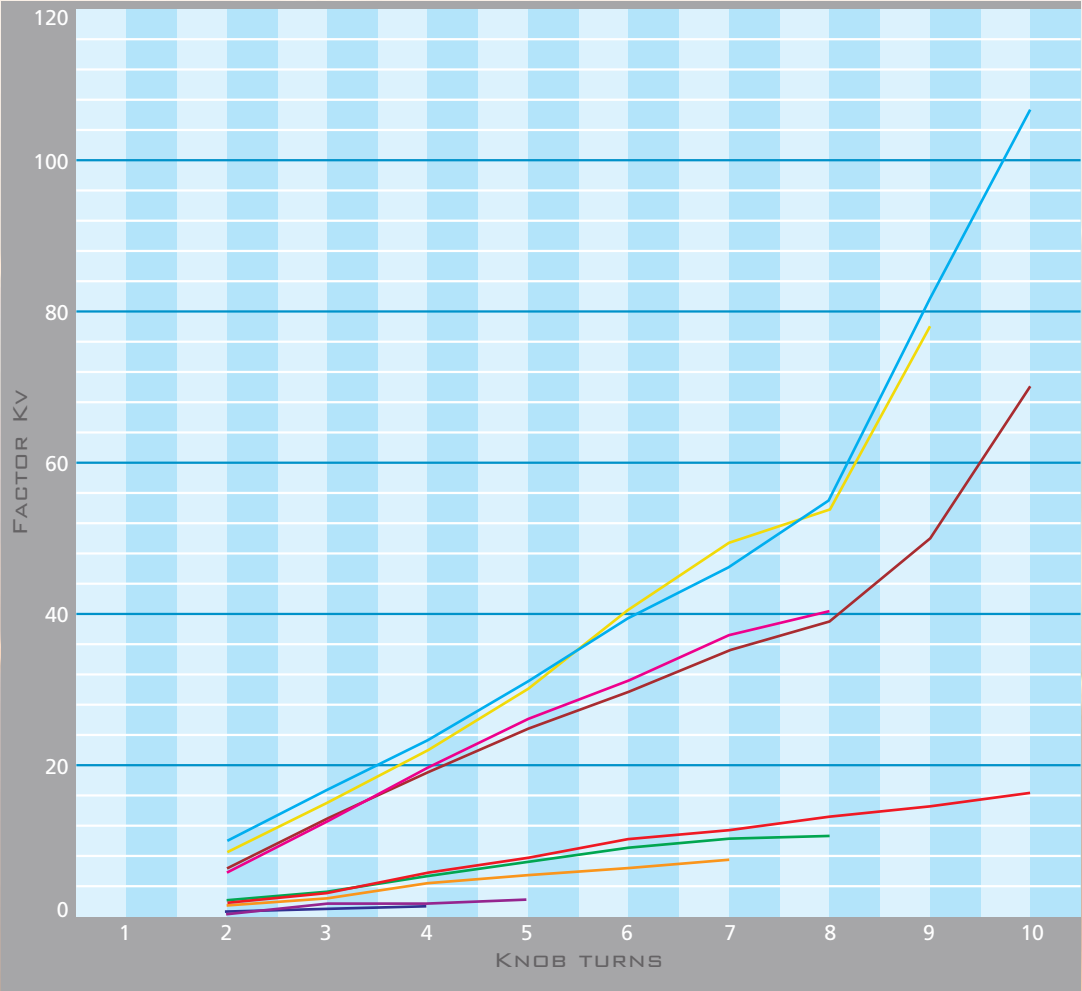
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KV GRAPHIC FOR VALVES FT 257/2

Knob Turns	Type 18	Type 14	Type 38	Type 12	Type 34	Type 100	Type 114	Type 112	Type 200
1									
2	0.66	0.47	1.4	2.06	1.85	6.6	6.2	8.7	9.7
3	1.12	1.27	2.72	3.71	3.61	12.9	12.7	15.6	16.5
4	1.59	1.81	4.12	5.57	5.67	18.9	19.05	22.7	23.5
5		2.63	5.57	7.21	7.71	24.8	25.9	30.4	31.1
6			6.97	8.93	9.57	30.2	31.3	40.4	39.7
7			7.77	10.31	11.65	35.7	37.1	49	46.6
8				10.93	13.5	39.4	40.2	54.2	55.4
9					15.2	50.2		78.3	82.5
10					16.5	70			107.3

- Type 18
- Type 14
- Type 38
- Type 12
- Type 34
- Type 100
- Type 114
- Type 112
- Type 200



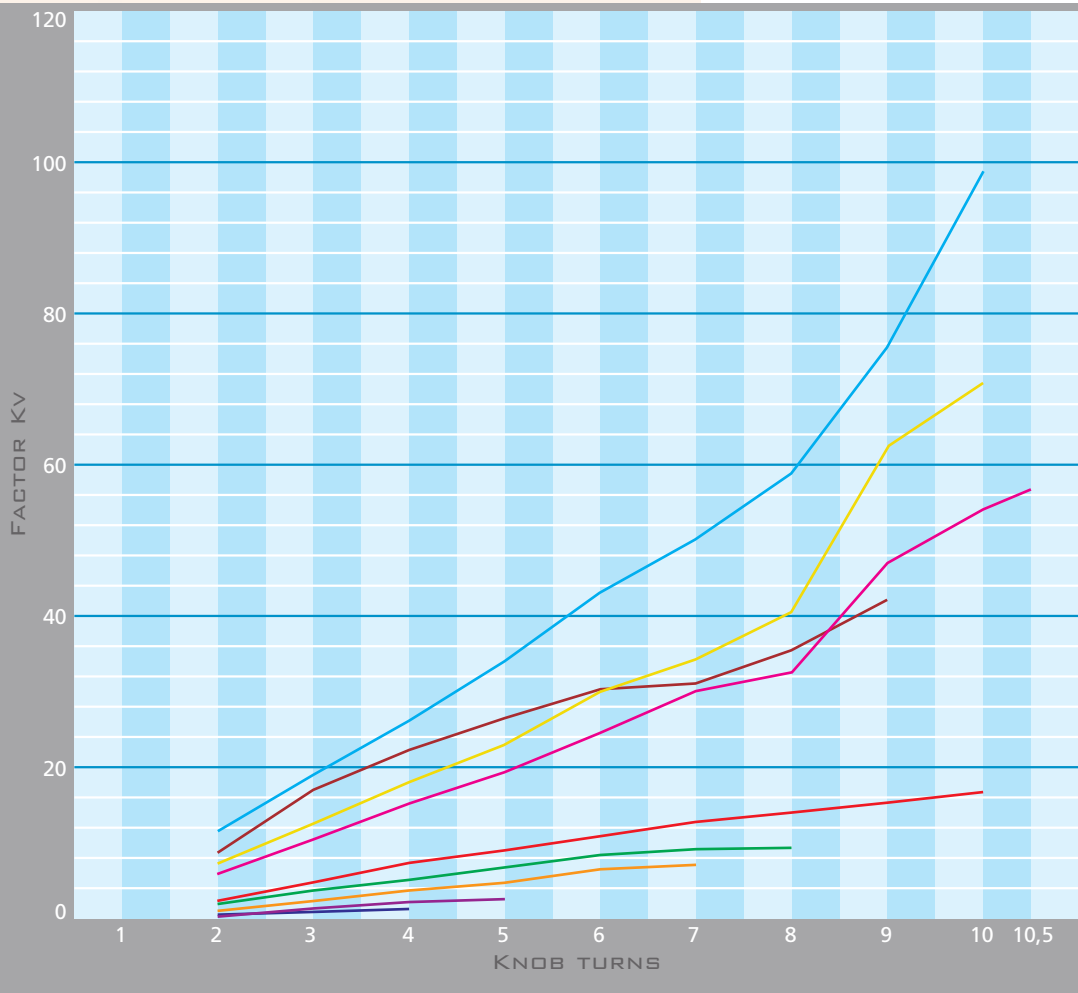
KV GRAPHIC OF VALVES FT 257/5



NOB TURNS	TYPE 18	TYPE 14	TYPE 38	TYPE 12	TYPE 34	TYPE 100	TYPE 114	TYPE 112	TYPE 200
1									
2	0.57	0.49	1.11	1.85	2.3	8.97	6.4	7	11.8
3	0.95	1.4	2.84	3.92	5.1	17.2	10.9	12.3	18.8
4	1.3	2.1	3.92	5.48	7.4	22.8	15.2	17.8	26.3
5		2.84	4.95	6.95	9.2	26.8	19.8	23.3	34.4
6			5.83	8.39	11.2	29.9	24.4	28.9	43.5
7			6.68	9.03	13.2	31.7	29.1	34.2	49.9
8				9.73	14.6	35.8	32.5	40.1	57.7
9					15.5	42.06	47.6	62.9	75.9
10					17.1		53.3	71.1	99.1
10,5							56.3		

- Type 18
- Type 14
- Type 38
- Type 12
- Type 34
- Type 100
- Type 114
- Type 112
- Type 200

KV FACTOR FREE FLOW FOR VALVE FT 1251/5	
TIPO	KV
18	4.23
14	10.9
38	27.74
12	48.98
34	63.5
100	77.5
114	153.5
112	205
200	360



FLOW RATE CALCULATION IN FUNCTION OF THE VALVE KV COEFFICIENT

HOME

PRESENTATION

VALVES INDEX

+

-

◀

▶

LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

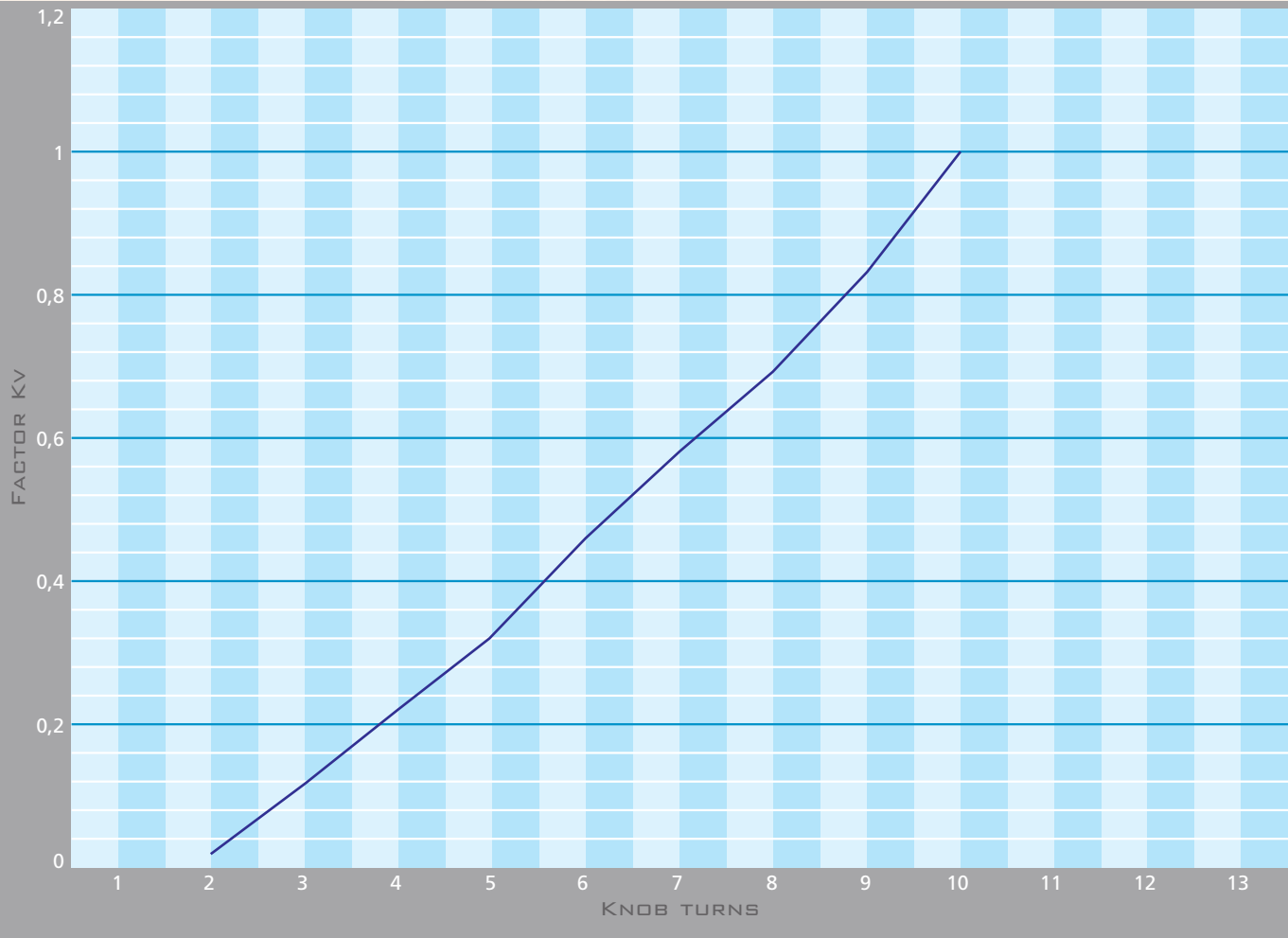
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FLOW RATE CALCULATION IN FUNCTION OF THE VALVE KV COEFFICIENT

KV FACTOR ON VALVES FT 247/2

Knob turns	Type 18 Microfine
1	
2	0.023
3	0.124
4	0.226
5	0.323
6	0.468
7	0.567
8	0.691
9	0.830
10	1

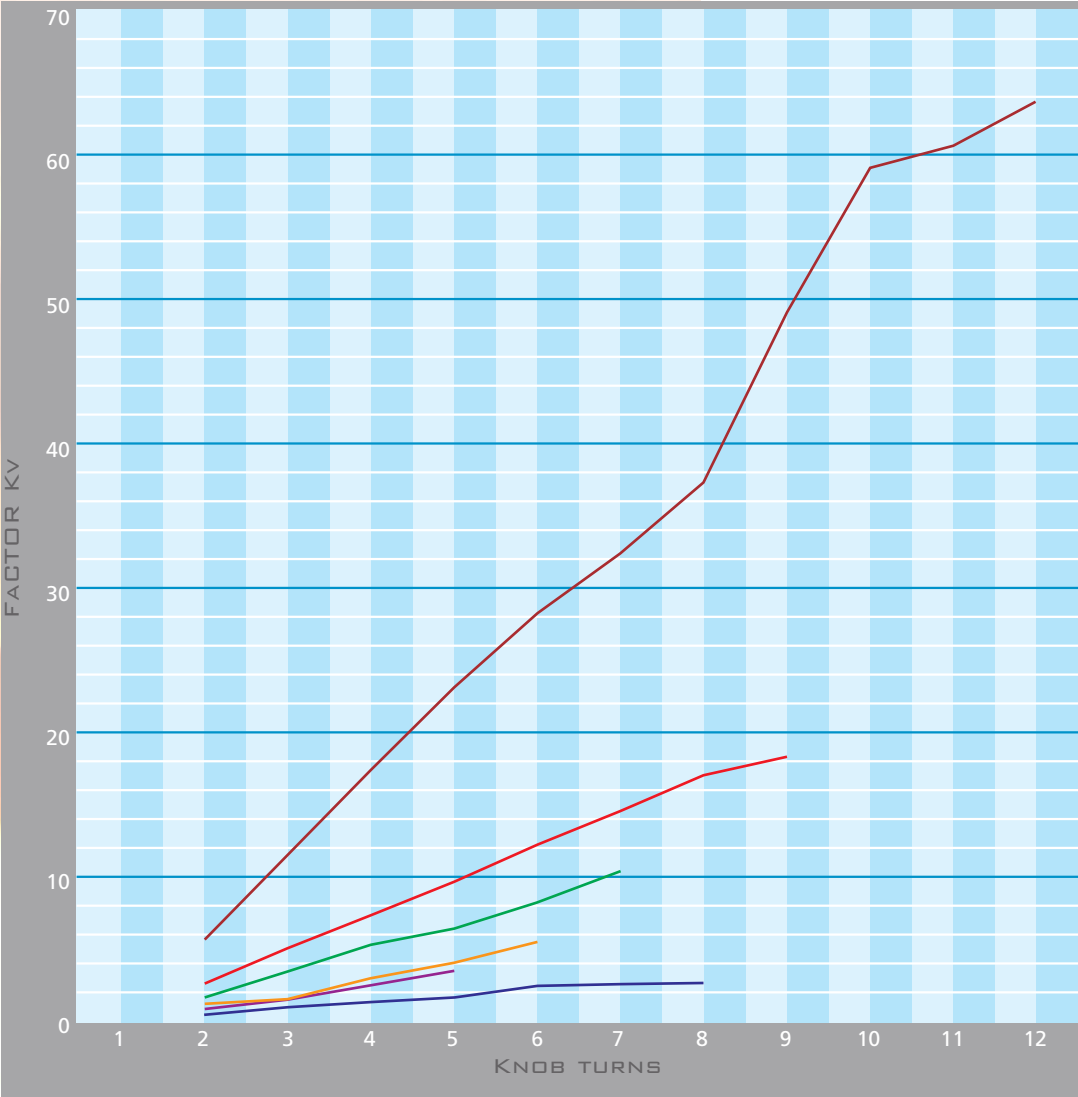


KV GRAPHIC FOR VALVES FT 267/2



NOB TURNS	TYPE 18	TYPE 14	TYPE 38	TYPE 12	TYPE 34	TYPE 100
1						
2	0.62	0.72	0.93	1.69	2.62	5.98
3	0.95	1.56	1.69	3.5	5.01	11.75
4	1.28	2.38	2.91	5.15	7.4	17.32
5	1.77	3.52	4	6.37	9.69	23.2
6	2.41		5.65	8.04	12.16	28.04
7	2.6			10.31	14.93	32.6
8	2.7				17.32	37.5
9					18.64	49
10						58.3
11						61.3
12						63.96

- Type 18
- Type 14
- Type 38
- Type 12
- Type 34
- Type 100



FLOW RATE CALCULATION IN FUNCTION OF THE VALVE KV COEFFICIENT

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



FLOW RATE CALCULATION IN FUNCTION OF THE VALVE KV COEFFICIENT

KV GRAPHIC FOR VALVES FT 267/5

Knob Turns	Type 14	Type 38	Type 12	Type 34	Type 100
1					
2	1.24	2.16	0.87	1.54	3.92
3	2.31	3.71	3.13	4.35	8.76
4	3.35	4.91	6	7.68	13.36
5		6.18	8.7	11.32	17.73
6		8.82	10.8	13.98	23.7
7			12.9	16.74	31.5
8			15.6	19.09	47.1

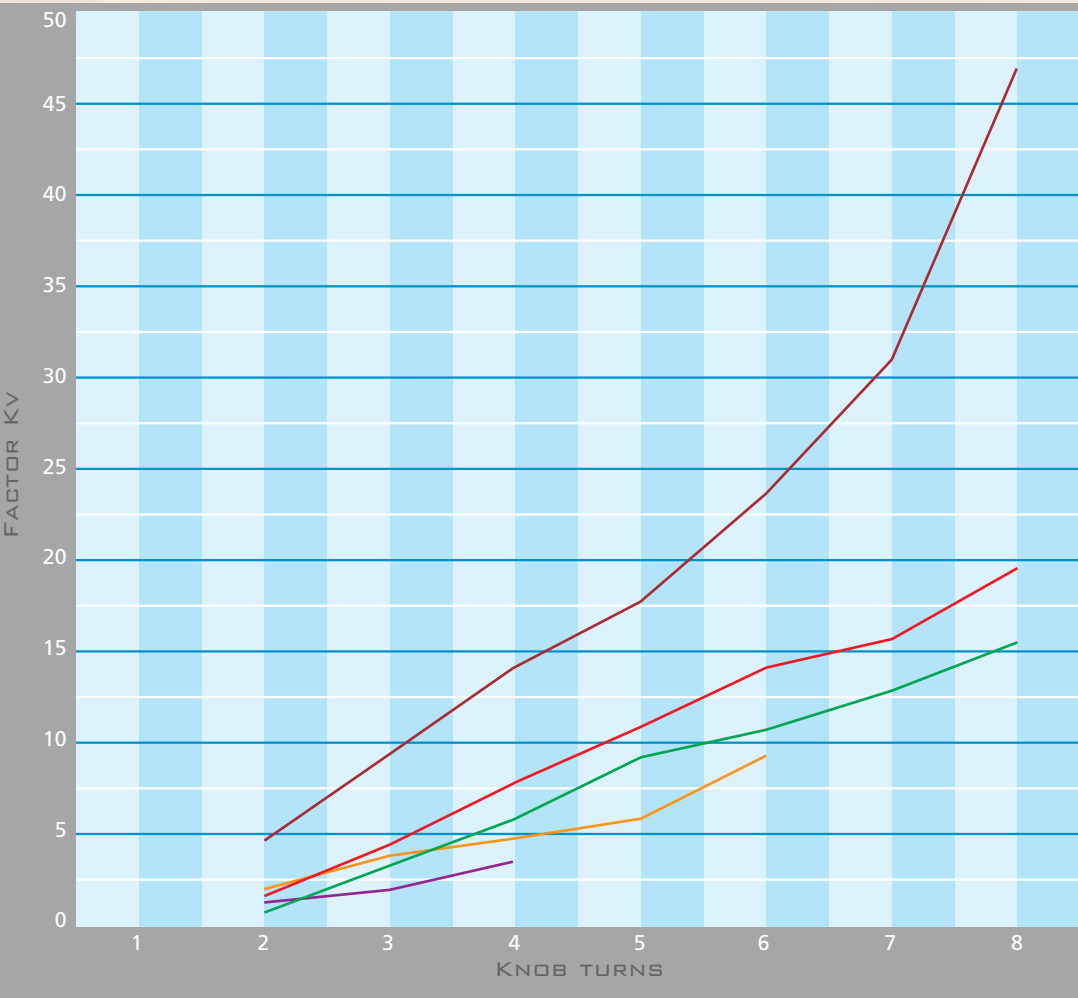
KV FACTOR FREE FLOW FOR VALVE FT 267/5

TIPO	KV
14	9.7
38	23.7
12	40.2
34	51.5
100	67

KV FACTOR FREE FLOW FOR VALVE FT 267/6

TIPO	KV
14	17.9
38	26.7
12	49.4
34	69.9

- Type 14
- Type 38
- Type 12
- Type 34
- Type 100



KV GRAPHIC FOR VALVESFT 280/2



Knob Turns	Type 18	Type 14	Type 38	Type 12	Type 03	Type 60
1	0.39					
2	0.72	2.68	0.82	1.9		2.68
3	1.11	4.12	1.94	3.7	3.09	4.64
4	1.48	5.24	2.89	5.6	4.33	6.39
5	2.23	5.71	3.71	6.8	5.85	7.05
6	3.23		4.6	8.5	6.49	
7			5.07	10		
8			9.73	11.8		
9				17.5		

HOME

PRESENTATION

VALVES INDEX



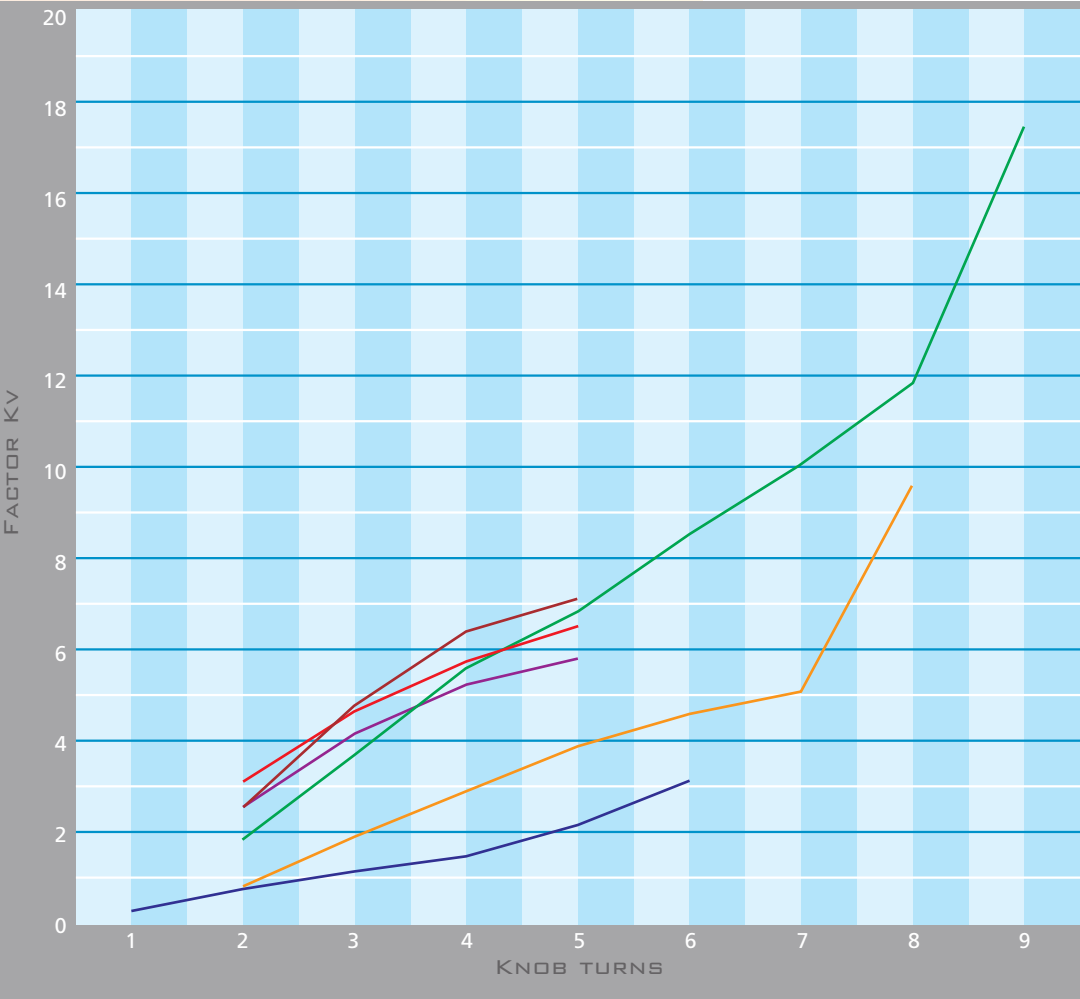
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WHOLE PAGE

PRINT

ESC

- Type 18
- Type 14
- Type 38
- Type 12
- Type 03
- Type 60



FLOW RATE CALCULATION IN FUNCTION OF THE VALVE KV COEFFICIENT

HOME

PRESENTATION

VALVES INDEX



LAST SEEN

WHOLE PAGE

PRINT

ESC



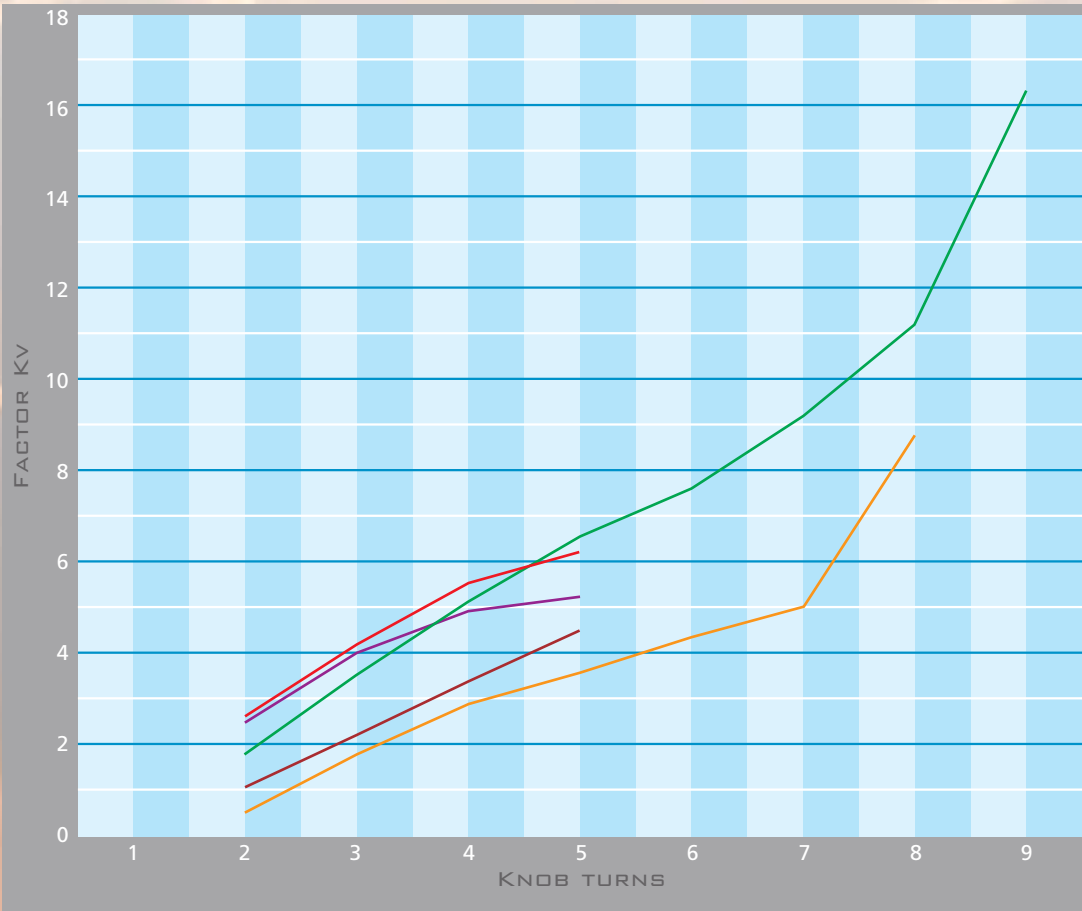
FLOW RATE CALCULATION IN FUNCTION OF THE VALVE KV COEFFICIENT

KV GRAPHIC FOR VALVES FT 280/5

Knob turns	Type 14	Type 38	Type 12	Type 03	Type 60
1					
2	2.47	0.62	1.85	2.51	1.03
3	4	1.85	3.52	4.15	2.23
4	4.95	2.9	5.15	5.54	3.4
5	5.24	3.5	6.64	6.18	4.45
6		4.3	7.59		
7		5	9.28		
8		8.7	11.3		
9			16.29		

KV FACTOR FREE FLOW FOR VALVE FT 280/5	
TIPO	KV
14	6.8
38	13.15
12	28.45
03	7.21
60	8.25

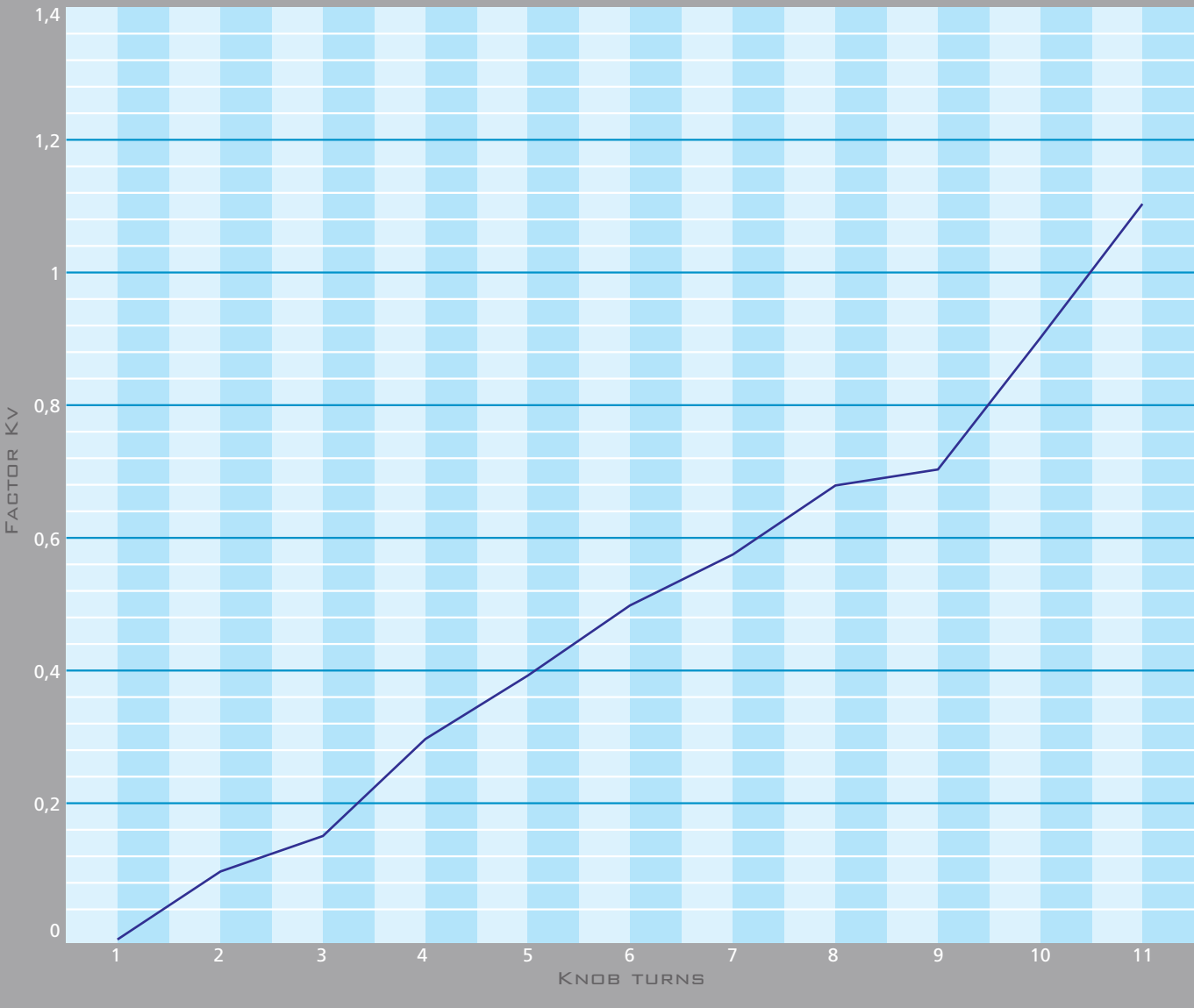
Type 14
Type 38
Type 12
Type 03
Type 60





KV FACTOR ON VALVES FT 281/5

KNOB TURNS	FACTOR KV
1	0.0087
2	0.087
3	0.152
4	0.248
5	0.394
6	0.493
7	0.574
8	0.641
9	0.7
10	0.92
11	1.152



HOME

PRESENTATION

VALVES INDEX



LAST SEEN

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FLOW RATE CALCULATION IN FUNCTION OF THE VALVE KV COEFFICIENT

HOME

PRESENTATION

VALVES INDEX



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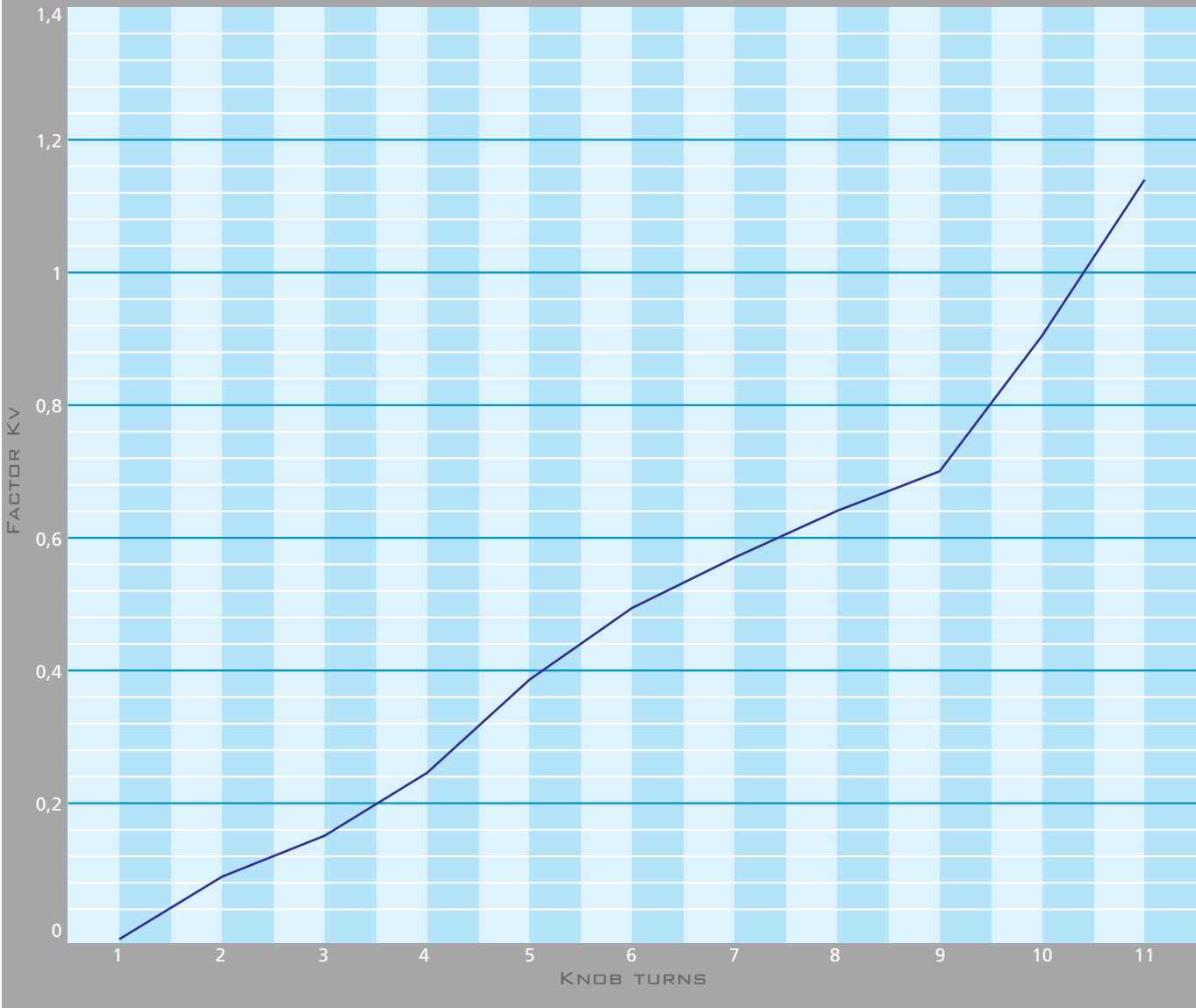
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KV FACTOR FLOW FOR VALVE FT 281/5	
Knob	Fattore Kv
1	0.012
2	0.087
3	0.152
4	0.248
5	0.394
6	0.493
7	0.571
8	0.641
9	0.7
10	0.912
11	1.146

KV FACTOR FREE FLOW FOR VALVE FT 281/5	
Type	Kv
03	5.58





HOME

PRESENTATION

VALVES INDEX

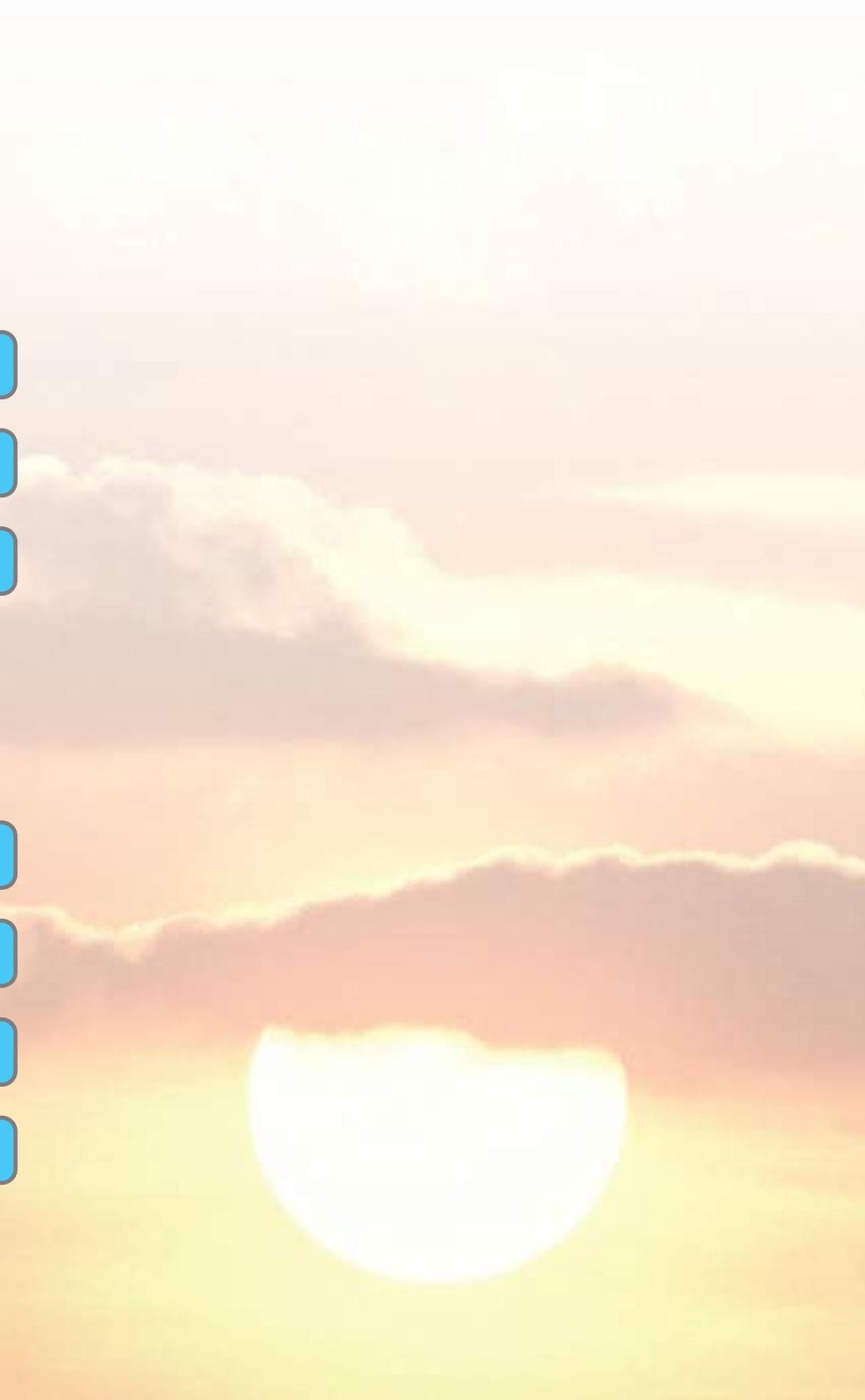


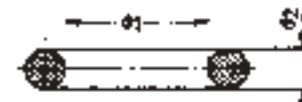
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O - RING ACCORDING TO ANGLO-AMERICAN STANDARD

HOME

PRESENTATION

VALVES INDEX



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ESC

REF. N.	CODE	O - RING SIZE		
		ØD 1	ØD 2	A ØEXT.
OR 2007	004	1,78	1,78	5,34
OR 2010	005	2,57	1,78	6,13
OR 2012	006	2,90	1,78	6,46
OR 2015	007	3,69	1,78	7,25
OR 2018	008	4,48	1,78	8,04
OR 2021	009	5,28	1,78	8,84
OR 2025	010	6,07	1,78	9,63
OR 106	-	6,75	1,78	10,31
OR 2031	011	7,66	Ø 1,78	11,22
OR 108	-	8,73	1,78	12,29
OR 2037	012	9,25	1,78	12,81
OR 2043	013	10,82	1,78	14,38
OR 114	-	11,11	1,78	14,67
OR 2050	014	12,42	1,78	15,98
OR 2056	015	14,00	1,78	17,56
OR 2062	016	15,60	1,78	19,16
OR 2068	017	17,17	1,78	20,73
OR 2075	018	18,77	1,78	22,33
OR 2081	019	20,35	1,78	23,91
OR 2087	020	21,95	1,78	25,51
OR 2093	021	23,52	1,78	27,08
OR 2100	022	25,12	1,78	28,68
OR 2106	023	26,70	1,78	30,26
OR 2112	024	28,30	1,78	31,86
OR 2118	025	29,87	1,78	33,43
OR 2125	026	31,47	1,78	35,03
OR 2131	027	33,05	1,78	36,61
OR 2137	028	34,65	1,78	38,21
OR 2150	029	37,82	1,78	41,38
OR 2162	030	41,00	1,78	44,56
OR 2175	031	44,17	1,78	47,73
OR 2187	032	47,35	1,78	50,91
OR 2200	033	50,52	1,78	54,08
OR 2212	034	53,70	1,78	57,26
OR 2224	035	56,87	1,78	60,43
OR 2237	036	60,05	1,78	63,61
OR 2250	037	63,22	1,78	66,78
OR 2262	038	66,40	1,78	69,96
OR 2275	039	69,57	1,78	73,13
OR 2287	040	72,75	1,78	76,31
OR 3021	107	5,23	2,62	10,47
OR 3024	108	6,02	2,62	11,26
OR 3030	109	7,59	2,62	12,83
OR 109	-	9,13	2,62	12,83
OR 3037	110	9,19	2,62	14,43
OR 112	-	9,92	2,62	15,16
OR 3043	111	10,78	2,62	16,02
OR 115	-	11,91	2,62	17,15
OR 3050	112	12,37	2,62	17,61
OR 117	-	13,10	2,62	18,34
OR 3056	113	13,95	2,62	19,19
OR 119	-	15,08	2,62	20,32
OR 3062	114	15,54	2,62	20,78
OR 121	-	15,88	2,62	21,12
OR 3068	115	17,13	2,62	22,37
OR 123	-	17,86	2,62	23,10
OR 3075	116	18,72	2,62	23,96
OR 3081	117	20,24	2,62	25,48
OR 128	-	20,63	2,62	25,87
OR 3087	118	21,89	2,62	27,24

REF. N.	CODE	O - RING SIZE		
		ØD 1	ØD 2	A ØEXT.
OR 130	-	22,22	2,62	27,46
OR 3093	119	23,47	2,62	28,71
OR 132	-	23,81	2,62	29,05
OR 3100	120	25,07	2,62	30,31
OR 3106	121	26,65	2,62	31,89
OR 3112	122	28,25	2,62	33,49
OR 3118	123	29,82	2,62	35,06
OR 3125	124	31,42	2,62	36,66
OR 3131	125	32,99	2,62	38,23
OR 3137	126	34,60	2,62	39,84
OR 3143	127	36,14	2,62	41,38
OR 3150	128	37,77	2,62	43,01
OR 3156	129	39,34	2,62	44,58
OR 3162	130	40,95	2,62	46,19
OR 3168	131	42,52	2,62	47,76
OR 3175	132	44,12	2,62	49,36
OR 3181	133	45,69	2,62	50,93
OR 3187	134	47,30	2,62	52,54
OR 3193	135	48,89	2,62	54,13
OR 3200	136	50,47	2,62	55,71
OR 4028	203	7,51	3,53	14,57
OR 4036	204	9,12	3,53	16,18
OR 4050	206	12,29	3,53	19,35
OR 4055	207	13,87	3,53	20,93
OR 4061	208	15,47	3,53	22,53
OR 4067	209	17,04	3,53	24,10
OR 4075	210	18,64	3,53	25,70
OR 4081	211	20,22	3,53	27,28
OR 4087	212	21,82	3,53	28,88
OR 4093	213	23,40	3,53	30,46
OR 4100	214	24,99	3,53	32,05
OR 134	-	25,80	3,53	32,86
OR 4106	215	26,58	3,53	33,64
OR 4112	216	28,17	3,53	35,23
OR 4118	217	29,75	3,53	36,81
OR 4125	218	31,34	3,53	38,40
OR 4131	219	32,93	3,53	39,99
OR 4137	220	34,52	3,53	41,58
OR 4143	221	36,10	3,53	43,16
OR 4150	222	37,69	3,53	44,75
OR 144	-	39,69	3,53	46,75
OR 4162	223	40,86	3,53	47,92
OR 146	-	41,28	3,53	48,34
OR 147	-	42,86	3,53	49,92
OR 4175	224	44,04	3,53	51,10
OR 149	-	44,45	3,53	51,51
OR 150	-	46,04	3,53	53,10
OR 4187	225	47,22	3,53	54,28
OR 152	-	47,63	3,53	54,69
OR 153	-	49,21	3,53	56,27
OR 4200	226	50,39	3,53	57,45
OR 155	-	50,80	3,53	57,86
OR 156	-	52,39	3,53	59,45
OR 4212	227	53,57	3,53	60,63
OR 158	-	53,98	3,53	61,04
OR 159	-	55,56	3,53	62,62
OR 4225	228	56,74	3,53	63,80
OR 161	-	57,15	3,53	64,21
OR 162	-	58,74	3,53	65,80
OR 4237	229	59,92	3,53	66,98

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CAGLIARI
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CATANIA
CHIETI
COMO
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CREMONA
CUNEO
FERRARA

FIRENZE
FORLI
FROSINONE
GENOVA
LA SPEZIA
LATINA
LECCE
LIVORNO
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MANTOVA
MASSA CARRARA
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VALVES INDEX



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