

**MANNESMANN  
REXROTH**

**Pump Safety Block  
Model DBA... / DBAW, Series 1X**

**RA  
25 880/04.95**  
Replaces: 04.93

Sizes 10 to 40

... 6100 PSI  
(420 bar)

... 171 GPM  
(650 L/min)

- Permits low pressure start-up and by-pass of pump
- Direct mounting to SAE pressure port of pump
- Light biasing spring provides low by-pass pressure
- Small compression volume, permits smooth transition to by-pass mode
- Rapid pressure build up
- 4 control options:
  - Hand knob
  - Hex screw with protective cap
  - Lockable rotary knob with scale
  - Hand knob with scale
- 6 pressure ratings
- Solenoid operated unloading via mounted directional valve
- Integral check valve (optional)
- Soft-shift plate (optional) (model DBAW... only)



H/3450/92  
Model DBA25F2-1X/...



H/A3448/92  
Model DBAW25F2-1X/...6A...Z4

**Functional description**

Pump safety valves, models DBA/DBAW are pilot operated pressure relief valves integrated within a sandwich block, which may be mounted directly on to pump SAE pressure ports. DBA valves are used to limit system pressure, and DBAW valves are additionally equipped with solenoid unloading.

The pump safety valves (DBA) consist basically of a valve body (1), main cartridge insert (3) and pilot valve (2) with pressure adjustment. The valve housing is comprised of port "P" for fluid input and port "P1" for output. When cartridge (3) is open, the connection to port "T" (tank line) is open.

**Pump Safety Valve Model DBA**

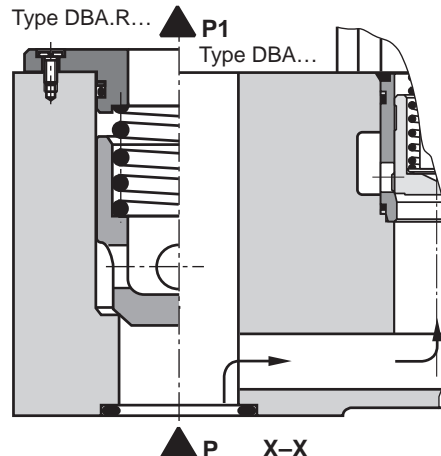
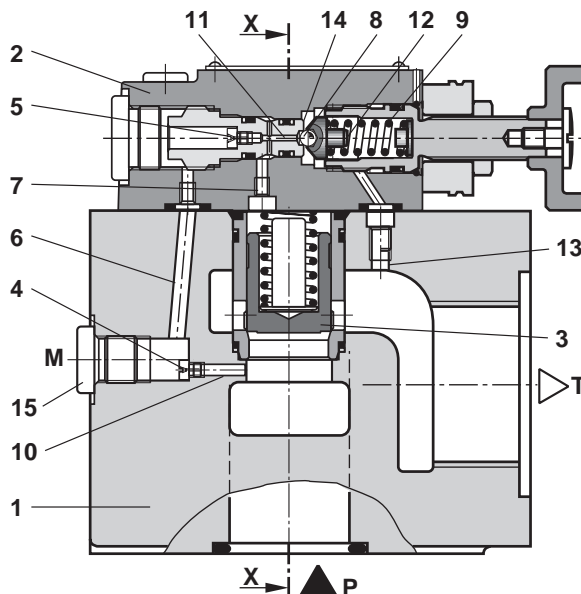
Pressure at "P" acts against the bottom of main cartridge (3). Simultaneously, pressure signals are available through drillings (6) and (7), incorporating orifices (4) and (5) to the spring side of the

main cartridge (3), and poppet (8) in pilot valve (2). If pressure at "P" exceeds the force value at spring (9), poppet (8) opens.

A pilot signal is fed internally via control drillings (10) and (6) from "P". As main cartridge (3) opens, fluid escapes via orifice (7) past poppet (8) into spring chamber (12). The pilot is drained either internally (type DBA...-1X/... ) via drilling (13), or externally (type DBA...-1X/..Y..) via drilling (14) to tank. Orifices (4) and (5) create a pressure drop at main cartridge (3). Fluid flows from port P to port T while the set pressure is maintained. A pressure gauge can be used for remote control applications, at port "M".

**Pump Safety Valve Model DBAR (with check valve)**

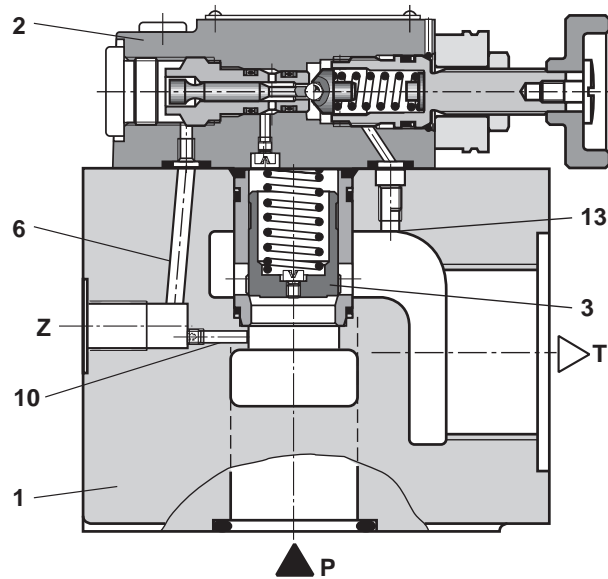
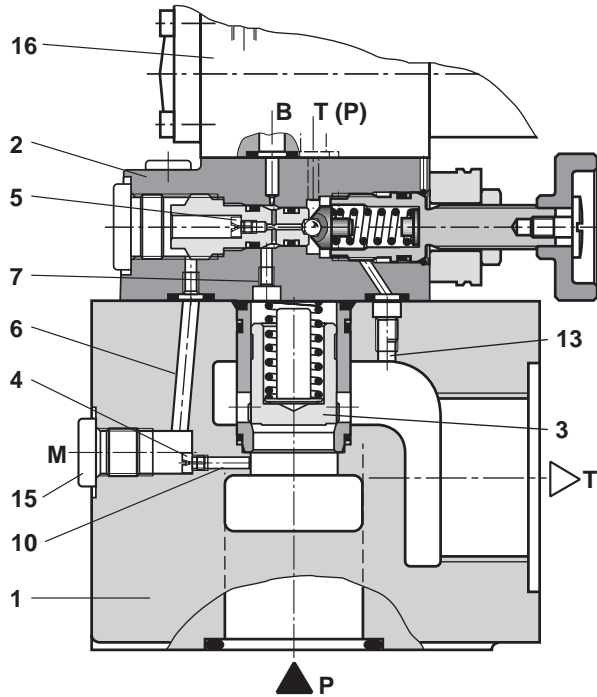
A check valve may be integrated into the housing also, reducing the number of components, installation area, and the length of mounting bolts.



## Functional description

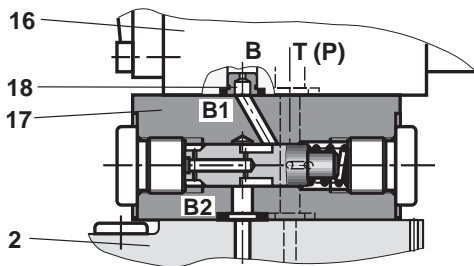
### Pump Safety Valve, Model DBA.../...Z...

In principle, the operation of this version is the same as the DBA... However, it can also be controlled via port "Z" by means of external pressure. The pilot valve features a 10% switching pressure differential, so that when operating an accumulator via port "Z" a pressure drop of 10% occurs before the main valve closes again.



### Pump Safety Valve Model DBAW...

In principle, the operation of this valve is the same as the DBA... However, unloading at main cartridge (3) is achieved by actuating a directional unloading valve (16).

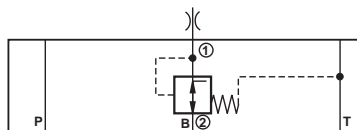


### Pump Safety Valve with Soft Shift

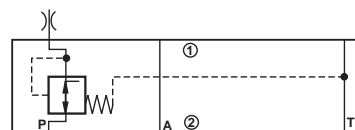
(Sandwich plate) • Model DBAW.../...S6.R12  
• Model DBAW.../...S6SL..B12

Soft shift plate (17) can be optionally installed to aid in smooth unloading. The decompression of pilot oil via B2 to B1 and further by orifice (18) permits a dampened transition during unloading. Shock caused by rapid opening can be drastically reduced.

The degree of damping (decompression shock) is determined by the size of orifice (18). A 1.2 mm diameter orifice is installed standard (order code ..R12.. or ..B12..).



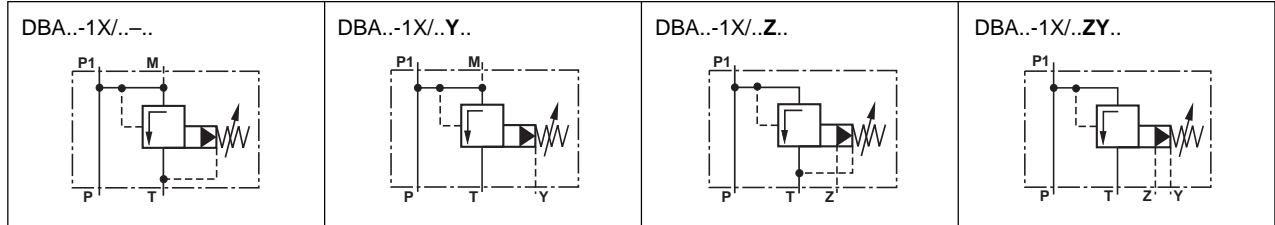
Model DBAW.../...S6.R12



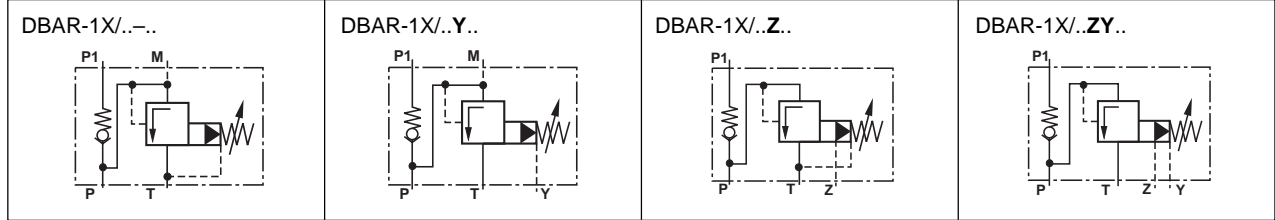
Model DBAW.../...S6SL..B12

### Symbols

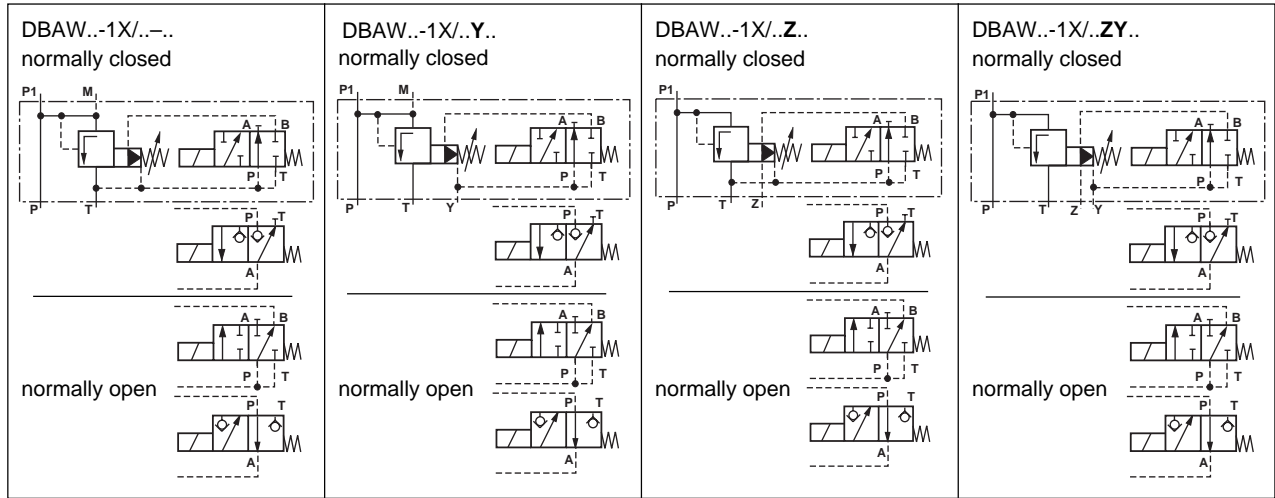
#### Pump safety relief



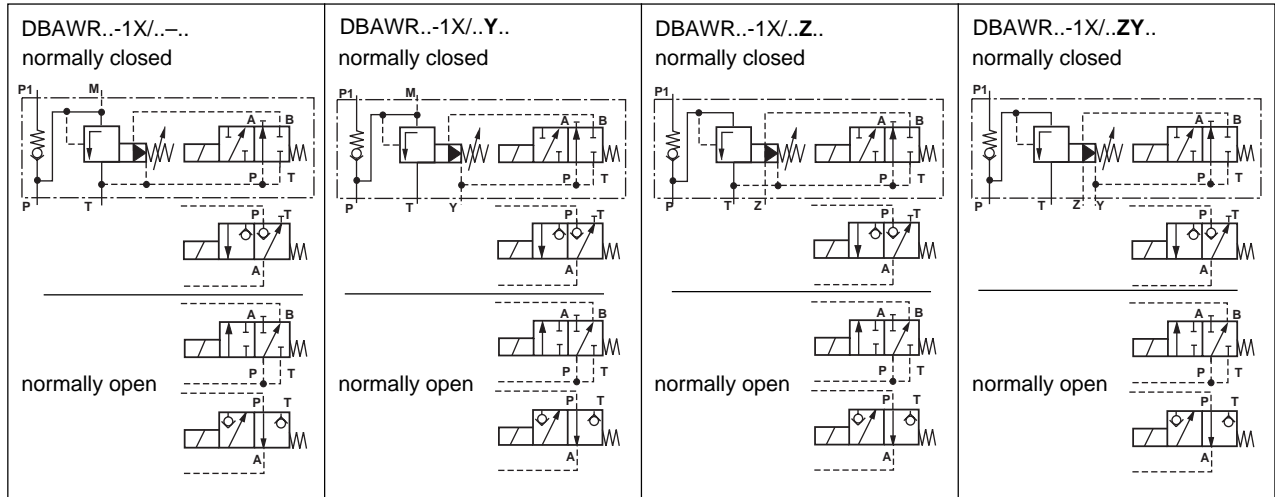
#### Pump safety relief with check



#### Pump safety relief with directional unloading



#### Pump safety relief with directional unloading and check valve



**Technical data** (for applications outside these parameters please consult us)

**General**

Installation position			Optional				
Weight			Size 10	Size 16	Size 25	Size 32	Size 40
– Pump safety valve	DBA	lbs. (kg)	14 (6.4)	14 (6.4)	15 (6.7)	18 (8)	25 (11.4)
	DBAW	lbs. (kg)	16.8 (7.6)	16.8 (7.6)	18 (8)	20.3 (9.2)	27.8 (12.6)
– Check valve		lbs. (kg)	+ 0.25 (+ 0.1)	+ 0.35 (+ 0.15)	+ 0.5 (+ 0.25)	+ 0.7 (+ 0.3)	+ 0.9 (+ 0.4)
– Pressure shock damping		lbs. (kg)	+ 1.3 (+ 0.6) (with directional spool valve)				
		lbs. (kg)	+ 1.3 (+ 0.6) (with directional poppet valve)				
Technical data for directional spool valve			See data sheet RA 23 177				
Technical data for directional poppet valve			See data sheet RA 22 057				

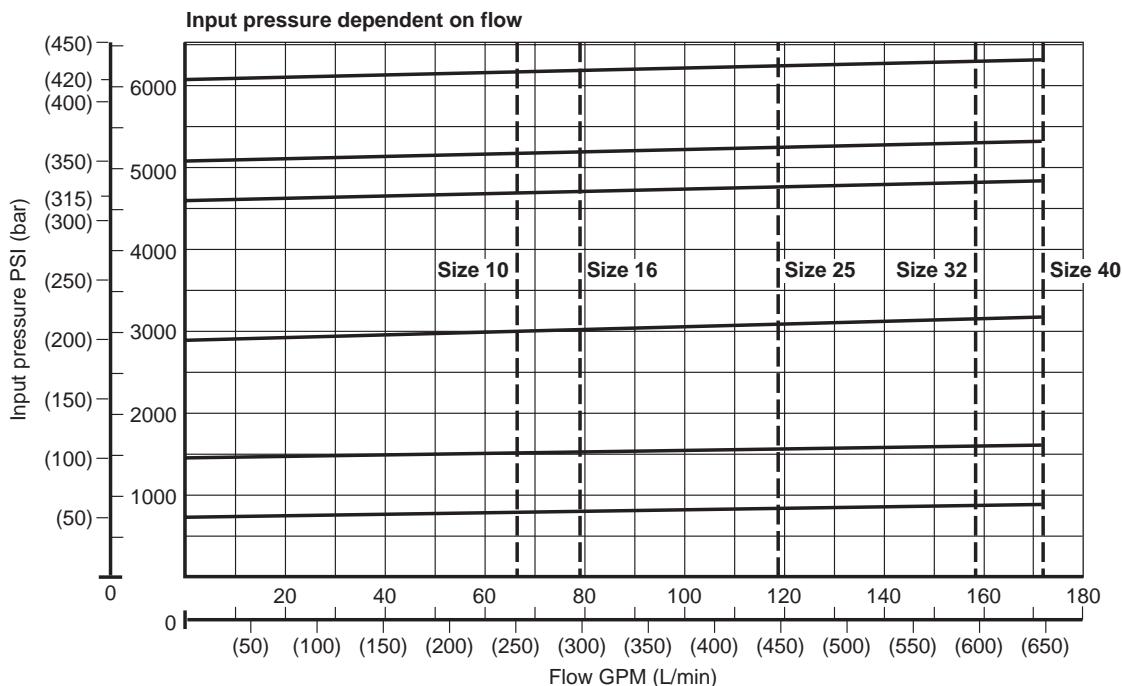
**Hydraulic**

Operating pressure, ports P, T, Z	PSI (bar)	up to 6100 (420)					
Opening pressure (for DBAR...)	PSI (bar)	1 (0.5)					
Back pressure, port Y	DBA	PSI (bar)	up to 4600 (315)				
	DBAW	PSI (bar)	up to 2300 (160) for DC and up to 1450 (100) for AC solenoids				
Setting pressure	min.	PSI (bar)	Flow-dependent (see Technical Data page 4)				
	max.	PSI (bar)	...725 (50), ...1450 (100), ...3000 (210), ...4600 (315), ... 5100 (350), ...6100 (420)				
Flow, max			Size 10	Size 16	Size 25	Size 32	Size 40
	DBA / DBAW	GPM (L/min)	66 (250)	79 (300)	119 (450)	158 (600)	172 (650)
	DBAR / DBAWR	GPM (L/min)	39 (150)	39 (150)	79 (300)	92 (350)	119 (450)
Hydraulic fluid		Mineral oil (HL, HLP) to DIN 51 524; phosphate-ester (HFD-R)					
Fluid temperature range		°F (°C)	–22 to 176 (–30 to +80) (with NBR seals)				
			–4 to 176 (–20 to +80) (with Viton seals)				
Viscosity range	SUS (mm <sup>2</sup> /s)	60 to 3710 (10 to 800)					
Fluid cleanliness		Maximum permissible degree of contamination of fluid to NAS 1638 Class 10. We, therefore, recommend a filter with a minimum retention rate of $\beta_{20} \geq 75$ . To ensure a long service life, we recommend a maximum permissible degree of contamination of fluid to NAS 1638 Class 9. We, therefore, recommend a filter with a minimum retention rate of $\beta_{10} \geq 100$ .					

**Operating curves, measured at  $v = 190$  SUS (41 mm<sup>2</sup>/s) and  $t = 122$  °F (50 °C)**

The curves are measured with **external pilot oil drain at zero pressure.**

With internal pilot oil return the input pressure is increased by the back pressure present at port T.

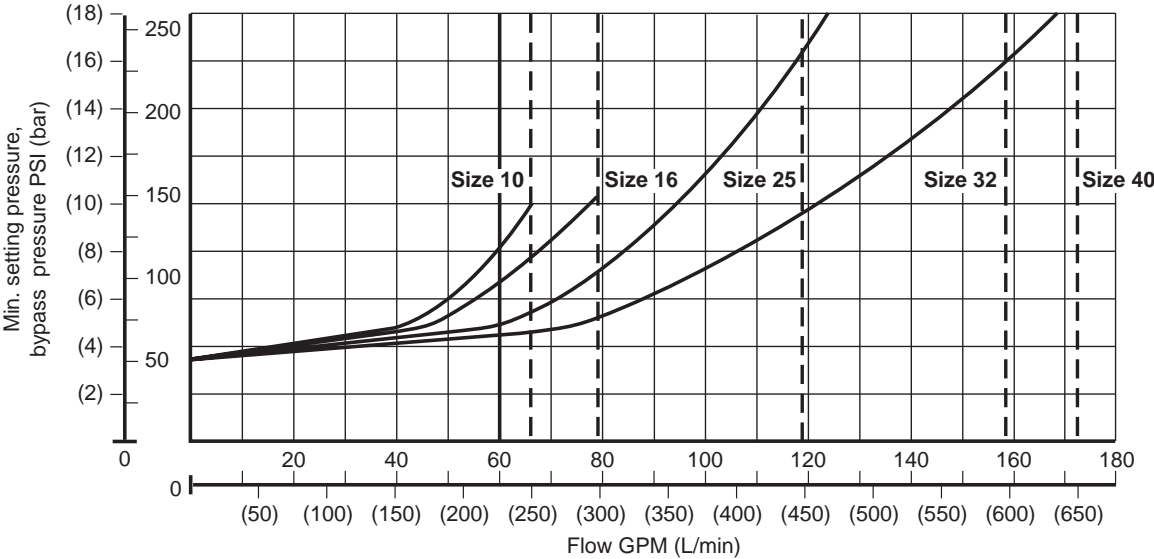


(The curves are valid for an outlet pressure of  $p_T = 0$  over the entire flow range)

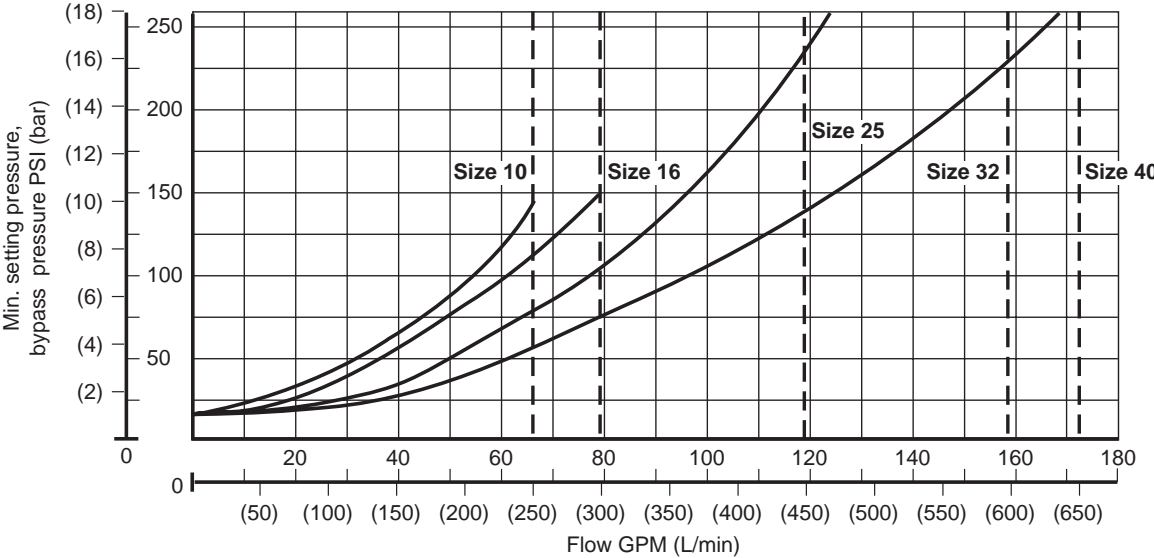
**Operating curves, measured at  $v = 190 \text{ SUS}$  ( $41 \text{ mm}^2/\text{s}$ ) and  $t = 122 \text{ }^\circ\text{F}$  ( $50 \text{ }^\circ\text{C}$ )**

The curves are measured with **external pilot oil drain at zero pressure**.  
With internal pilot oil return the input pressure is increased by the back pressure present at port T.

**Minimum setting pressure and bypass pressure dependent on flow**  
Standard model

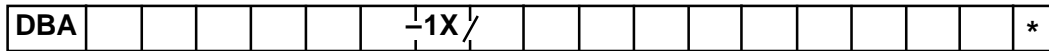


**Minimum setting pressure and bypass pressure dependent on flow**  
Model "U"



(The curves are valid for an outlet pressure of  $p_T = 0$  over the entire flow range)

**Order codes**



**Without** = No code  
directional valve  
**With** = W<sup>1</sup>  
mounted  
directional valve

**With check valve** = R<sup>5</sup>  
**Without** = No code  
**check valve**

**Size**  
Size 10 = 10  
Size 16 = 15  
Size 25 = 25  
Size 32 = 30  
Size 40 = 40

Normally closed = A<sup>1</sup>  
Normally open = B<sup>1</sup>

**Connection / SAE flange** <sup>4</sup>

Standard pressure series = F  
High pressure series = H

**Adjustment mechanism**

Hand knob = 1  
Adjustment screw with protective cap = 2  
Lockable hand knob with scale = 3<sup>2</sup>  
Hand knob with scale = 7

Series 10 to 19 = 1X  
(10 to 19: externally interchangeable)

Pressure setting to 725 PSI (50 bar) = 50  
Pressure setting to 1450 PSI (100 bar) = 100  
Pressure setting to 3000 PSI (210 bar) = 200  
Pressure setting to 4600 PSI (315 bar) = 315  
Pressure setting to 5100 PSI (350 bar) = 350  
Pressure setting to 6100 PSI (420 bar) = 420  
(model "H" only)

**Pilot oil supply and drain**

Internal pilot (standard) = — <sup>1</sup>  
External pilot = Z  
With external drain = Y  
With external pilot and drain = ZY

Standard model = No code  
Valve for minimum opening pressure = U  
Model "U" not suitable as cross port relief valve

**Without** soft-shift plate = No code  
**With** soft-shift plate (model DBAW only) = S

Further details  
to be written  
in clear text

**No code** = NBR  
seals, suitable  
for mineral oil  
(HL, HLP)  
to DIN 51 524  
**V** = FPM seals,  
suitable for  
phosphate-ester  
(HFD-R)

**R12<sup>3</sup>** = 1.2 mm dia.  
orifices in port B  
of the directional  
spool valve

**B12<sup>3</sup>** = 1.2 mm dia.  
orifices in port P  
of directional  
poppet valve

**Type of electrical connection**  
(for further electrical connections  
see data sheet RA 08 000)

**Z45<sup>1</sup>** = Angled plug  
**Z55<sup>1</sup>** = Large angled plug  
**Z55L<sup>1</sup>** = Large angled plug  
with light  
**DA<sup>1</sup>** = conduit box with 1/2"  
npt connection  
**DAL<sup>1</sup>** = conduit box with 1/2"  
npt connection and light

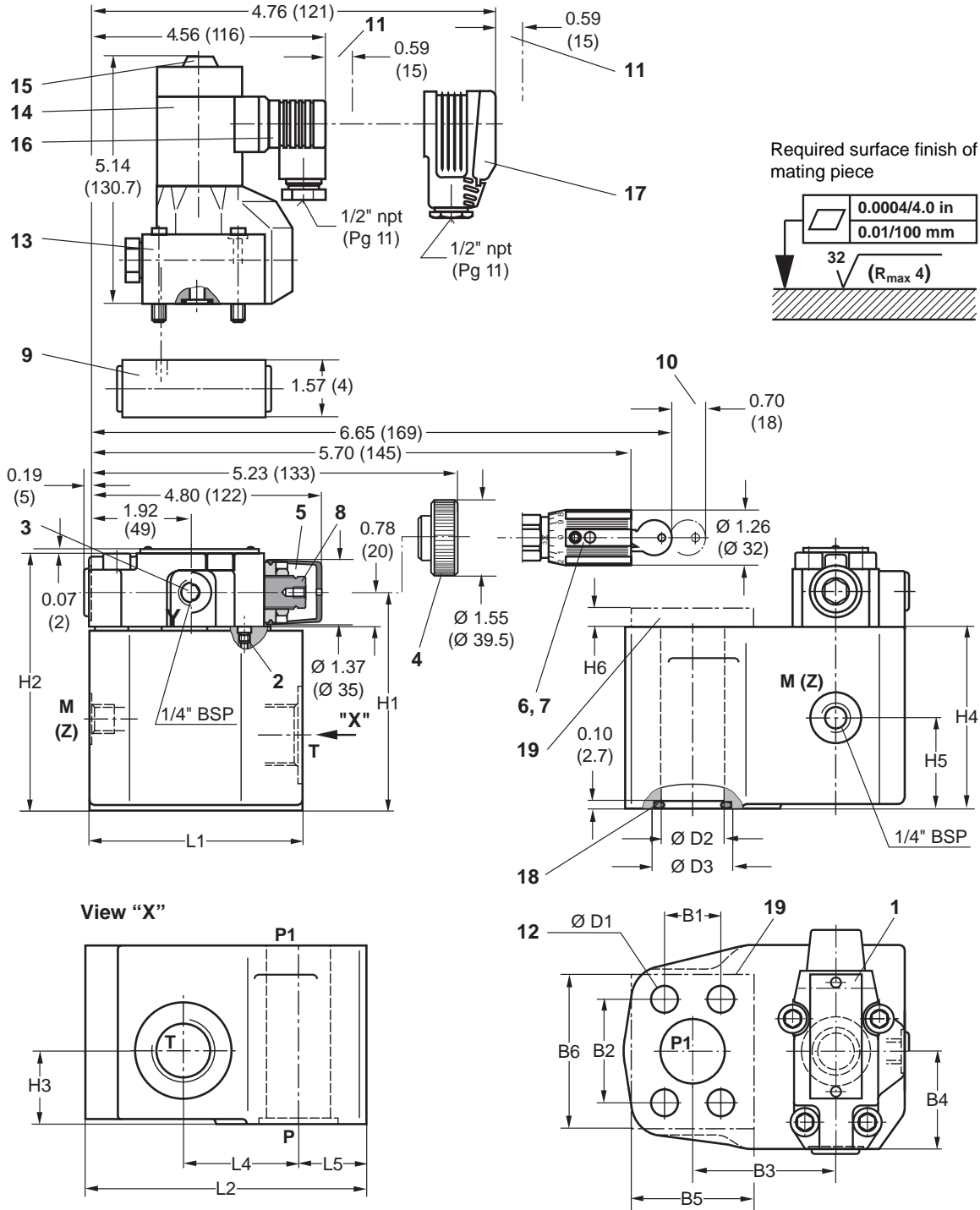
**No code** = Without manual override  
**N<sup>1</sup>** = With rubber button manual  
override  
**N9** = With manual override  
(directional valves only)

**G24<sup>1</sup>** = DC voltage 24 V  
**W110R<sup>1</sup>** = DC solenoid with built-in rectifier  
for AC voltage 120 V frequency  
dependent (only for voltages ≥ 110 V  
and Z5 plugs)  
**W120-60<sup>1</sup>** = AC solenoid 120 V–60 Hz  
(directional valves only)

**No code** = Without directional valve  
**6A<sup>1</sup>** = With directional valve (standard  
valve – up to 4600 PSI (315 bar)  
setting pressure)  
**6B<sup>1</sup>** = With directional valve (heavy duty  
valve – up to 5100 PSI (350 bar)  
setting pressure)  
**6SL<sup>1</sup>** = With poppet valve (mandatory at  
pressures in excess of  
5100 PSI (350 bar)

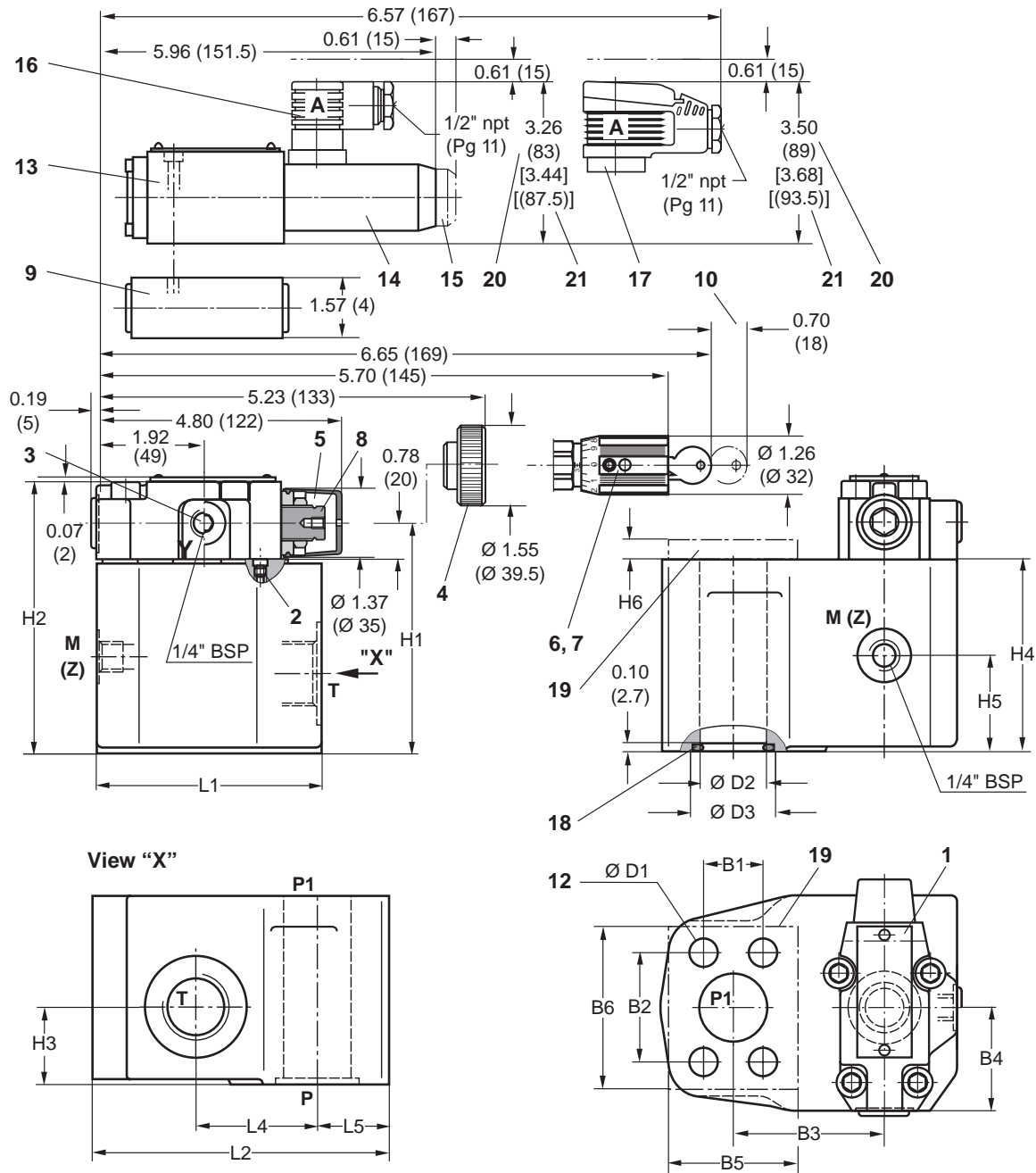
<sup>1</sup> Code **only** required for model with directional valve ("DBAW").  
<sup>2</sup> Key RR00 008158 is included in supply.  
<sup>3</sup> Code **only** required for model with directional valve and soft-shift plate ("DBAW.../...S...")  
<sup>4</sup> Please note pressure ratings and connection dimensions on page 9.  
<sup>5</sup> Only to 4600 PSI (315 bar)

**Unit dimensions, Model DBA.../DBAW...with poppet valve: dimensions in inches (millimeters)**



- 1 Nameplate
  - 2 Open if internal drain
  - 3 Port Y for external drain
  - 4 Adjustment "1"
  - 5 Adjustment "2"
  - 6 Adjustment "3"
  - 7 Adjustment "7"
  - 8 Socket screw 10 mm A/F
  - 9 Optional damping plate (soft-shift)
  - 10 Space required to remove key
  - 11 Space required to remove plug
  - 12 Block mounting holes
  - 13 Poppet valve size 6 (see RA 22 057)
  - 14 Solenoid rotates 90° (4 x 90°)
  - 15 Manual override
  - 16\* "Z4" plug (rotates 4 x 90°)
  - 17\* "Z5" and "Z5L" plugs (rotates 4 x 90°)
  - 18 O ring (see dimensions table on page 9)
  - 19 Integral check valve, model "R"
- \* The additional "5", i.e. Z45, Z55 indicates 1/2" npt cable connection
- For further dimensions see Table on page 9**  
A/F = Across Flats

**Unit dimensions, Model DBA.../DBAW...with directional valve: dimensions in inches (millimeters)**



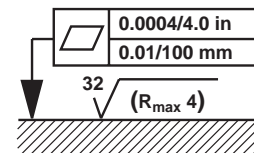
- 1 Nameplate
- 2 Open if internal drain
- 3 Port Y for external drain
- 4 Adjustment "1"
- 5 Adjustment "2"
- 6 Adjustment "3"
- 7 Adjustment "7"
- 8 Socket screw 10 mm A/F
- 9 Optional damping plate (soft-shift)
- 10 Space required to remove key
- 11 Space required to remove plug
- 12 Block mounting holes
- 13 Directional spool valve size 6 (see RA 23 177)
- 14 Solenoid "a"
- 15 Manual override
- 16\* "Z4" plug
- 17\* "Z5" and "Z5L" plugs
- 18 O ring (see dimensions table on page 9)
- 19 Integral check valve, model "R"
- 20 Dimension for standard valve
- 21 Dimension [( ) ] for high performance valve

\* The additional "5", i.e. Z45, Z55 indicates 1/2" npt cable connection

**For further dimensions see Table on page 9**

A/F = Across Flats

Required surface finish of mating piece





**Unit dimensions: dimensions in inches (millimeters)**

Type	Size	L1	L2	L3	L4	L5	B1	B2	B3	B4	B5 <sup>1</sup>	B6 <sup>1</sup>	H1	H2
DBA...F...	10	4.48 (114)	4.72 (120)	6.49 (~ 165)	1.77 (45)	1.18 (30)	0.68 (17.5)	1.50 (38.1)	2.16 (55)	1.89 (48)	1.57 (40)	2.55 (65)	3.89 (99)	4.68 (119)
	16	4.48 (114)	4.72 (120)	6.49 (~ 165)	1.77 (45)	1.18 (30)	0.87 (22.2)	1.87 (47.6)	2.16 (55)	1.89 (48)	1.57 (40)	2.55 (65)	3.89 (99)	4.68 (119)
	25	4.48 (114)	5.07 (129)	6.49 (~ 165)	1.96 (50)	1.37 (35)	1.03 (26.2)	2.06 (52.4)	2.36 (60)	1.89 (48)	1.96 (50)	3.07 (78)	3.93 (100)	4.72 (120)
	32	4.76 (121)	5.43 (138)	6.49 (~ 165)	2.16 (55)	1.51 (38.5)	1.18 (30.2)	2.31 (58.7)	2.55 (65)	1.90 (48.3)	2.36 (60)	3.54 (90)	4.13 (105)	4.92 (125)
	40	5.43 (138)	6.14 (156)	6.77 (~ 172)	2.14 (54.5)	1.87 (47.5)	1.40 (35.8)	2.75 (69.9)	2.93 (74.5)	2.15 (54.7)	2.55 (65)	4.33 (110)	4.64 (118)	5.43 (138)
DBA...H...	10	4.48 (114)	4.72 (120)	6.49 (~ 165)	1.77 (45)	1.18 (30)	0.71 (18.25)	1.59 (40.5)	2.16 (55)	1.89 (48)	1.81 (46)	2.12 (54)	3.89 (99)	4.68 (119)
	16	4.48 (114)	4.72 (120)	6.49 (~ 165)	1.77 (45)	1.18 (30)	0.93 (23.8)	2.00 (50.8)	2.16 (55)	1.89 (48)	1.81 (46)	2.12 (54)	3.89 (99)	4.68 (119)
	25	4.48 (114)	5.07 (129)	6.49 (~ 165)	1.96 (50)	1.37 (35)	1.09 (27.8)	2.25 (57.2)	2.36 (60)	1.89 (48)	2.75 (70)	3.15 (80)	3.93 (100)	4.72 (120)
	32	4.76 (121)	5.43 (138)	6.49 (~ 165)	2.16 (55)	1.51 (38.5)	1.25 (31.8)	2.62 (66.7)	2.55 (65)	1.90 (48.3)	3.15 (80)	3.74 (95)	4.13 (105)	4.92 (125)
	40	5.43 (138)	6.14 (156)	6.77 (~ 172)	2.14 (54.5)	1.87 (47.5)	1.44 (36.6)	3.12 (79.4)	2.93 (74.5)	2.15 (54.7)	3.74 (95)	4.33 (110)	4.64 (118)	5.43 (138)

Type	Size	H3	H4	H5	H6 <sup>1</sup>	Ø D1	Ø D2	Ø D3	Ports		O ring Item 18 (mm)
									P and P1	T	
DBA...F...	10	1.61 (41)	3.11 (79)	1.47 (37)	0.35 (9)	0.35 (9)	0.66 (17)	1.23 (31.4)	SAE 1/2"	3/4" BSP	18.66 x 3.53
	16	1.61 (41)	3.11 (79)	1.47 (37)	0.35 (9)	0.43 (11)	0.78 (20)	1.23 (31.4)	SAE 3/4"	3/4" BSP	25 x 3.53
	25	1.65 (42)	3.15 (80)	1.49 (38)	0.31 (8)	0.43 (11)	0.98 (25)	1.55 (39.4)	SAE 1"	1" BSP	32.92 x 3.53
	32	1.69 (43)	3.34 (85)	1.69 (43)	0.31 (8)	0.43 (11)	1.26 (32)	1.72 (43.9)	SAE 1-1/4"	1-1/4" BSP	37.7 x 3.53
	40	1.96 (50)	3.85 (98)	2.20 (56)	0.31 (8)	0.51 (13)	1.49 (38)	2.10 (53.5)	SAE 1-1/2"	1-1/2" BSP	47.22 x 3.53
DBA...H...	10	1.61 (41)	3.11 (79)	1.47 (37)	0.35 (9)	0.35 (9)	0.66 (17)	1.23 (31.4)	SAE 1/2"	3/4" BSP	18.66 x 3.53
	16	1.61 (41)	3.11 (79)	1.47 (37)	0.35 (9)	0.43 (11)	0.80 (20.5)	1.23 (31.4)	SAE 3/4"	3/4" BSP	25 x 3.53
	25	1.65 (42)	3.15 (80)	1.49 (38)	0.31 (8)	0.51 (13)	0.98 (25)	1.55 (39.4)	SAE 1"	1" BSP	32.92 x 3.53
	32	1.69 (43)	3.34 (85)	1.69 (43)	0.31 (8)	0.59 (15)	1.26 (32)	1.72 (43.9)	SAE 1-1/4"	1-1/4" BSP	37.7 x 3.53
	40	1.96 (50)	3.85 (98)	2.20 (56)	0.31 (8)	0.66 (17)	1.57 (40)	2.10 (53.5)	SAE 1-1/2"	1-1/2" BSP	47.22 x 3.53

Type	Size	Fixing screws <sup>2</sup> DIN 912 – 10.9	Tightening torque in lb-ft (Nm)
DBA...F...	10	M10 x 110	55.3 (75)
	16	M10 x 110	55.3 (75)
	25	M10 x 110	55.3 (75)
	32	M10 x 120	55.3 (75)
	40	M12 x 140	95.8 (130)
DBA...H...	10	M10 x 115	55.3 (75)
	16	M10 x 115	55.3 (75)
	25	M12 x 120	95.8 (130)
	32	M14 x 125	151.2 (205)
	40	M16 x 150	228.6 (310)

<sup>1</sup> For model "R" only (with integrated check valve)<sup>2</sup> Not included in supply (separate order)**Permissible pressures for flange connections to SAE 7518 C**

	Standard pressure series "F"		High pressure series "H"	
SAE 1/2"	5000 PSI	350 bar	6000 PSI	420 bar
SAE 3/4"	5000 PSI	350 bar	6000 PSI	420 bar
SAE 1"	5000 PSI	350 bar	6000 PSI	420 bar
SAE 1-1/4"	4000 PSI	280 bar	6000 PSI	420 bar
SAE 1-1/2"	3000 PSI	210 bar	6000 PSI	420 bar

**Permissible pumps, standard pressure version "F"**

Pump safety valve		DBA. 10 .F	DBA. 15 .F	DBA. 25 .F	DBA. 30 .F	DBA. 40 .F
Pump type	Port P	SAE 1/2"	SAE 3/4"	SAE 1"	SAE 1-1/4"	SAE 1-1/2"
- <b>Variable displacement pump</b> Series 30 to RA 92 711		-	-	A10VSO71 <sup>1</sup>	-	-
		-	A10VSO28	A10VSO45	A10VSO71 <sup>2</sup>	-
- <b>Gear pump</b> G3, Series 3X to RA 10 039		-	-	G3-3X/020	G3-3X/029	-
		-	-	G3-3X/023	G3-3X/032	-
		-	-	G3-3X/026	G3-3X/038	-
G4, Series 2X to RA 10 042		-	-	-	G4-2X/040	G4-2X/063
		-	-	-	G4-2X/050	G4-2X/070
		-	-	-	-	G4-2X/080
		-	-	-	-	G4-2X/100
- <b>Internal gear pump</b> GC, Series 1X to RA 10 215 GC, Series 2X		GC2-1X/003	GC4-1X/020	GC5-1X/040	-	GC6-1X/080
		GC2-1X/005	GC4-1X/025	GC5-1X/050	-	GC6-1X/100
		GC2-1X/006	GC4-1X/032	GC5-1X/064	-	GC6-1X/125
		GC2-1X/008	-	-	-	GC7-2X/160
		GC3-1X/010	-	-	-	GC7-1X/200
		GC3-1X/013	-	-	-	GC7-2X/250
		GC3-1X/016	-	-	-	-
GH, Series 1X to RA 10 218		GH2-1X/003	GH4-1X/020	GH5-1X/040	-	GH6-1X/080
		GH2-1X/005	GH4-1X/025	GH5-1X/050	-	GH6-1X/100
		GH2-1X/006	GH4-1X/032	GH5-1X/064	-	GH6-1X/125
		GH2-1X/008	-	-	-	-
		GH3-1X/010	-	-	-	-
		GH3-1X/013	-	-	-	-
		GH3-1X/016	-	-	-	-
- <b>Vane pump</b> V4 to RA 10 460		-	-	-	-	V4-4X/125

<sup>1</sup>A10VSO71 = Series 31

<sup>2</sup>A10VSO71 = Series 30

**Permissible pumps, high pressure version "H"**

Pump safety valve		DBA. 10 .H	DBA. 15 .H	DBA. 25 .H	DBA. 30 .H	DBA. 40 .H
Pump type	Port P	SAE 1/2"	SAE 3/4"	SAE 1"	SAE 1-1/4"	SAE 1-1/2"
- <b>Fixed displacement pump</b> Series 6 to RA 91 401		A2FO23	A2FO45	A2FO80	A2FO125	-
		A2FO28	A2FO56	A2FO90	A2FO160	-
		A2FO32	A2FO63	A2FO107	A2FO180	-
		-	-	-	A2FO200	-
Series 6 to RA 91 425		-	-	-	-	A2F355
		-	-	-	A2F250	A2F500
- <b>Industrial variable pump</b> Series 1 to RA 92 050		-	A4VSO40	A4VSO71	A4VSO125	A4VSO250
- <b>Variable displacement pump</b> Series 6.3 to RA 92 203		-	-	-	A7V250	A7V355
		-	-	-	-	A7V500
Series 31 to RA 92 711		-	-	-	A10VSO140	-
		-	-	-	A10VSO100	-
Series 5 to RA 92 450		-	-	-	A2V250	A2V355
		-	-	-	-	A2V500

**Mannesmann Rexroth Corporation**



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