



FD...type Balanced Valve

FD...2XJ....type

Sizes 12, 16, 25, 32
Max. Working Pressure: 315 bar
Max. Flow: 560 L/min



Contents

Function and configuration	02
Curcuit examples	03
Symbols	04
Specification	04
Technical data	05
Characteristic curves	05
Unit dimensions	06-11

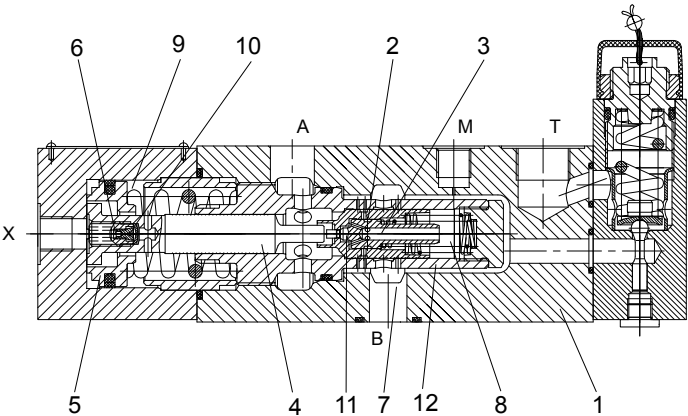
Features

- Installation in manifolds (cartridge valve)
- With SAE flange ports
- Sub-plate connection or block, porting pattern to DIN 24340 form D, ISO 5781 and CETOP-RP121 H
- Check valve pilot operated (leakage-free)
- The check-Q-meter controls the returning flow QV2 in relation to the flow Qv1 in the inlet port of actuator. For the application in cylinders system, the area ratio ($QV2 = QV1 \Phi$) has to be taken into account
- Bypass valve, free flow in opposite direction
- Safety valve, optional

Function and configuration

FD type valve is used to prevent runaway of hydraulic cylinder and motor in hydraulic system. It can also prevent pipe bursting.

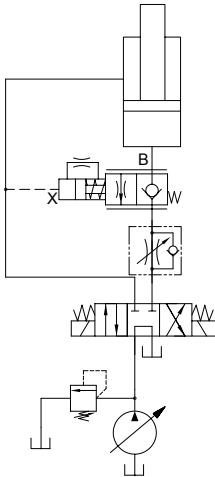
The valve consists of the housing (1), main poppet (2), pilot part (3), steel ball(11), pilot spool (4), spring seat (5) and damping (6). When load is lifted, fluid flows from A to B, the main spool (2) is opened. If pipe is cracked caused by the system, main spool (2) closes immediately as chamber (8) is connected with load pressure.



Circuit examples

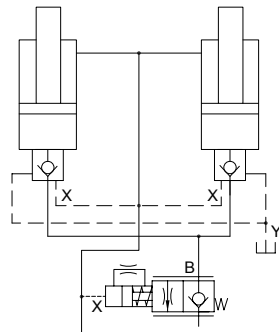
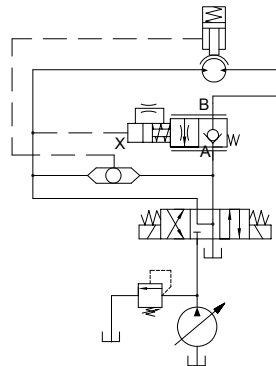
• Cylinder with single rod

On safety grounds, a closed in-between position directional valve should always be used!



• Hydraulic motor

To make sure that brake can be operated, both of the directional valve ports have to be connected to the tank in the in-between position. If the brake is externally unloaded then it is possible to use a closed in-between position directional valve.



Symbols

Without safety valve		With safety valve
Type of valve: FD12KA-1XJ/B30... FD16KA-1XJ/B30... FD25KA-1XJ/B40... FD32KA-1XJ/B60...		Type of valve: FD12PA-1XJ/B30... FD12FA-1XJ/B30... FD16PA-1XJ/B30... FD16FA-1XJ/B30... FD25PA-1XJ/B40... FD25FA-1XJ/B40... FD32PA-1XJ/B60... FD32FA-1XJ/B60...
Type of valve: FD12FB-1XJ/B30... FD16FB-1XJ/B30... FD25FB-1XJ/B40... FD32FB-1XJ/B60...		

Specification

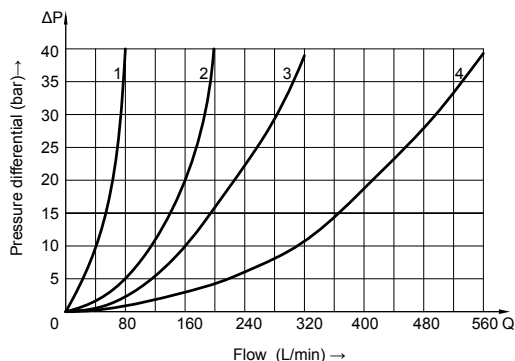
	FD		10J			*
Balanced valve						Further details in clear text
Nominal size 12	= 12					No code = NBR seals
Nominal size 16	= 16					V = FKM seals
Nominal size 25	= 25					
Nominal size 32	= 32					
Cartridge valve	= KA					External connection threaded connection (X, M, T)
Sub-plate mounting	= PA					No code = Inch thread
Flange connections without safety valve	= FA					2 = Metric thread
Flange connections with safety valve	= FB					
Series 10J to 19J	=10J					B00 = Without orifice
(10J to 19J: unchanged installation and connection dimensions)						B30 = Orifice Ø 0.3 mm (sizes 12 and 16)
						B40 = Orifice Ø 0.4 mm (size 25)
						B60 = Orifice Ø 0.6 mm (size 32)
						(other orifice diameters on request)
Pressure setting range of safety valve						
Pressure setting up to 200 bar	=20					
Pressure setting up to 300 bar	=30					
Pressure setting up to 400 bar	=40					

Technical data

Operating pressure, ports A, X	bar	to 350
Operating pressure, port B	bar	to 420
Pilot pressure, port X (flow control range)	bar	min.20~60, max.350
Cracking pressure, A to B	bar	2
Setting pressure for secondary pressure relief valve	bar	to 400
Flow -rate	L/min	80(size 12),200(size 16),320(size 25),560(size 32)
Area ratio of the pre-opening	$\frac{\text{poppet seat area}}{\text{area of pilot spool}} = \frac{1}{20}$	
Fluid	Mineral oil, phosphate ester	
Fluid temperature range	°C	-20 to +80
Viscosity range	mm ² /s	10 to 800
Degree of contamination	Maximum permissible degree of fluid contamination: Class 9. NAS 1638 or 20/18/15, ISO4406	

Characteristic curves (Measured at t=40°C ±5°C, using HLP46)

04



Pressure differential
Pin relation to flow Q,
measured at throttle position:

Throttle fully open (Px=60bar)

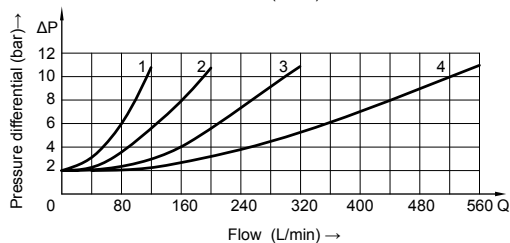
B to A

1 = size 12

2 = size 16

3 = size 25

4 = size 32



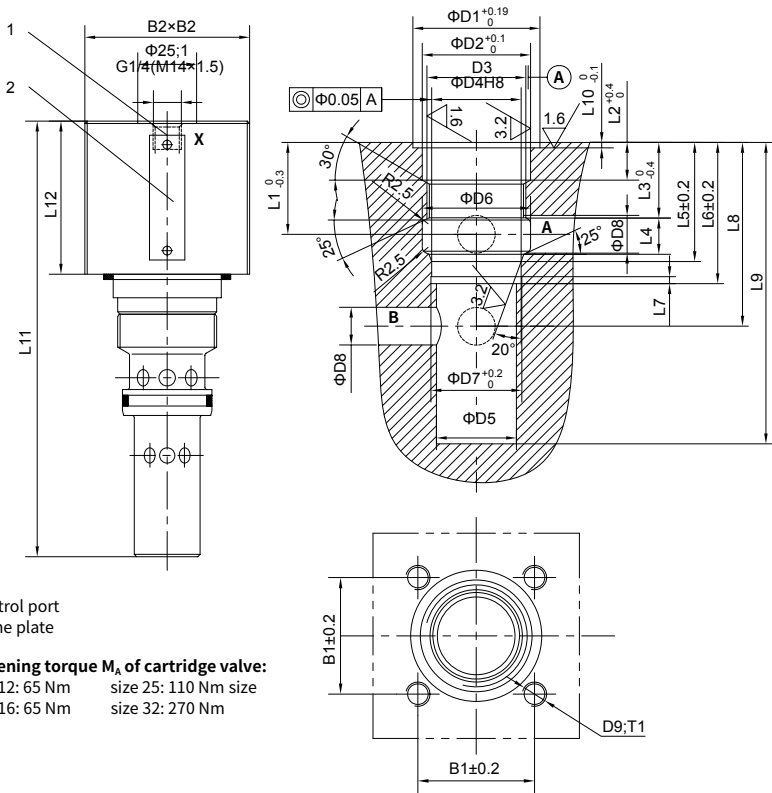
Pressure differential Pin
in relation to flow Q,
measured over the
check valve.

A to B

Unit dimensions

(Dimensions in mm)

• Installation in manifolds (cartridge valve)



1 Control port
2 Name plate

Tightening torque M_k of cartridge valve:
size 12: 65 Nm size 25: 110 Nm size
16: 65 Nm size 32: 270 Nm

Type	B1	B2	D1	D2	D3	D4	D5	D6	D7	D8	D9	T1	L1	L2	L3	L4	L5
FD12KA	48	70	54	46	M42×2	38	34	46	38.6	16	M10	16	39	16	32	15.5	50.5
FD16KA	48	70	54	46	M42×2	38	34	46	38.6	16	M10	16	39	16	32	15.5	50.6
FD25KA	56	80	60	54	M52×2	48	40	60	48.6	25	M12	19	50	19	39	22	65
FD32KA	66	95	72	65	M64×2	58	52	74	58.6	30	M16	23	52	19	40	25	71

Type	L6	L7	L8	L9	L10	L11	L12	valve fixing screws/Tighting torque	M_k (Nm)	Weight
FD12KA	60	3	78	128	2.3	191	65	4 pcs M10×70 GB/T70.1-10.9	69	3.5kg
FD16KA	60	3	78	128	2.3	191	65	4 pcs M10×70 GB/T70.1-10.9	69	3.5kg
FD25KA	80	4	105	182	2.3	253	75	4 pcsM12×80 GB/T70.1-10.9	120	5.6kg
FD32KA	85	4	115	198	2.3	289	94	4 pcsM16×100 GB/T70.1-10.9	295	8.0kg

(Dimensions in mm)

-
- Technical drawing of a mechanical assembly, showing two views (top and side) with dimensions and labels.
- Top View Dimensions:**
- Overall width: $L6$
 - Overall height: $H2$
 - Distance from left edge to centerline: $L2$
 - Distance from centerline to right edge: $L2$
 - Distance from top edge to centerline: $H1$
 - Distance from centerline to bottom edge: $H1$
 - Distance from left edge to feature X: $L4$
 - Distance from centerline to feature X: $L5$
 - Distance from top edge to feature X: $B1$
 - Distance from centerline to feature X: $B1$
 - Distance from left edge to feature X: $L1$
 - Distance from centerline to feature X: $L2$
 - Distance from top edge to feature X: $B3$
 - Distance from centerline to feature X: $B4$
 - Distance from left edge to feature X: $L3$
 - Distance from centerline to feature X: $L2$
 - Distance from top edge to feature X: $B2$
 - Distance from centerline to feature X: $B2$
- Side View Dimensions:**
- Overall width: $L6$
 - Overall height: $H2$
 - Distance from left edge to centerline: $L2$
 - Distance from centerline to right edge: $L2$
 - Distance from top edge to centerline: $H1$
 - Distance from centerline to bottom edge: $H1$
 - Distance from left edge to feature X: $L4$
 - Distance from centerline to feature X: $L5$
 - Distance from top edge to feature X: $B1$
 - Distance from centerline to feature X: $B1$
 - Distance from left edge to feature X: $L1$
 - Distance from centerline to feature X: $L2$
 - Distance from top edge to feature X: $B3$
 - Distance from centerline to feature X: $B4$
 - Distance from left edge to feature X: $L3$
 - Distance from centerline to feature X: $L2$
 - Distance from top edge to feature X: $B2$
 - Distance from centerline to feature X: $B2$
- Labels and Features:**
- 1:** Feature X (top view)
 - 2:** Feature M (top view)
 - 3:** Feature A (side view)
 - 4:** Feature B (side view)
 - 5:** Feature C (side view)
 - 6:** Feature D (side view)
 - 7:** Feature E (side view)
 - 8:** Feature F (side view)
 - 9:** Feature G (side view)
 - 10:** Feature H (side view)
 - 11:** Feature I (side view)
 - 12:** Feature J (side view)
 - 13:** Feature K (side view)
 - 14:** Feature L (side view)
 - 15:** Feature M (side view)
 - 16:** Feature N (side view)
 - 17:** Feature O (side view)
 - 18:** Feature P (side view)
 - 19:** Feature Q (side view)
 - 20:** Feature R (side view)
 - 21:** Feature S (side view)
 - 22:** Feature T (side view)
 - 23:** Feature U (side view)
 - 24:** Feature V (side view)
 - 25:** Feature W (side view)
 - 26:** Feature X (side view)
 - 27:** Feature Y (side view)
 - 28:** Feature Z (side view)
 - 29:** Feature AA (side view)
 - 30:** Feature AB (side view)
 - 31:** Feature AC (side view)
 - 32:** Feature AD (side view)
 - 33:** Feature AE (side view)
 - 34:** Feature AF (side view)
 - 35:** Feature AG (side view)
 - 36:** Feature AH (side view)
 - 37:** Feature AI (side view)
 - 38:** Feature AJ (side view)
 - 39:** Feature AK (side view)
 - 40:** Feature AL (side view)
 - 41:** Feature AM (side view)
 - 42:** Feature AN (side view)
 - 43:** Feature AO (side view)
 - 44:** Feature AP (side view)
 - 45:** Feature AQ (side view)
 - 46:** Feature AR (side view)
 - 47:** Feature AS (side view)
 - 48:** Feature AT (side view)
 - 49:** Feature AU (side view)
 - 50:** Feature AV (side view)
 - 51:** Feature AW (side view)
 - 52:** Feature AX (side view)
 - 53:** Feature AY (side view)
 - 54:** Feature AZ (side view)
 - 55:** Feature BA (side view)
 - 56:** Feature BB (side view)
 - 57:** Feature BC (side view)
 - 58:** Feature BD (side view)
 - 59:** Feature BE (side view)
 - 60:** Feature BF (side view)
 - 61:** Feature BG (side view)
 - 62:** Feature BH (side view)
 - 63:** Feature BI (side view)
 - 64:** Feature BJ (side view)
 - 65:** Feature BK (side view)
 - 66:** Feature BL (side view)
 - 67:** Feature BM (side view)
 - 68:** Feature BN (side view)
 - 69:** Feature BO (side view)
 - 70:** Feature BP (side view)
 - 71:** Feature BQ (side view)
 - 72:** Feature BR (side view)
 - 73:** Feature BS (side view)
 - 74:** Feature BT (side view)
 - 75:** Feature BU (side view)
 - 76:** Feature BV (side view)
 - 77:** Feature BW (side view)
 - 78:** Feature BX (side view)
 - 79:** Feature BY (side view)
 - 80:** Feature BZ (side view)
 - 81:** Feature CA (side view)
 - 82:** Feature CB (side view)
 - 83:** Feature CC (side view)
 - 84:** Feature CD (side view)
 - 85:** Feature CE (side view)
 - 86:** Feature CF (side view)
 - 87:** Feature CG (side view)
 - 88:** Feature CH (side view)
 - 89:** Feature CI (side view)
 - 90:** Feature CJ (side view)
 - 91:** Feature CK (side view)
 - 92:** Feature CL (side view)
 - 93:** Feature CM (side view)
 - 94:** Feature CN (side view)
 - 95:** Feature CO (side view)
 - 96:** Feature CP (side view)
 - 97:** Feature CQ (side view)
 - 98:** Feature CR (side view)
 - 99:** Feature CS (side view)
 - 100:** Feature CT (side view)
 - 101:** Feature CU (side view)
 - 102:** Feature CV (side view)
 - 103:** Feature CW (side view)
 - 104:** Feature CX (side view)
 - 105:** Feature CY (side view)
 - 106:** Feature CZ (side view)
 - 107:** Feature DA (side view)
 - 108:** Feature DB (side view)
 - 109:** Feature DC (side view)
 - 110:** Feature DD (side view)
 - 111:** Feature DE (side view)
 - 112:** Feature DF (side view)
 - 113:** Feature DG (side view)
 - 114:** Feature DH (side view)
 - 115:** Feature DI (side view)
 - 116:** Feature DJ (side view)
 - 117:** Feature DK (side view)
 - 118:** Feature DL (side view)
 - 119:** Feature DM (side view)
 - 120:** Feature DN (side view)
 - 121:** Feature DO (side view)
 - 122:** Feature DP (side view)
 - 123:** Feature DQ (side view)
 - 124:** Feature DR (side view)
 - 125:** Feature DS (side view)
 - 126:** Feature DT (side view)
 - 127:** Feature DU (side view)
 - 128:** Feature DV (side view)
 - 129:** Feature DW (side view)
 - 130:** Feature DX (side view)
 - 131:** Feature DY (side view)
 - 132:** Feature DZ (side view)
 - 133:** Feature EA (side view)
 - 134:** Feature EB (side view)
 - 135:** Feature EC (side view)
 - 136:** Feature ED (side view)
 - 137:** Feature EE (side view)
 - 138:** Feature EF (side view)
 - 139:** Feature EG (side view)
 - 140:** Feature EH (side view)
 - 141:** Feature EI (side view)
 - 142:** Feature EJ (side view)
 - 143:** Feature EK (side view)
 - 144:** Feature EL (side view)
 - 145:** Feature EM (side view)
 - 146:** Feature EN (side view)
 - 147:** Feature EO (side view)
 - 148:** Feature EP (side view)
 - 149:** Feature EQ (side view)
 - 150:** Feature ER (side view)
 - 151:** Feature ES (side view)
 - 152:** Feature ET (side view)
 - 153:** Feature EU (side view)
 - 154:** Feature EV (side view)
 - 155:** Feature EW (side view)
 - 156:** Feature EX (side view)
 - 157:** Feature EY (side view)
 - 158:** Feature EZ (side view)
 - 159:** Feature FA (side view)
 - 160:** Feature FB (side view)
 - 161:** Feature FC (side view)
 - 162:** Feature FD (side view)
 - 163:** Feature FE (side view)
 - 164:** Feature FF (side view)
 - 165:** Feature FG (side view)
 - 166:** Feature FH (side view)
 - 167:** Feature FI (side view)
 - 168:** Feature FJ (side view)
 - 169:** Feature FK (side view)
 - 170:** Feature FL (side view)
 - 171:** Feature FM (side view)
 - 172:** Feature FN (side view)
 - 173:** Feature FO (side view)
 - 174:** Feature FP (side view)
 - 175:** Feature FQ (side view)
 - 176:** Feature FR (side view)
 - 177:** Feature FS (side view)
 - 178:** Feature FT (side view)
 - 179:** Feature FU (side view)

Operating pressure 420bar Flange mounting screws and blanking flange are included within the scope of supply.

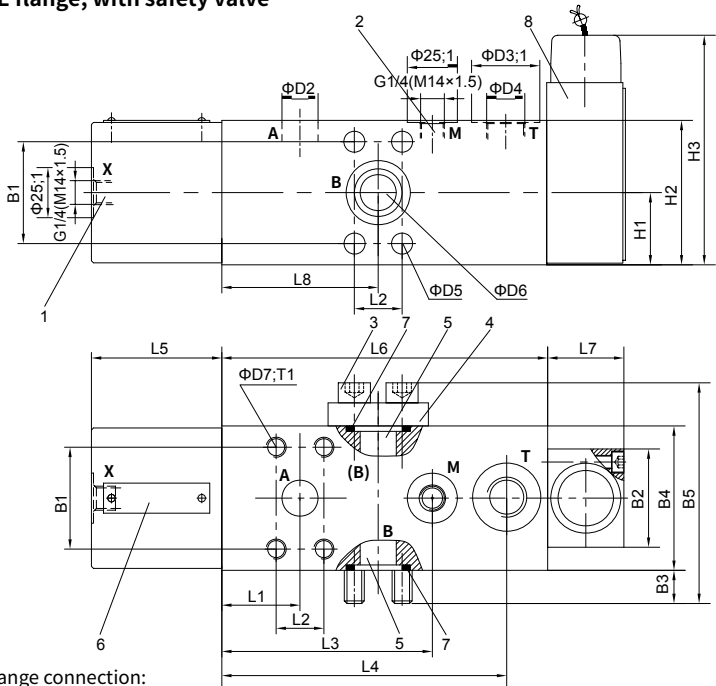
- | Type | B1 | B2 | B3 | B4 | D1 | D2 | D3 | D4 | D5 | H1 | H2 | L1 | L2 | L3 | L4 |
|--------|------|-------------|-----|-----|----|----|------|----|-----|----|-----|----|------|-----|----|
| FD12FA | 50.8 | <u>16.5</u> | 72 | 110 | 43 | 18 | 10.5 | 18 | M10 | 36 | 72 | 39 | 23.8 | 105 | 65 |
| FD16FA | 50.8 | 16.5 | 72 | 110 | 43 | 18 | 10.5 | 18 | M10 | 36 | 72 | 39 | 23.8 | 105 | 65 |
| FD25FA | 57.2 | <u>14.5</u> | 90 | 132 | 50 | 25 | 13.5 | 25 | M12 | 45 | 90 | 50 | 27.8 | 148 | 75 |
| FD32FA | 66.7 | 20 | 105 | 154 | 56 | 30 | 15 | 30 | M14 | 50 | 105 | 52 | 31.8 | 155 | 94 |

Type	L5	L6	T1	Weight	O-ring(7)	Valve fixing screws
FD12FA	140	78	15	7.2kg	25×3.5	4 pcs M10×100 GB/T70.1-10.9
FD16FA	140	78	15	7.2kg	25×3.5	4 pcs M10×100 GB/T70.1-10.9
FD25FA	200	105	18	16kg	32.92×3.53	4 pcs M12×120 GB/T70.1-10.9
FD32FA	215	115	21	23kg	37.7×3.53	4 pcs M14×140 GB/T70.1-10.9

Unit dimensions

(Dimensions in mm)

• SAE flange, with safety valve



SAE flange connection:

Operating pressure 420bar

Flange mounting screws and blanking flange are included within the scope of supply.

- 1 Control port 2 Measuring port 3 Flange fixing screws 4 Cover
5 Optional port B 6 Name plate 7 O-ring 8 Safety valve

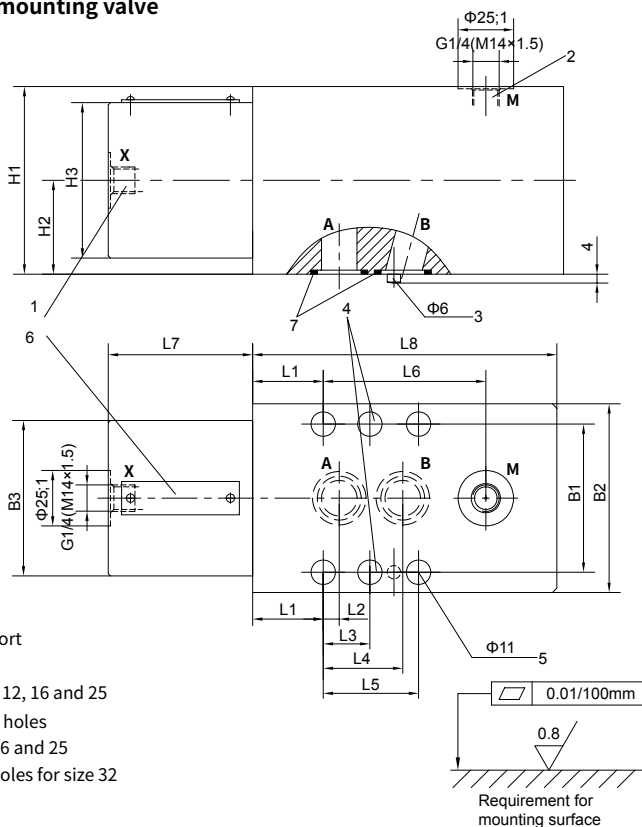
Type	B1	B2	B3	B4	B5	D1	D2	D3	D4		D5	D6	D7	H1	H2	H3	L1
									Inch	Metric							
FD12FB	50.8	49	16.5	72	110	43	18	34	G1/2	M22×1.5	10.5	18	M10	36	72	118	39
FD16FB	50.8	49	16.5	72	110	43	18	34	G1/2	M22×1.5	10.5	18	M10	36	72	118	39
FD25FB	57.2	78	14.5	90	132	50	25	42	G3/4	M27×2	13.5	25	M12	45	90	145	50
FD32FB	66.7	78	20	105	154	56	30	42	G3/4	M27×2	15	30	M14	50	105	145	52

Type	L2	L3	L4	L5	L6	L7	L8	T1	Weight	O-ring(7)	valve fixing screws
FD12FB	23.8	105	141.5	65	162	38	78	15	9kg	25×3.5	4 pcs M10×100
FD16FB	23.8	105	141.5	65	162	38	78	15	9kg	25×3.5	4 pcs M10×100
FD25FB	27.8	148	198	75	225	50	105	18	20kg	32.92×3.53	4 pcs M12×120
FD32FB	31.8	155	215	94	240	50	115	21	28kg	37.7×3.53	4 pcs M14×140

Unit dimensions

(Dimensions in mm)

• Sub-plate mounting valve



Type	B1	B2	B3	H1	H2	H3	L1	L2	L3	L4	L5	L6
FD12PA	66.7	85	70	85	42.5	70	31.8	7.2	-	35.8	42.9	73.2
FD16PA	66.7	85	70	85	42.5	70	31.8	7.2	-	35.8	42.9	73.2
FD25PA	79.4	100	80	100	50	80	38.9	11.1	-	49.2	60.3	109.1
FD32PA	96.8	120	95	120	60	95	35.3	16.7	42.1	67.5	84.2	119.7

Type	L7	L8	Valve fixing screws/tightening torque	M _A (Nm)	Weight	O-ring(7)
FD12PA	65	140	4 pcs M10×100 GB/T70.1-10.9	75	9.3kg	21.3×2.4
FD16PA	65	140	4 pcs M10×100 GB/T70.1-10.9	75	9.3kg	21.3×2.4
FD25PA	75	200	4 pcs M10×120 GB/T70.1-10.9	75	18kg	29.82×2.62
FD32PA	94	215	6 pcs M10×140 GB/T70.1-10.9	75	28kg	38×3