



M+S HYDRAULIC

HYDRAULIC BRAKES MOTOR-BRAKES & VALVE BLOCKS



ACCESSORIES and MOTOR-BRAKES

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HYDRAULIC DISC BRAKES LB, LBS, LBV- Wet



APPLICATION

- » Heavy Duty machinery
- » Wheel drives
- » Material handling
- » Mining
- » Agricultural machines
- » Conveyors
- » Door openers and swing drives etc.



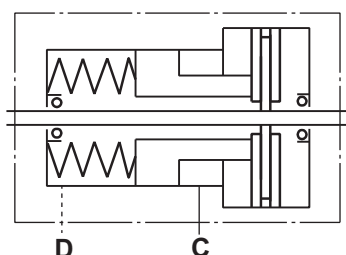
GENERAL

Fluid type	Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)
Temperature range, °C [°F]	-40÷140 [-40÷284]
Viscosity range, mm²/s	20÷75 [98÷347]
Filtration	ISO code 20/16 (nominal filtration of 25 microns)
Maintenance	Changed after the first 50-100 h, then after every 500-1500 h.

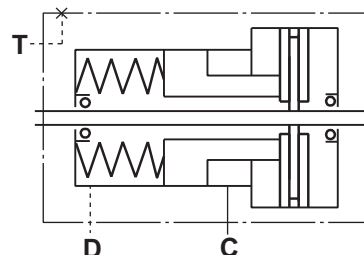
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LB, LBS

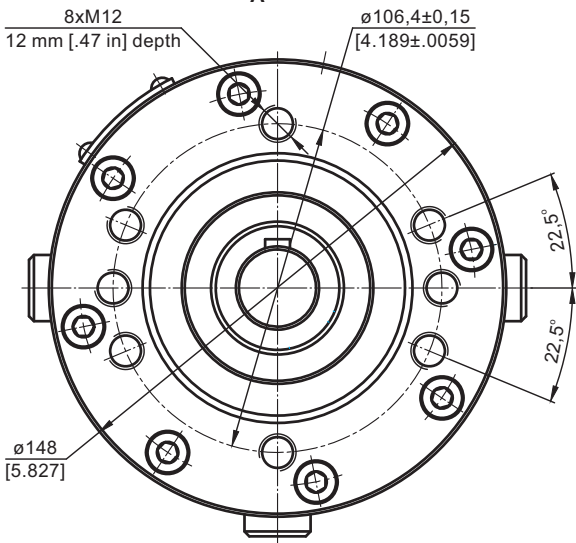
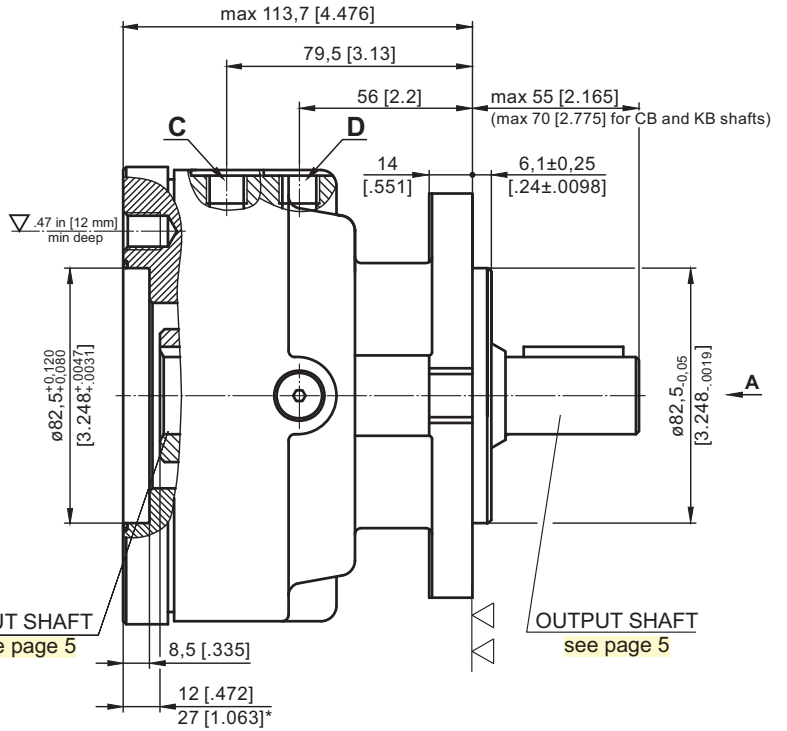
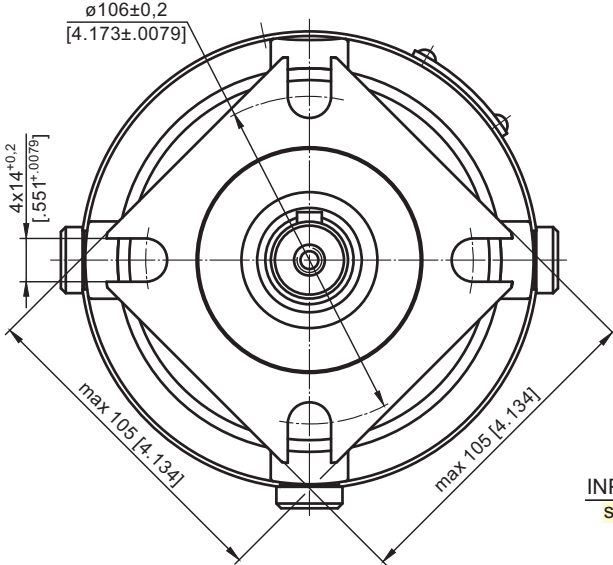


LBV



HYDRAULIC DISC BRAKE for FLANGE ATTACHMENT to MP, MR and MS HYDRAULIC MOTORS

TYPE LB/288



▽ - Place for attachment (tightening torque for screw M12-12.9 - $7^{+0.5}$ daNm [620⁺⁴⁴ lb-in])

▽▽ - Place for attachment

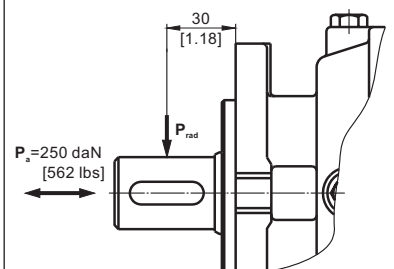
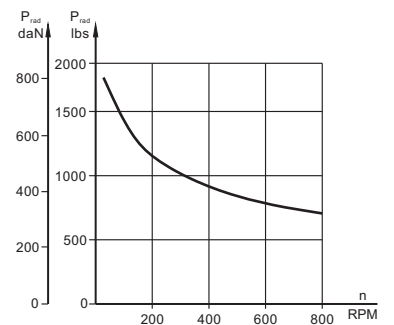
C: Brake release Port - G $\frac{1}{4}$, 9 mm [0.35 in] depth

D: Drainage tap - G $\frac{1}{4}$, 9 mm [0.35 in] depth

* - For Input Shaft Hole Versions **SH** and **SB**.



LOAD CURVE

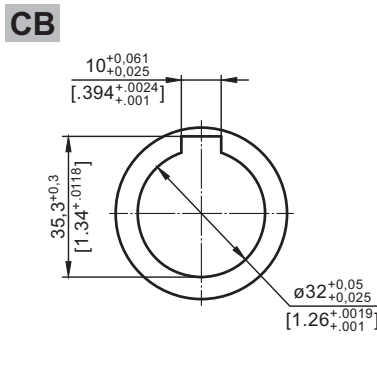
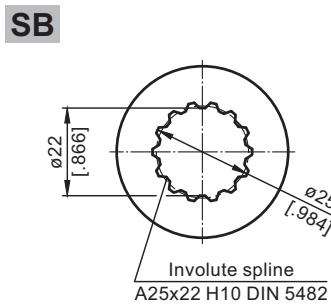
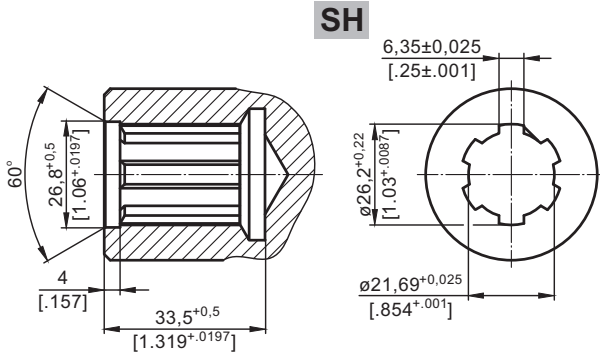
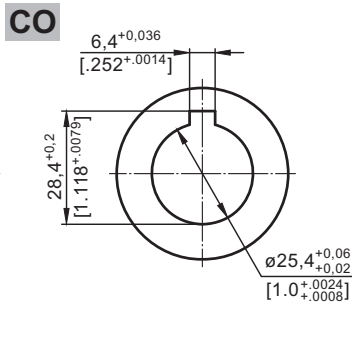
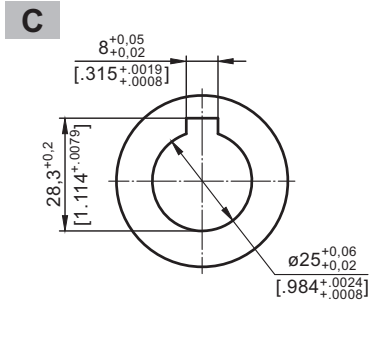


SPECIFICATION DATA

Description LB/288...	7	14	21	32	43	63
*Min. Static Torque, daNm [lb-in]	6-8 [531-708]	13-15 [1150-1327]	20-22 [1770-1947]	31-34 [2743-3009]	41-45 [3628-3982]	61-64 [5399-5665]
Opening Pressure, min bar [PSI]	4-5 [58-73]	8-9 [116-130]	12-13 [174-188]	18-20 [260-290]	24-26 [348-377]	38-39 [550-565]
	max 300 [4350]					
Min. oil quantity for brake releasing, cm ³ [in ³]	7 - 8 [4.27 - .488]					
Oil volume, cm ³ [in ³]	50 - 120 [3.5 - 7.35]					
Max. Pressure in drain space, bar [PSI]	0,5 [7.25]					
Weight, kg [lb]	9 [19.8]					

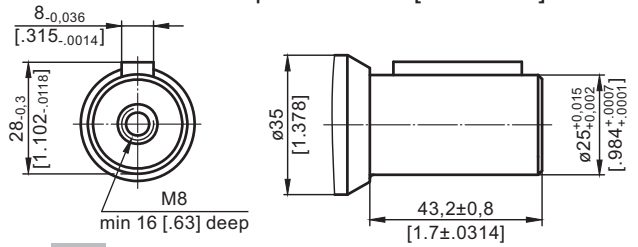
*Static torque is obtained at working pressure - 0 bar [0 PSI].

INPUT SHAFT HOLES

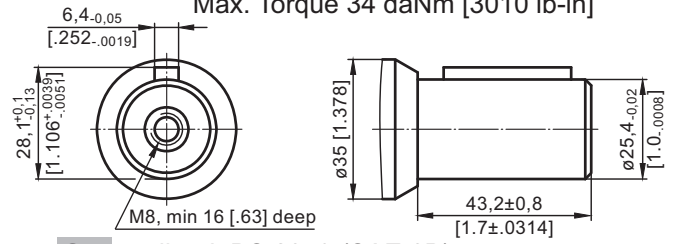


OUTPUT SHAFT EXTENSIONS

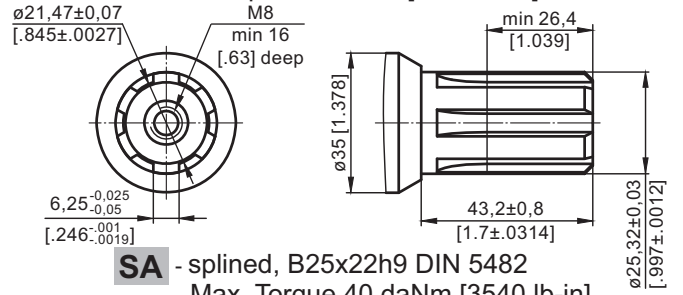
C - ø25 straight, Parallel key A8x7x30 DIN 6885
Max. Torque 34 daNm [3010 lb-in]



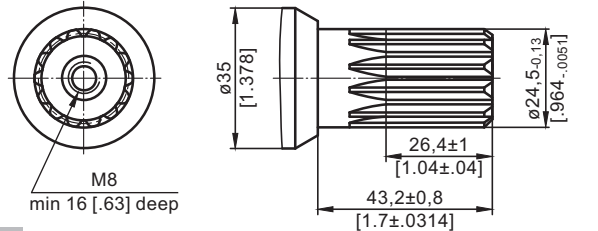
CO - ø1" straight, Parallel key 1/4"x1/4"x1/4" BS46
Max. Torque 34 daNm [3010 lb-in]



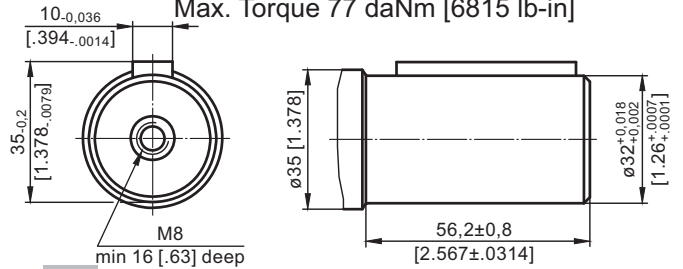
SH - splined, BS 2059 (SAE 6B)
Max. Torque 40 daNm [3540 lb-in]



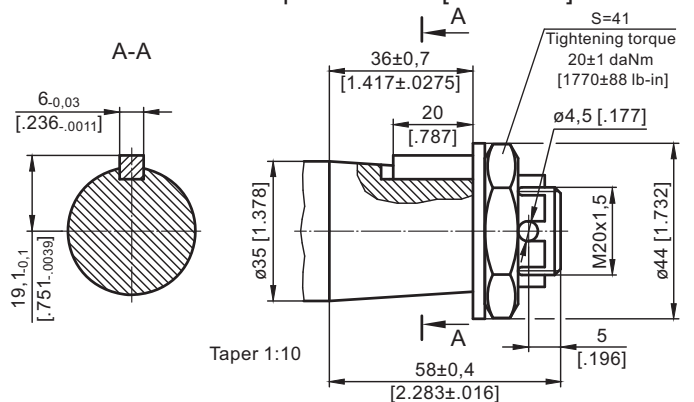
SA - splined, B25x22h9 DIN 5482
Max. Torque 40 daNm [3540 lb-in]



CB - ø32 straight, Parallel key A10x8x45 DIN 6885
Max. Torque 77 daNm [6815 lb-in]

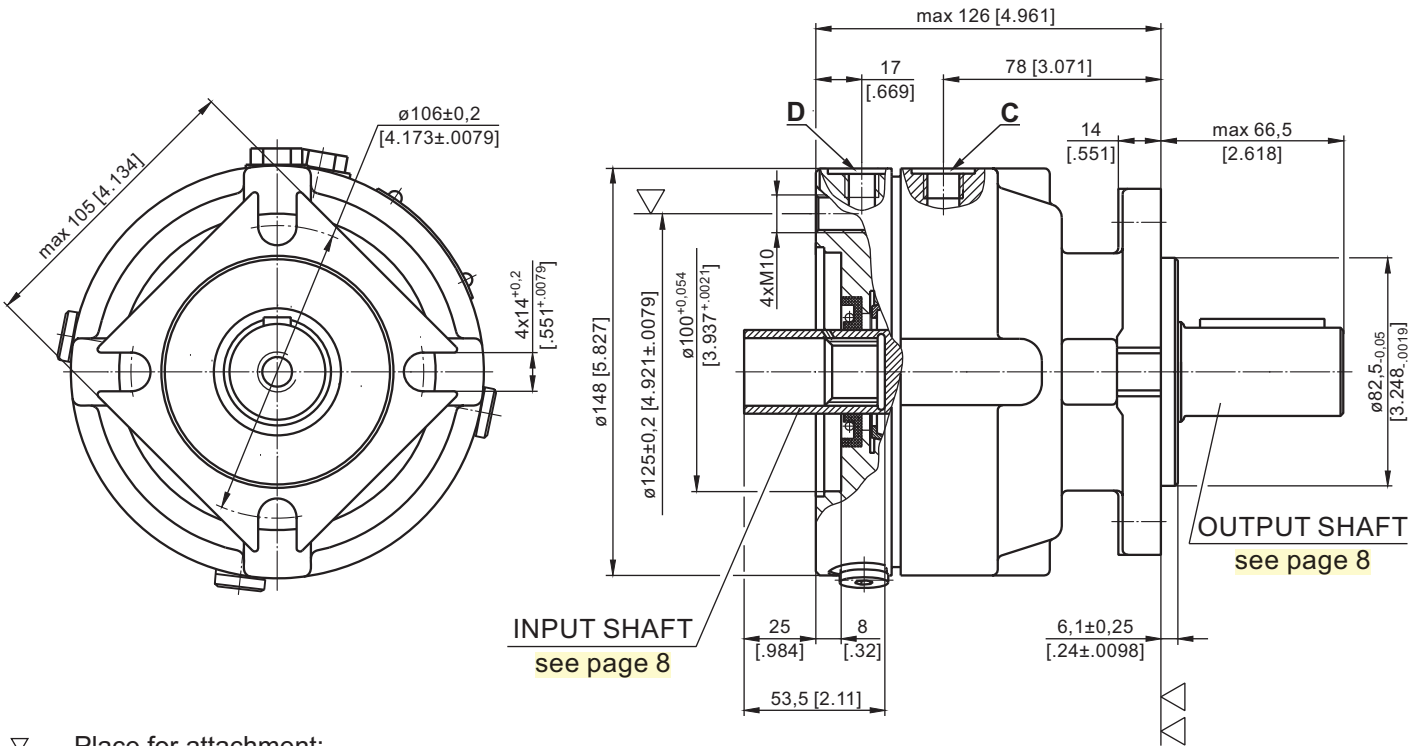


KB - tapered, Parallel key B6x6x20 DIN 6885
Max. Torque 95 daNm [8400 lb-in]



HYDRAULIC DISC BRAKE for FLANGE ATTACHMENT to MSS and MSV HYDRAULIC MOTORS

TYPE LBS/289



▽ - Place for attachment:

LBS - tightening torque for screw M10x35 - 12.9 DIN 912 - $6,5^{+0.5}$ daNm [575^{+44} lb-in]

LBV - tightening torque for screw M10xL - 12.9 DIN 931 - $6,5^{+0.5}$ daNm [575^{+44} lb-in]

▽▽ - Place for attachment

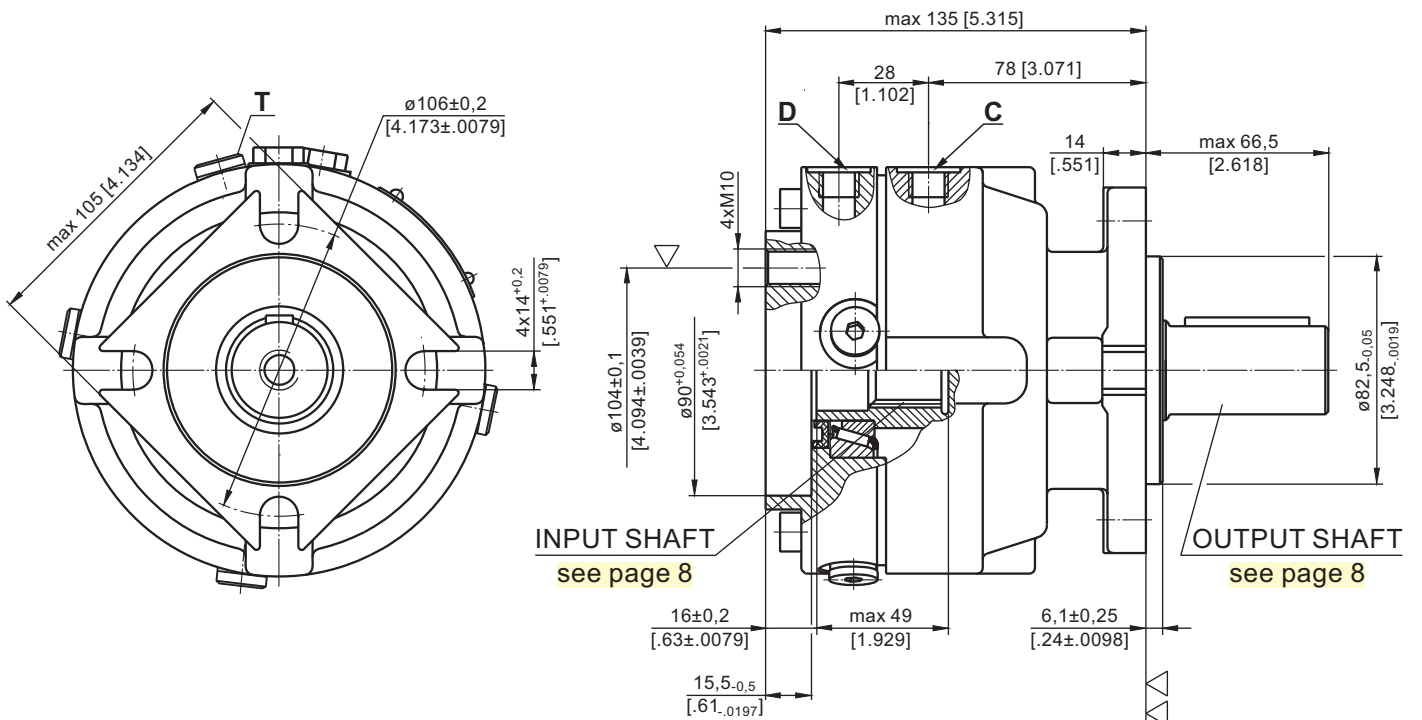


C: Brake release Port - G $\frac{1}{4}$, 9 mm [.35 in] depth

D: Drain plug for the Brake - G $\frac{1}{4}$, 9 mm [.35 in] depth

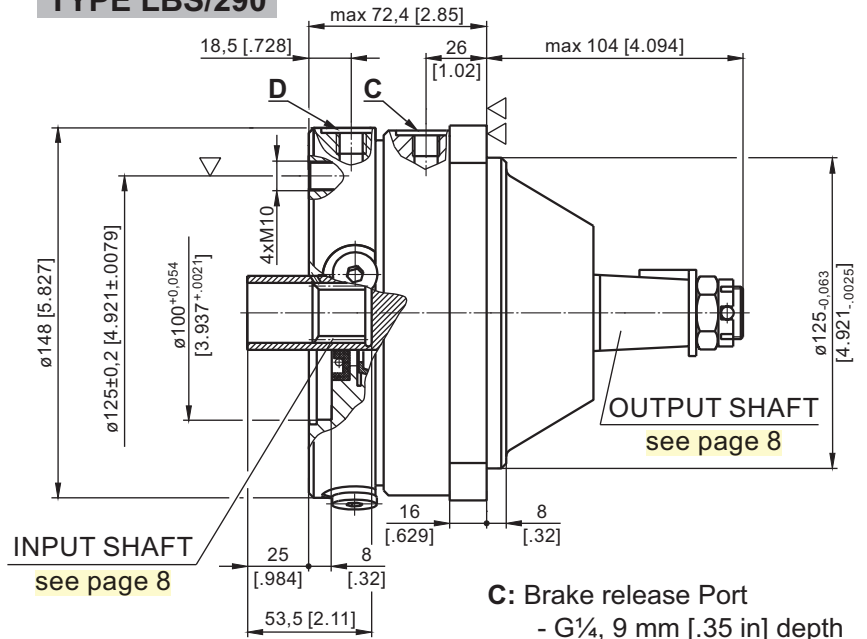
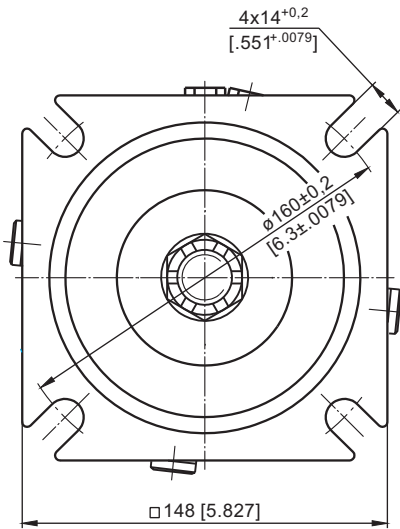
T: Drain plug for the Motor - G $\frac{1}{4}$, 9 mm [.35 in] depth

TYPE LBV/289



HYDRAULIC DISC BRAKE for FLANGE ATTACHMENT to MSS and MSV HYDRAULIC MOTORS

TYPE LBS/290



▽ - Place for attachment

LBS - tightening torque for screw M10x35 - 12.9 DIN 912 - 6,5⁺⁵ daNm [575⁺⁴⁴ lb-in]

LBV - tightening torque for screw M10xL - 12.9 DIN 931 - 6,5⁺⁵ daNm [575⁺⁴⁴ lb-in]

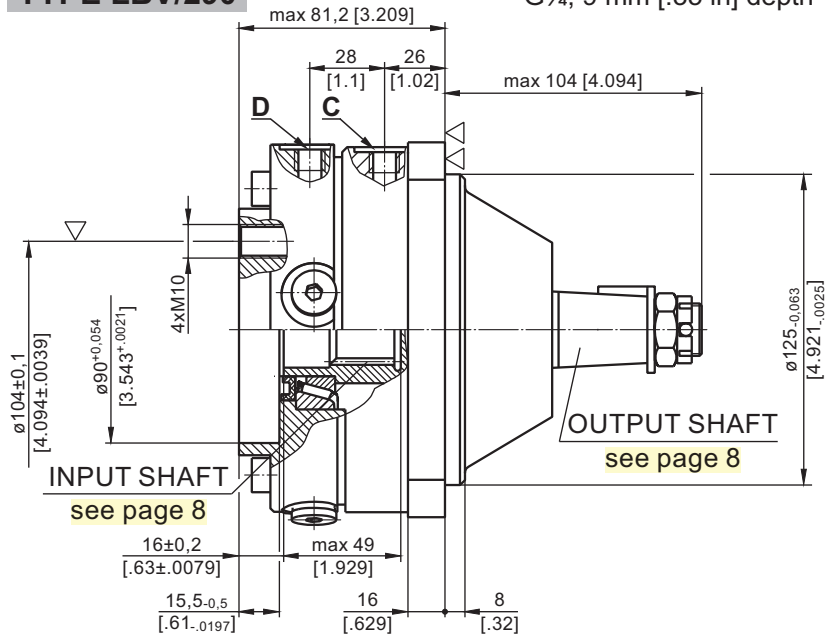
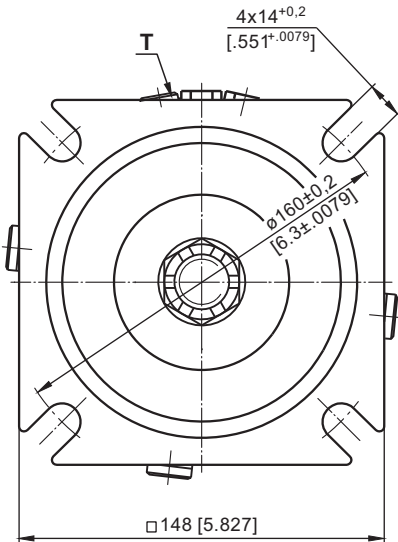
▽▽ - Place for attachment

C: Brake release Port
- G¹/₄, 9 mm [.35 in] depth

D: Drain plug for the Brake
- G¹/₄, 9 mm [.35 in] depth

T: Drain plug for the Motor
- G¹/₄, 9 mm [.35 in] depth

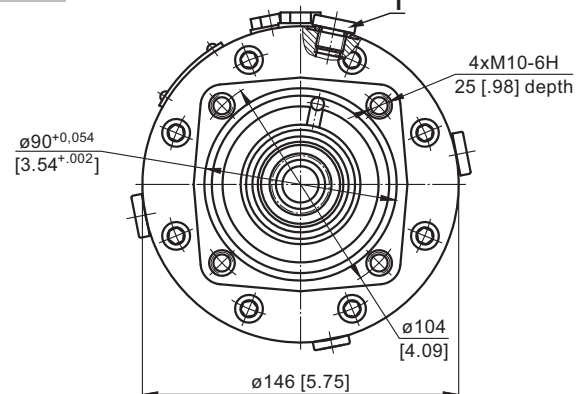
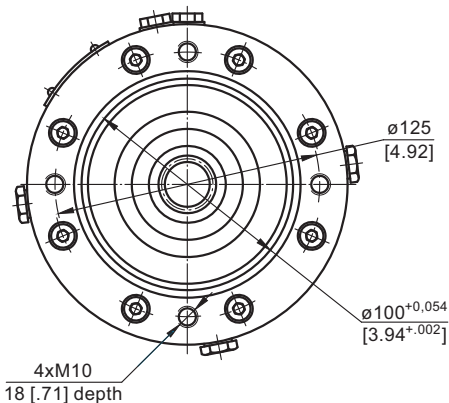
TYPE LBV/290



TYPE LBS/289(290)

INPUT FACE For Versions 289 and 290

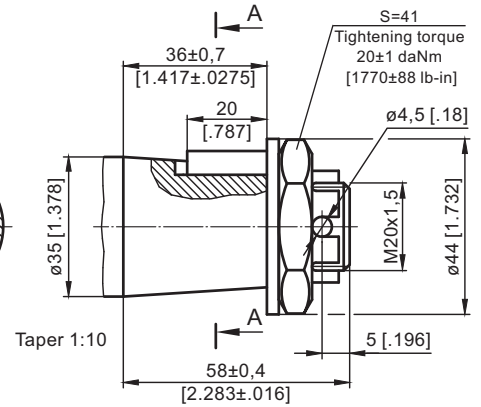
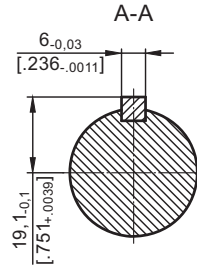
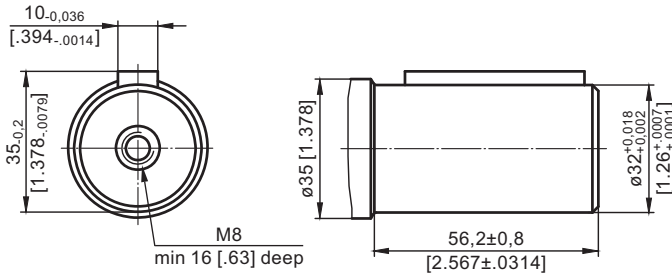
TYPE LBV/289(290)



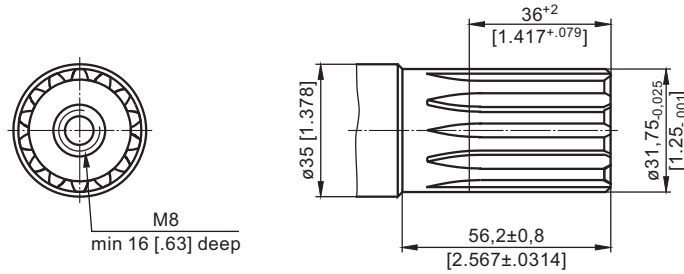
OUTPUT SHAFT EXTENSIONS

CB - $\varnothing 32$ straight, Parallel key A10x8x45 DIN 6885
Max. Torque 77 daNm [6815 lb-in]

KB - tapered 1:10, Parallel key B6x6x20 DIN 6885
Max. Torque 95 daNm [8400 lb-in]



SH - $\varnothing 1\frac{1}{4}$ " splined 14T, DP12/24 ANS B92.1-1970
Max. Torque 95 daNm [8400 lb-in]



SPECIFICATION DATA

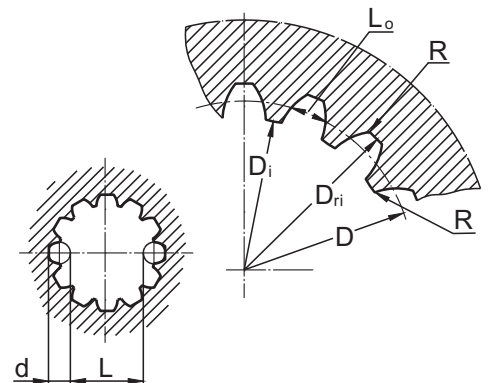
Description LBS/289(290) LBV/289(290)	21	32	43	63	L43	L63	
*Min. Static Torque, daNm [lb-in]	20-22 [1770-1947]	31-34 [2743-3009]	41-45 [3628-3982]	61-64 [5399-5665]	41-45 [3628-3982]	61-64 [5399-5665]	
Opening Pressure, bar [PSI]	min	12-13 [174-188]	18-20 [260-290]	24-26 [348-377]	37-39 [540-565]	20-22 [290-320]	21-23 [305-333]
	max	300 [4350]					
Min. oil quantity for brake releasing	7 - 8 [0.427 - .488]						
Oil volume	50 - 120 [3.05 - 7.35]						
Max. Pressure in drain space	5 [72]						
Weight	9 [19.8]						

* Static torque is obtained at working pressure - 0 bar [0 PSI].

INTERNAL SPLINE DATA for the ATTACHED COMPONENT

Fillet Root Side Fit	LBS(V)/289 LBS(V)/290		LBS(V)/314 LBS(V)/315	
	mm	inch	mm	inch
Number of Teeth	z	12	12	16
Diametral Pitch	DP	12/24	12/24	12/24
Pressure Angle		30°	30°	30°
Pitch Dia.	D	25,4	1	33,8656
Major Dia.	D _{ri}	28,0±0,1	1.1 ± 1.098	38,4±0,4
Minor Dia.	D _i	23,0±0,033	.907 ± .905	32,15±0,06
Space Width [Circular]	L _o	4,308±0,020	.1704 ± .1688	4,516±0,037
Fillet Radius	R	0,2	.008	0,5
Max. Measurement between Pins	L	17,62±0,15	.699 ± .694	26,9±0,10
Pin Dia.	d	4,835±0,001	.19039 ± .190314	4,835±0,001
Corrected	x.m	+0,8	+0.031	+1,0

Standard ANS B92.1-1970, class 5
[m=2.1166]



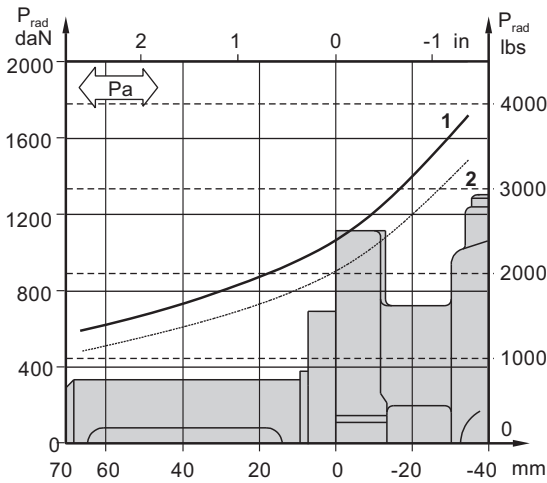
LOAD CURVE

The curve applies to a B10 bearing life of 3000 hours at 200 RPM

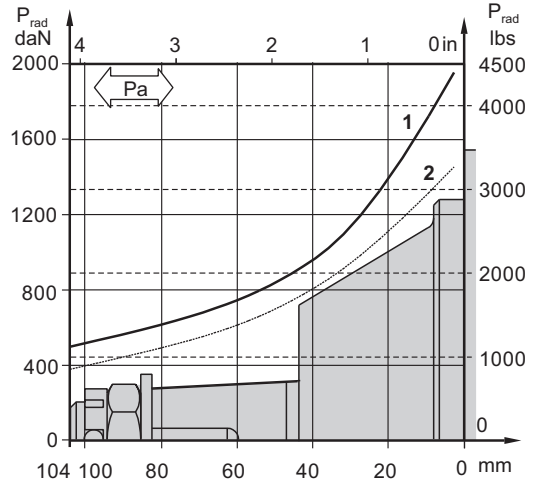
1: Pa<350 daN [787 lbs]

2: Pa=500 daN [1125 lbs]

LBS(V)/289



LBS(V)/290



ORDER CODE - LB/288

1	2	3	4	5
LB/288	-			

Pos.1 - Input Shaft Hole
C, CO, SH, CB, SB

Pos.2 - Static Torque code (See Specification data)
7, 14, 21, 32, 43, 63

Pos.3 - Output Shaft Extensions**
C - ø25 straight, Parallel key A8x7x32 DIN6885
CO - ø1" straight, Parallel key ¼"x¼"x¼" BS46
SH - ø25,32 splined BS 2059 (SAE 6B)
SA - ø24,5 splined B25x22 DIN 5482

CB - ø32 straight, Parallel key A10x8x45 DIN6885
KB - ø35 tapered 1:10, Parallel key B6x6x20 DIN6885

Pos.4 - Option (Paint)***
 omit - no Paint
P - Painted
PC - Corrosion Protected Paint

Pos.5 - Design Series
 omit - Factory specified

ORDER CODE - LBS, LBV

1	2	3	4	5	6
LB	/	-			

Pos.1 - Type
S - Disc Brake for short motor S - MSS
V - Disc Brake for very short motor V - MSV

Pos.2 - Design code
289 - for MSS and MSV motors
290 - for MSS and MSV motors (Wheel Mount)

Pos.3 - Static Torque code (See Specification data)
21, 32, 43, 63, L43, L63

Pos.4 - Output Shaft Extensions*
CB - ø32 straight, Parallel key A10x8x45 DIN6885
KB - ø35 tapered 1:10, Parallel key A6x6x20 DIN6885
SH - ø1¼" splined 14T ANS B92.1-1970

Pos.5 - Option (Paint)**
 omit - no Paint
P - Painted
PC - Corrosion Protected Paint

Pos.6 - Design Series
 omit - Factory specified

NOTES:

- * The permissible output torque for shafts must not be exceeded!
 For Max. Torque values see data on pages 5 and 8.
- ** The color is by customer's request.

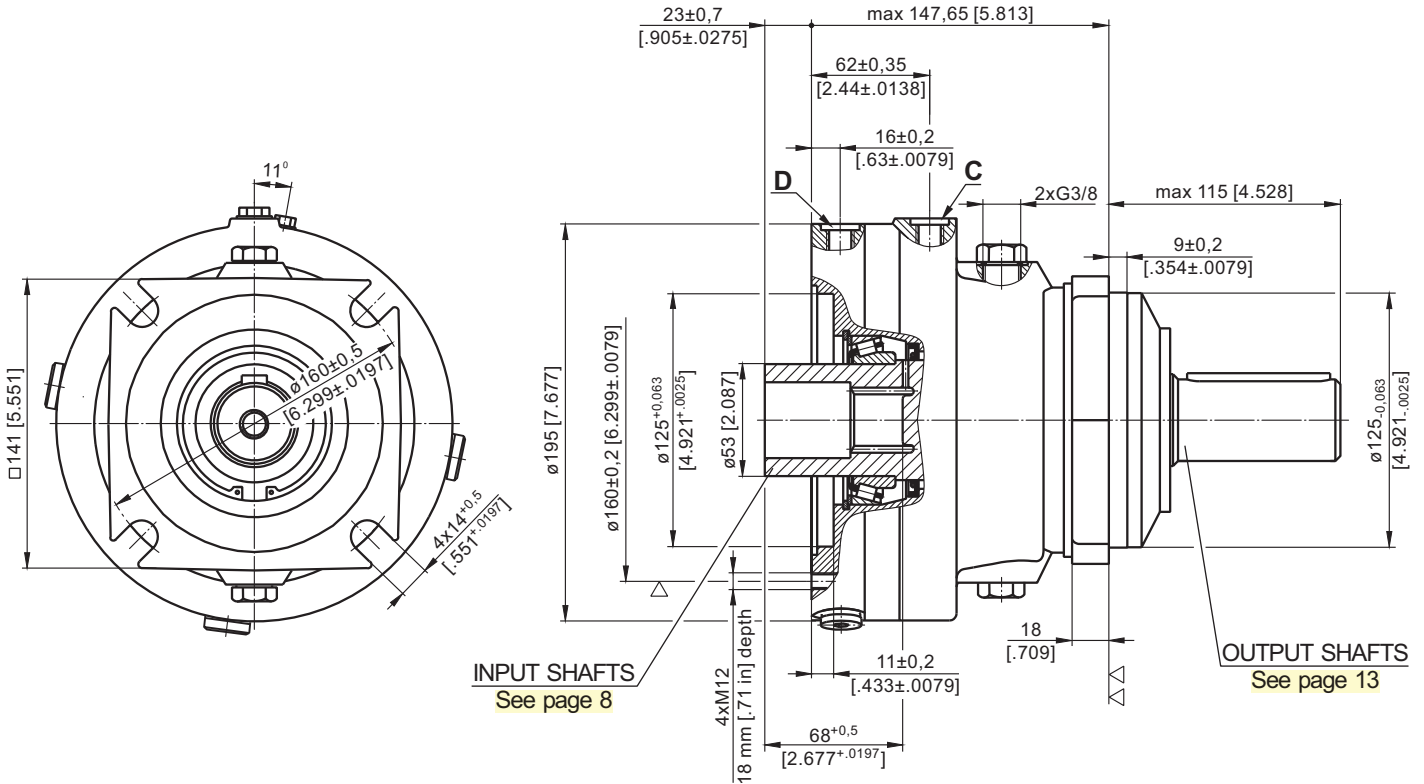
The Disc Brakes are mangano-phosphatized as standard.

ATTENTION:

- Hydraulic brake is delivered without oil (it is lubricated only).
- Hydraulic brake is filled through the drain port **D**. Space is filled with 50 ÷ 120 cm³ [3.05 ÷ 7.32 in³] mineral oil HLP (DIN 51524) or HM (ISO 6743/4). For LB/288 fill oil after hydraulic motor assembly.
- In all brakes, friction discs and separators should be lubricated.

HYDRAULIC DISC BRAKES
for FLANGE ATTACHMENT to MTS and MTV HYDRAULIC MOTORS

TYPE LBS/314

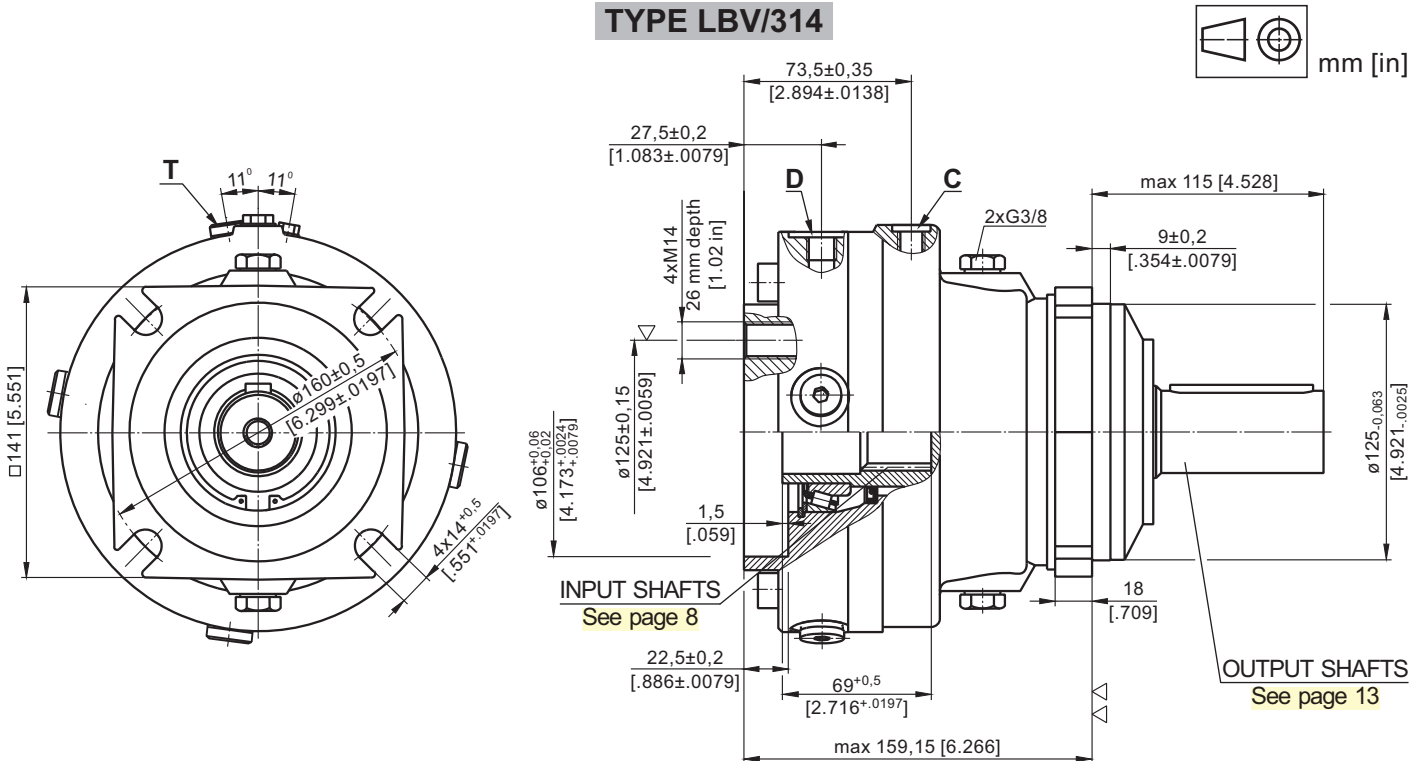


▽ - Place for attachment
(tightening torque for screw M12x30 - 12.9 DIN 912,
 $10^{+0.5}$ daNm [885⁺⁴⁴ lb-in])

C: Brake release Port - G $\frac{1}{4}$, 12 mm [.47 in] depth
D: Drainage tap - G $\frac{1}{4}$, 12 mm [.47 in] depth

▽▽ - Place for attachment

TYPE LBV/314

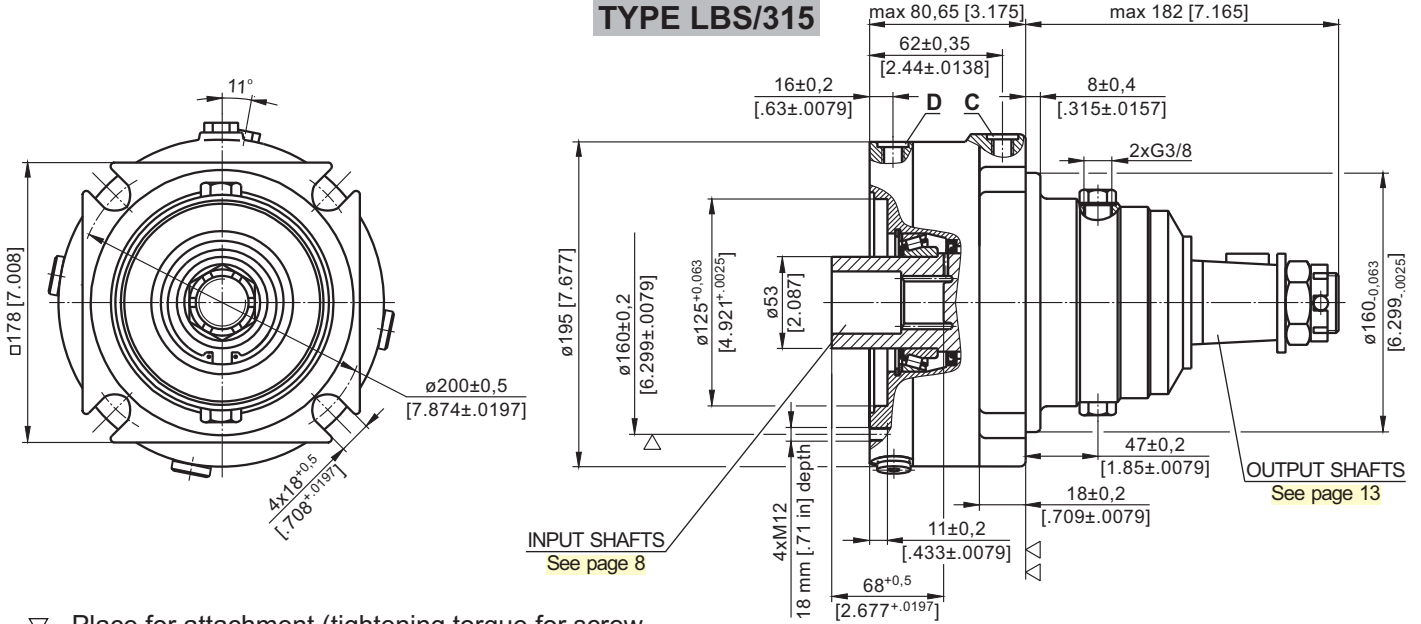


▽ - Place for attachment
(tightening torque for screw M14xL - 12.9 DIN 912,
 $13^{+0.5}$ daNm [1150⁺⁴⁴ lb-in])

C: Brake release Port - G $\frac{1}{4}$, 9 mm [.35 in] depth
D: Drain plug for the Brake - G $\frac{1}{4}$, 9 mm [.35 in] depth
T: Drain plug for the Motor - G $\frac{1}{4}$, 9 mm [.35 in] depth

▽▽ - Place for attachment

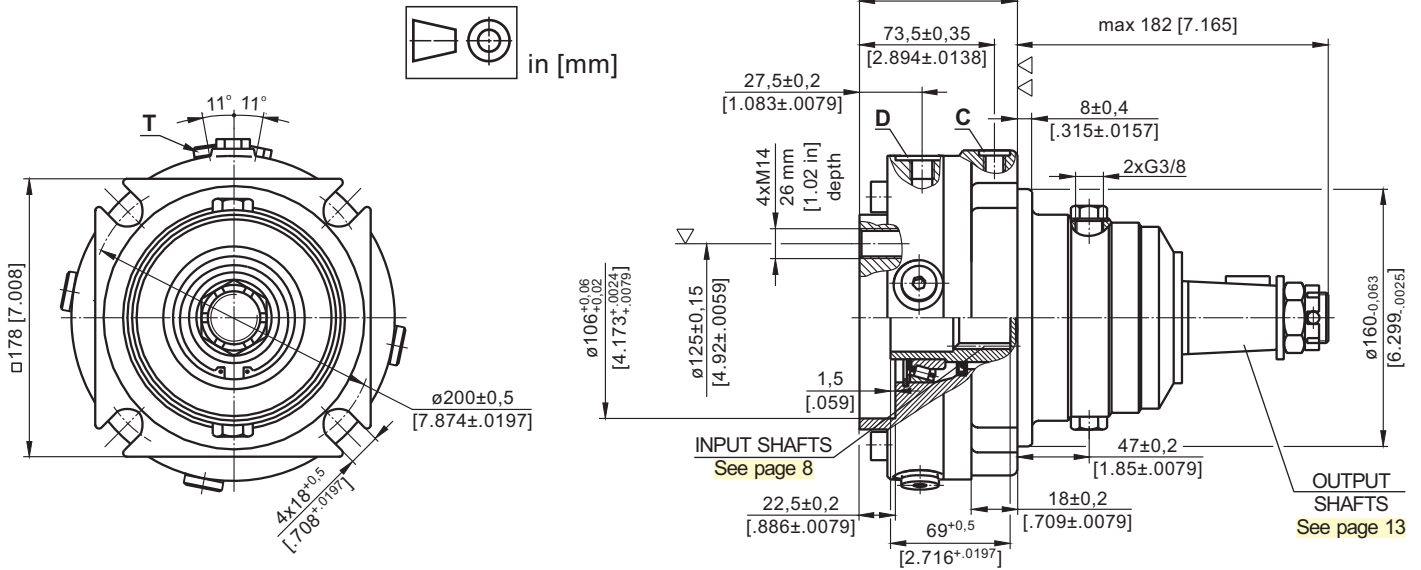
HYDRAULIC DISC BRAKES
for FLANGE ATTACHMENT to MTS and MTV HYDRAULIC MOTORS



▽ - Place for attachment (tightening torque for screw M12x30 - 12.9 DIN 912, 10^{+0.5} daNm [885⁺⁴⁴ lb-in])
▽▽ - Place for attachment

C: Brake release Port - G¹/₄, 12 mm [.47 in] depth
D: Drain tap - G¹/₄, 12 mm [.47 in] depth

TYPE LBV/315

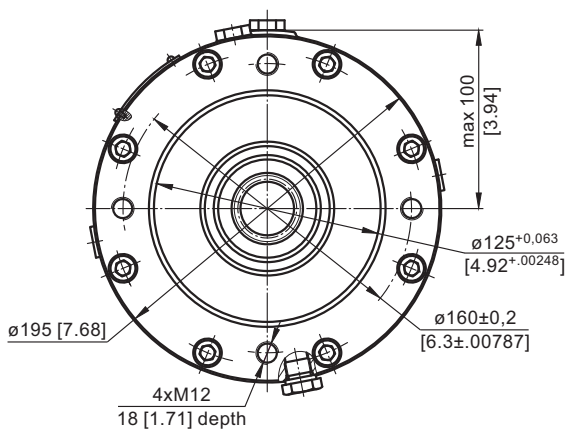


▽ - Place for attachment (tightening torque for screw M14xL - 12.9 DIN 912, 13^{+0.5} daNm [1150⁺⁴⁴ lb-in])
▽▽ - Place for attachment

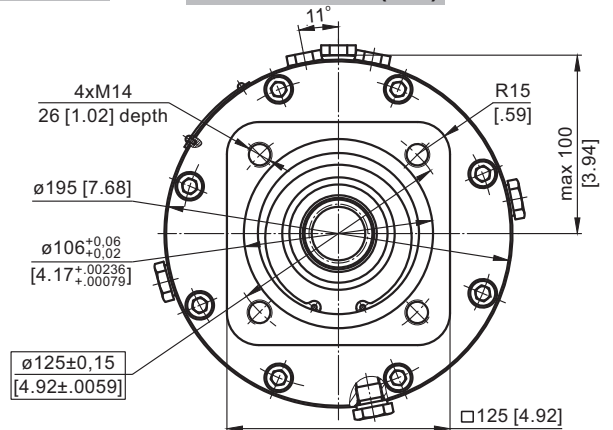
C: Brake release Port - G¹/₄, 9 mm [.35 in] depth
D: Drain plug for the Brake - G¹/₄, 9 mm [.35 in] depth
T: Drain plug for the Motor - G¹/₄, 9 mm [.35 in] depth

INPUT FACE
For Versions 314 and 315

TYPE LBS/314 (315)



TYPE LBV/314 (315)



SPECIFICATION DATA

Description	LBS/314,315	21	29	43	65	85	110	130
*Min. Static Torque,	daNm [lb-in]	18-23 [1593-2036]	28-33 [2478-2921]	42-46 [3717-4071]	61-70 [5399-6196]	83-92 [7346-8143]	108-118 [9559-10444]	126-136 [11152-12037]
Opening Pressure,	bar [PSI]	min**	4-5 [58-72]	6-7 [87-101]	9-10 [130-145]	13-15 [188-217]	18-20 [261-290]	23-25 [333-362]
		max	300 [4350]					
Min. oil quantity for brake releasing,	cm ³ [in ³]	8-9 [.488-.549]						
Oil volume,	cm ³ [in ³]	250						
Max. Pressure in drain space,	bar [PSI]	5 [72]						
Weight for .../314 .../315	kg [lb]	24 [52.9]						
		25 [55.1]						

* Static torque is obtained at working pressure - 0 bar.

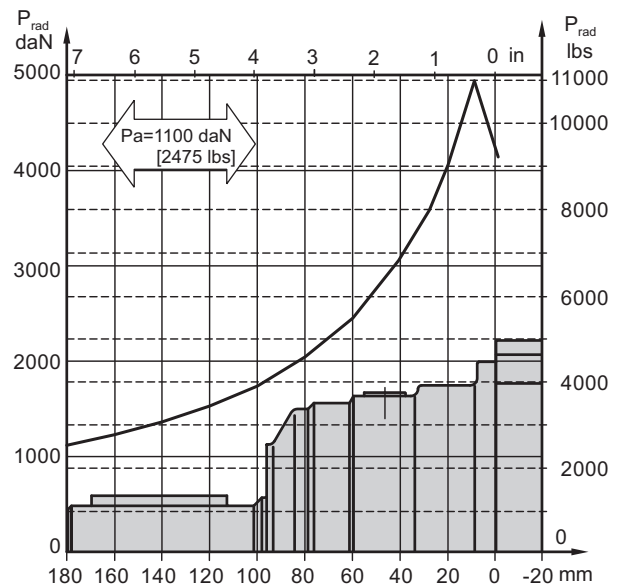
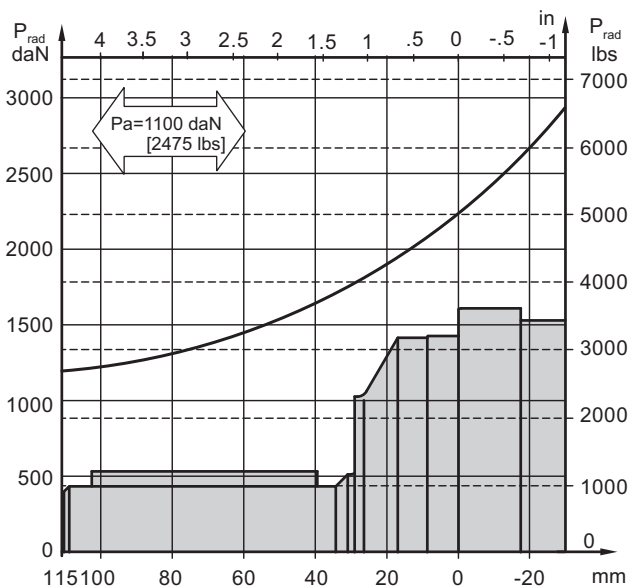
** The indicated value is a difference between the inlet pressure for driving of the brake and the drain pressure. Brakes must always have a drain line.

LOAD CURVE

The output shaft runs in tapered bearings that permit high axial and radial forces. The permissible radial load on the shaft is shown for an axial load of 0 N as function of the distance from the mounting flange to the point of load application. The curves apply to a B10 bearing life of 2000 hours at 100 RPM.

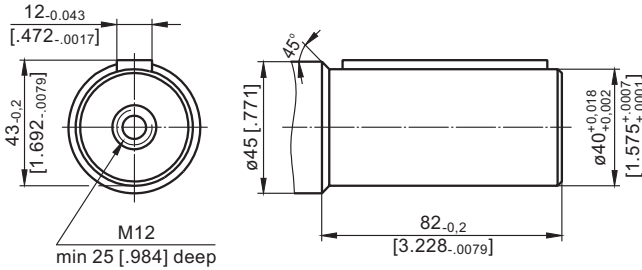
LBS(V) ... /314

LBS(V) ... /315

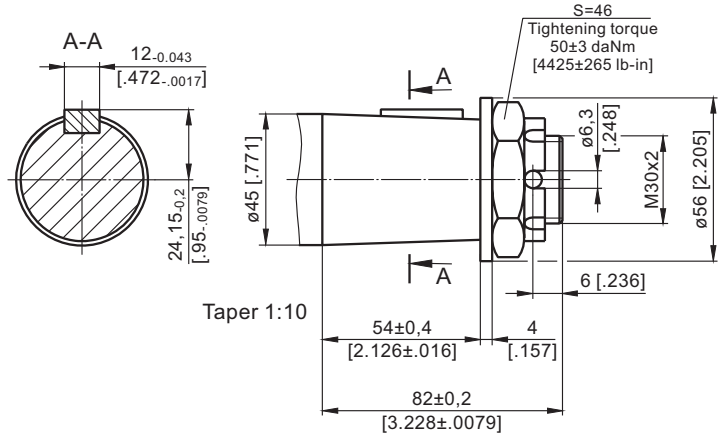


OUTPUT SHAFT EXTENSIONS

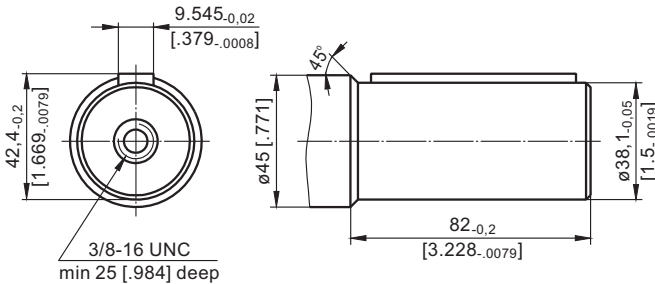
C - $\varnothing 40$ straight, Parallel key A12x8x70 DIN 6885
Max. Torque 132,8 daNm [11755 lb-in]



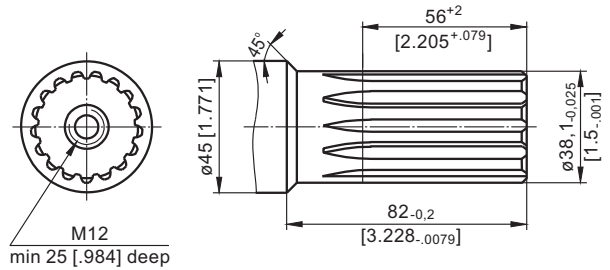
K - tapered 1:10, Parallel key B12x8x28 DIN 6885
Max. Torque 210,7 daNm [18650 lb-in]



CO - $\varnothing 1\frac{1}{2}$ " straight, Parallel key $\frac{3}{8}$ "x $\frac{3}{8}$ "x $2\frac{1}{4}$ " BS46
Max. Torque 132,8 daNm [11755 lb-in]



SH - $\varnothing 1\frac{1}{2}$ " splined 17T, DP 12/24 ANSI B92.1-1976
Max. Torque 132,8 daNm [11755 lb-in]



ORDER CODE

1	2	3	4	5	6
LB	/	-			

Pos.1 - Type

- S** - Disc Brake for short motor **S** - MTS
- V** - Disc Brake for very short motor **V** - MTV

Pos.2 - Design code

- 314** - for MTS and MTV motors
- 315** - for MTS and MTV motors (Wheel Mount)

Pos.3 - Static Torque code (see Specification data)

21, 29, 43, 65, 85, 110, 130

Pos.4 - Output Shaft Extensions*

- C** - $\varnothing 40$ straight, Parallel key A12x8x70 DIN6885
- CO** - $\varnothing 1\frac{1}{2}$ " straight, Parallel key $\frac{3}{8}$ "x $\frac{3}{8}$ "x $2\frac{1}{4}$ " BS46
- SH** - $\varnothing 1\frac{1}{2}$ " splined 17T, ANSI B 92.1-1976
- K** - $\varnothing 45$ tapered 1:10, Parallel key B12x8x28 DIN6885

Pos.5 - Option (Paint)**

- omit - no Paint
- P** - Painted
- PC** - Corrosion Protected Paint

Pos.6 - Design Series

- omit - Factory specified

NOTES:

- * The permissible output torque for shafts must not be exceeded!
- ** The color is by customer's request.

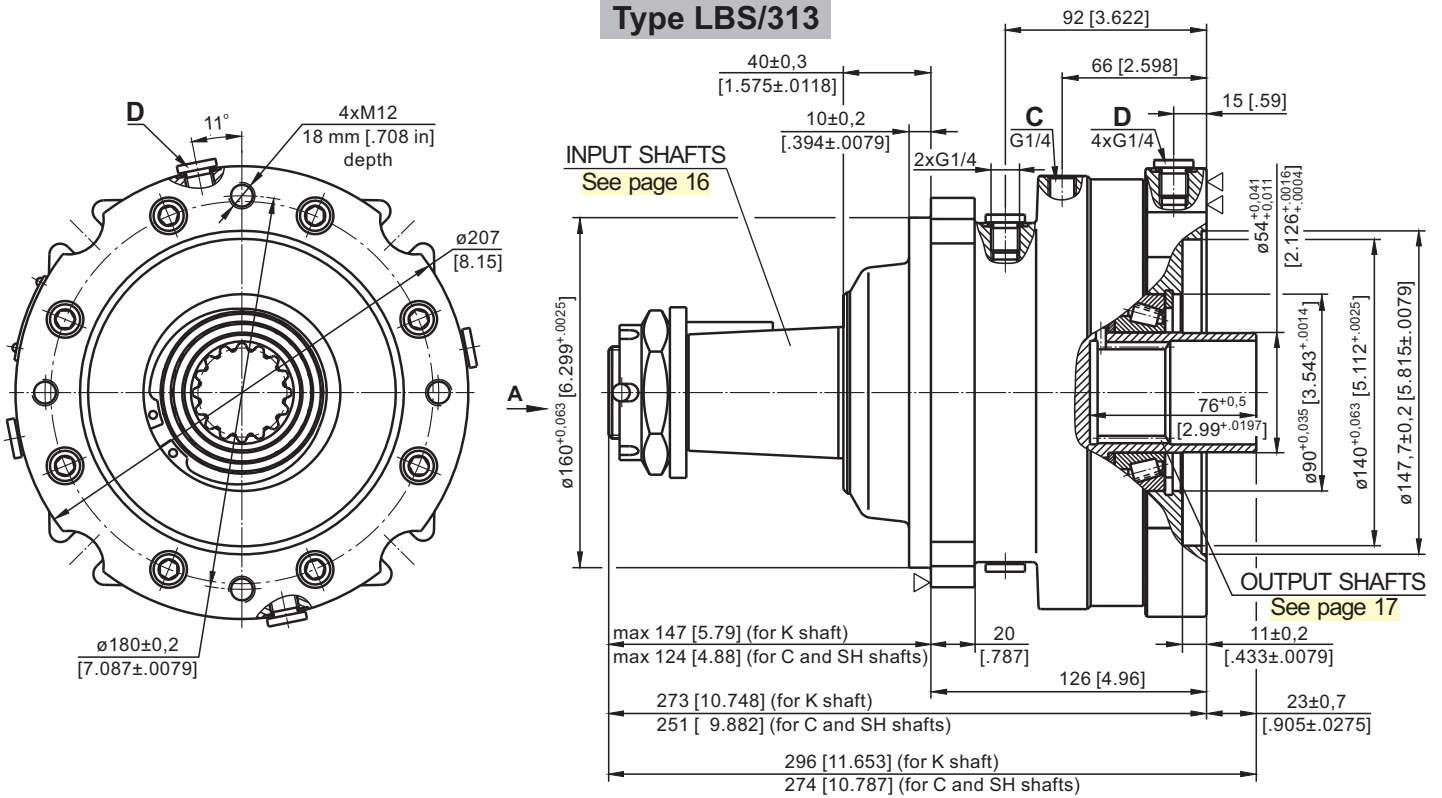
The Disc Brakes are mangano-phosphatized as standard.

ATTENTION:

- Hydraulic brake is delivered without oil (it is lubricated only).
- Fill the brake through the drain port **D** with 50 ÷ 120 cm³ [3.05 ÷ 7.32 in³] mineral oil HLP (DIN 51524) or HM (ISO 6743/4). LB/288 must be filled after the motor is assembled on the brake.
- In all brakes, friction discs and separators should be lubricated.

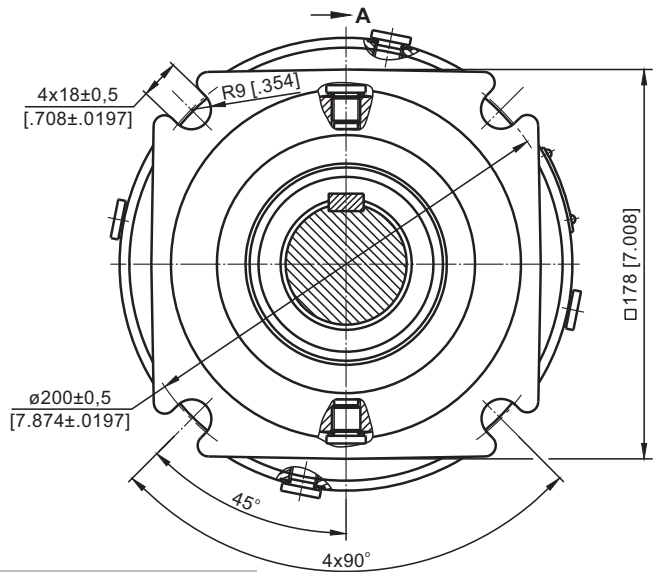
HYDRAULIC DISC BRAKES
for FLANGE ATTACHMENT to MVS HYDRAULIC MOTORS

Type LBS/313

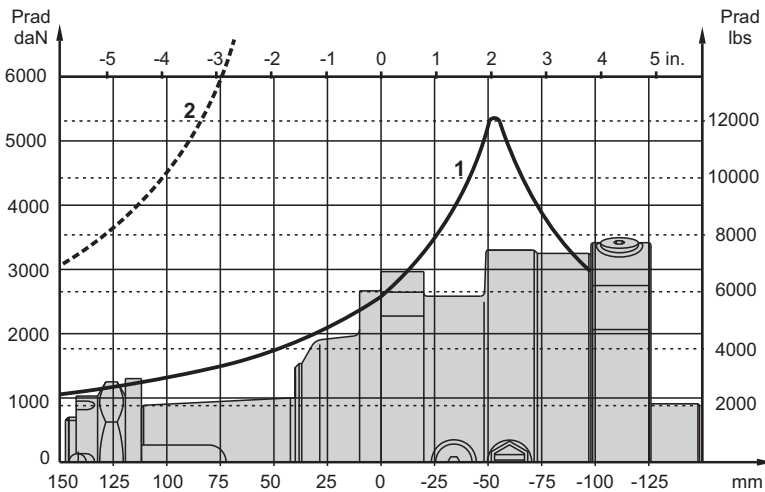


C: Brake release Port - G $\frac{1}{4}$, 12 mm [0.47 in] depth
D: Drainage tap - G $\frac{1}{4}$, 12 mm [0.47 in] depth

▽ - Place for attachment
▽▽ - Place for attachment
(tightening torque for screw M12x35 - 12.9 DIN 912,
 $10^{+0,5}$ daNm [885⁺⁴⁴ lb-in])



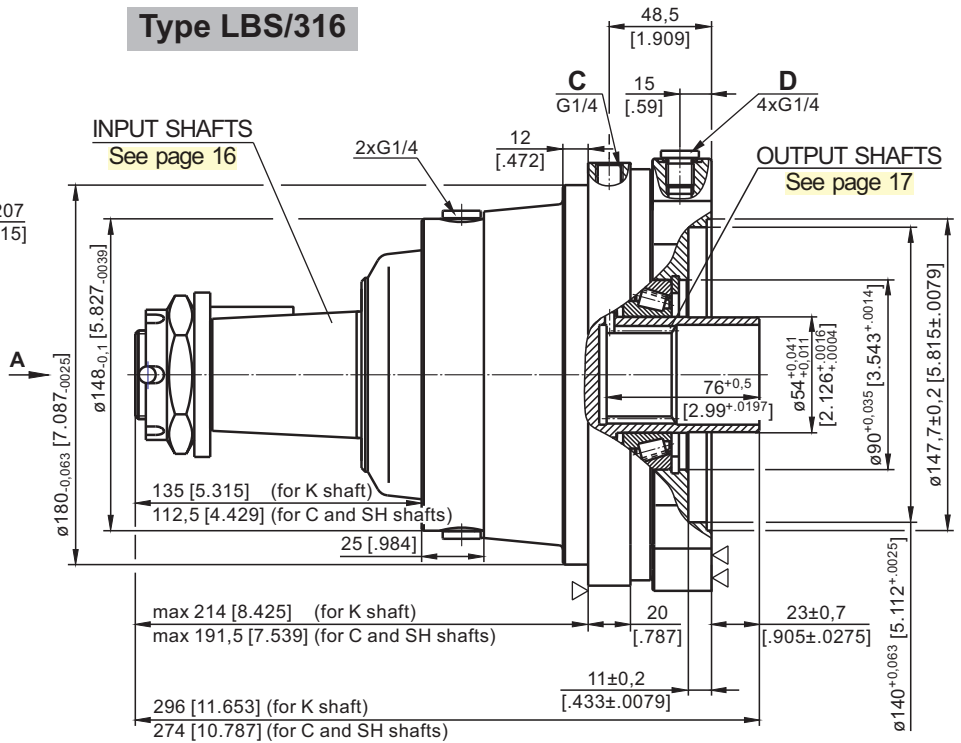
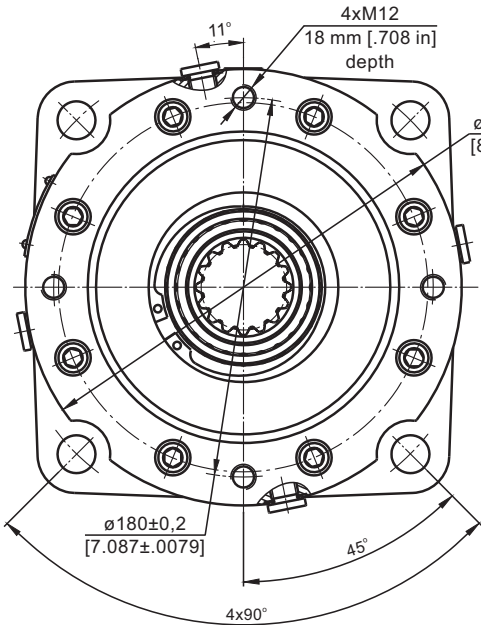
PERMISSIBLE SHAFT LOADS



1 - Bearing curve: The curve applies to a B10 bearing life of 3000 hours at 200 RPM.
2 - Shaft curve: The curve represents Max. permissible radial shaft load with safety factor 3:1.

HYDRAULIC DISC BRAKES
for FLANGE ATTACHMENT to MVS HYDRAULIC MOTORS

Type LBS/316

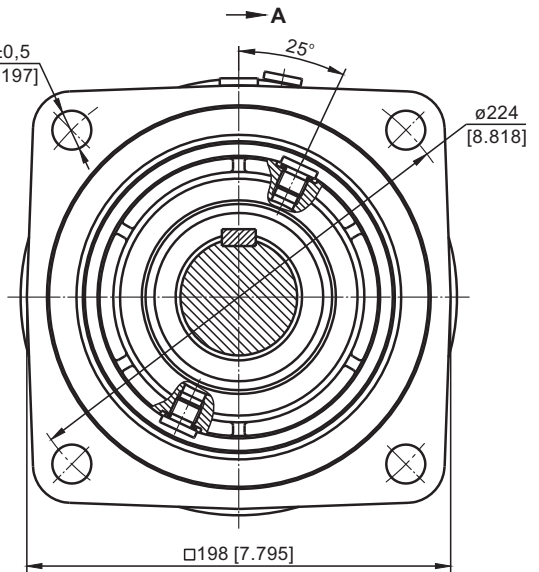


C: Brake release Port - G $\frac{1}{4}$, 12 mm [.47 in] depth

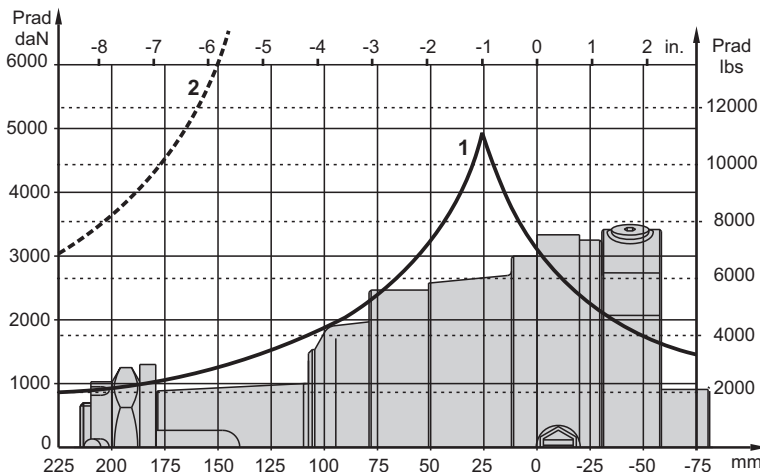
D: Drainage tap - G $\frac{1}{4}$, 12 mm [.47 in] depth

▽ - Place for attachment

▽▽ - Place for attachment
(tightening torque for screw M12x35 - 12.9 DIN 912,
10^{+0.5} daNm [885⁺⁴⁴ lb-in])



PERMISSIBLE SHAFT LOADS



- 1 - Bearing curve: The curve applies to a B10 bearing life of 3000 hours at 200 RPM.
- 2 - Shaft curve: The curve represents Max. permissible radial shaft load with safety factor 3:1.

SPECIFICATION DATA

Description LBS/313,316	21	29	43	65	85	110	130
*Min. Static Torque, daNm [lb-in]	18-23 [1593-2036]	28-33 [2478-2921]	42-47 [3717-4160]	61-71 [5399-6285]	83-94 [7346-8320]	108-118 [9559-10444]	127-137 [11240-12125]
Opening Pressure, bar [PSI]	min** 4-5 [58-72]	6-7 [87-101]	9-10 [130-145]	13-15 [188-217]	18-20 [261-290]	23-25 [333-362]	27-29 [391-420]
Min. oil quantity for brake releasing, cm ³ [in ³]	8 ÷ 9 [488 ÷ 549]						
Oil volume, cm ³ [in ³]	250 [15.25]						
Max. Pressure in drain space, bar [PSI]	5 [72]						
Weight for .../313 .../316 kg [lb]	25 [55.1]						
	26 [57.3]						

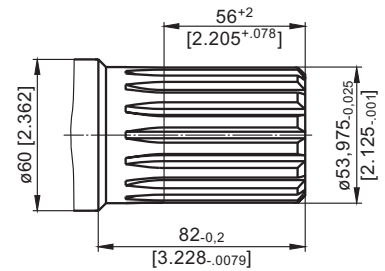
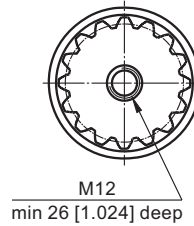
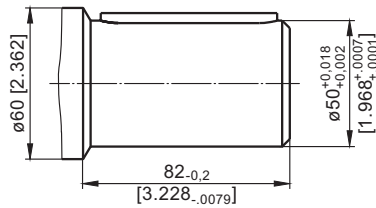
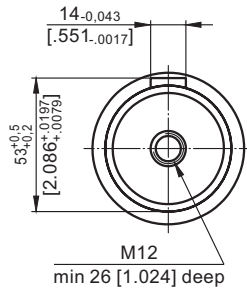
* Static torque is obtained at working pressure - 0 bar.

** The indicated value is a difference between the inlet pressure for driving of the brake and the drain pressure. Brakes must always have a drain line.

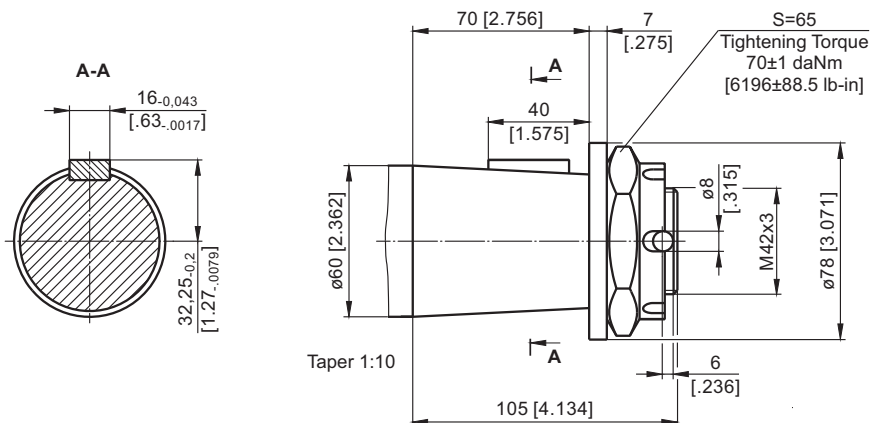
SHAFT EXTENSIONS

C - $\varnothing 50$ straight, Parallel key A14x9x70 DIN 6885
Max. Torque 271,2 daNm [24000 lb-in]

SH - $\varnothing 2\frac{1}{8}$ " splined, 16 DP 8/16 ANS B92.1-1976
Max. Torque 271,2 daNm [24000 lb-in]



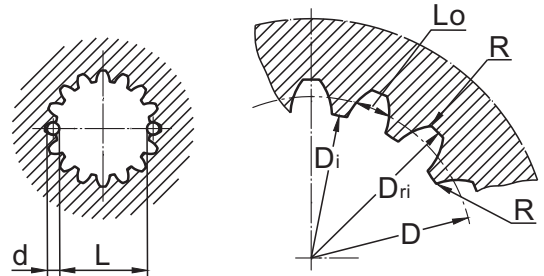
K - tapered 1:10, Parallel key B16x10x32 DIN 6885
Max. Torque 271,2 daNm [24000 lb-in]



INTERNAL SPLINE DATA for the ATTACHED COMPONENT

Standard ANS B92.1-1970, class 5
[$m=2.54$; corrected $x.m=+1,0$]

Fillet Root Side Fit		mm	inch
Number of Teeth	z	16	16
Diametral Pitch	DP	10/20	10/20
Pressure Angle		30°	30°
Pitch Dia.	D	40,640	1.6
Major Dia.	D _{ri}	45,2 ^{+0,4}	1.796 ^{+1.780}
Minor Dia.	D _i	38,5 ^{+0,039}	1.5175 ^{+1.516}
Space Width [Circular]	Lo	5,18±0,037	.2055±.2025
Fillet Radius	R	0,4	.015
Max. Measurement between Pins	L	32,47 ^{+0,15}	1.284 ^{+1.278}
Pin Dia.	d	5,6±0,001	.22051±.22043



Hardening Specification:
HV=750±50 on the surface.
HV=560 at 0,7±0,2 mm [.035±.019in] case depth
Material: 20 MoCr4 EN 10084 or better.

ORDER CODE

	1	2	3	4	5
LBS /		-			

Pos.1 - Design code

313 - for MVS motors

316 - for MVS motors (wheel mount)

Pos.2 - Static Torque code (see Specification data)

21, 29, 43, 65, 85, 110, 130

Pos.3 - Output Shaft Extensions*

C - ø50 straight, Parallel key A14x9x70 DIN6885

SH - ø2 1/8" splined, ANSI B 92.1-1976

K - ø60 tapered 1:10, Parallel key B16x10x32 DIN6885

Pos.4 - Option (Paint)**

omit - no Paint

P - Painted

PC - Corrosion Protected Paint

Pos.5 - Design Series

omit - Factory specified

NOTES:

* The permissible output torque for shafts must be not exceeded!

** The color is by customer's request.

The Disc Brakes are mangano-phosphatized as standard.

ATTENTION:

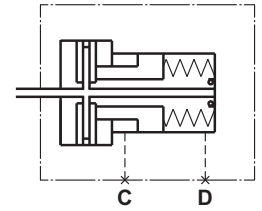
1. Hydraulic brake is delivered without oil (it is lubricated only).

2. In all brakes, friction discs and separators should be lubricated. Space is filled with 150 ÷ 300 cm³ [9.15 ÷ 18.3 in³] mineral oil HLP (DIN 51524) or HM (ISO 6743/4).

HYDRAULIC DISC BRAKES B...R - Wet

B...R brake is designed to be mounted to the wheels of low-speed agricultural and construction vehicles.

The advantage of these brakes is that despite the smallest possible dimensions they preserve long-term life of the bearings at high radial shaft load.



SPECIFICATION DATA

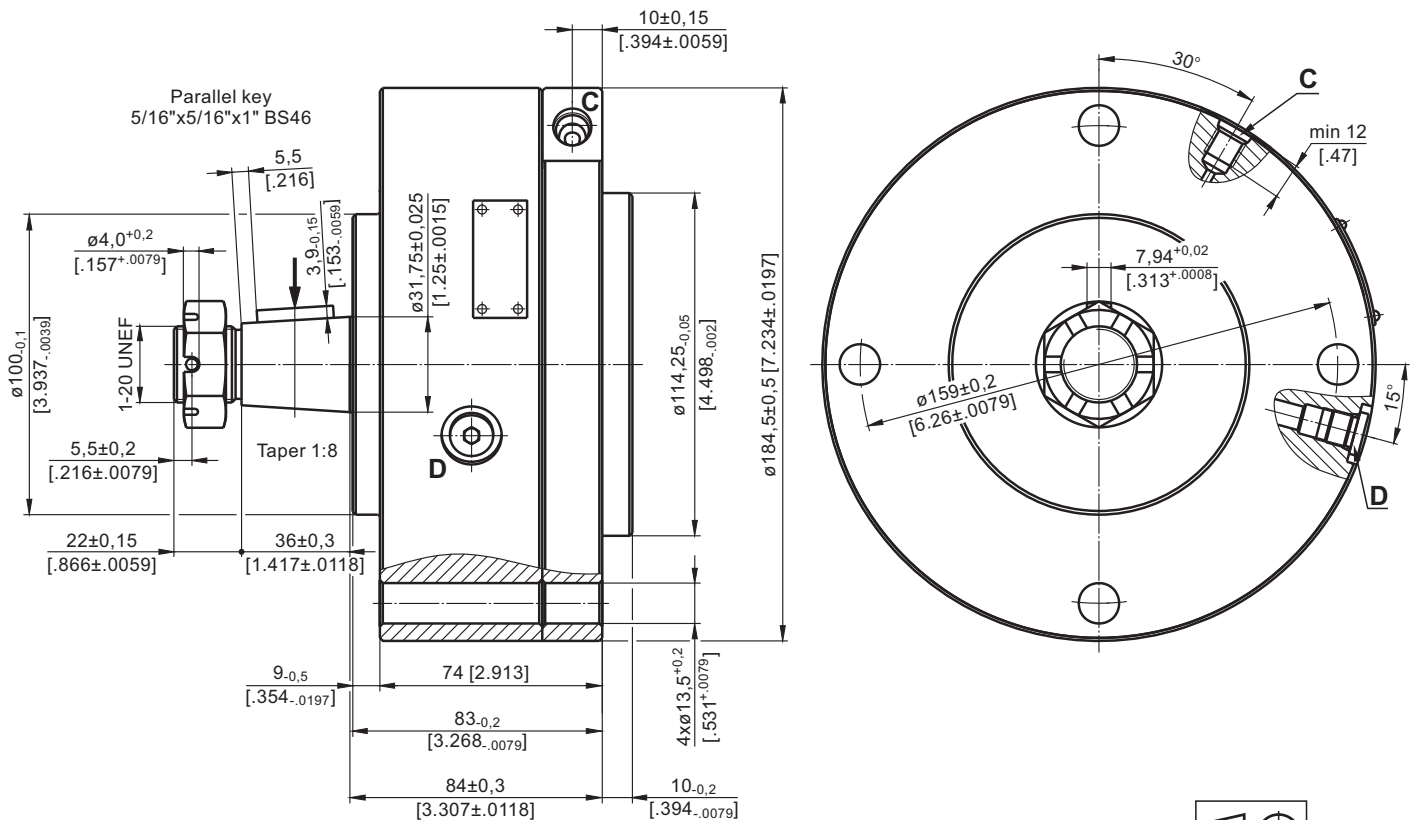
Type	B35R	B55R
Static Torque of Brake*, daNm [lb-in]	35 [3100]	55 [4870]
Initial Release Pressure, bar [PSI]	16 [232]	16 [232]
Full Release Pressure, bar [PSI]	19 [275]	19 [275]
Max. Operating Pressure, bar [PSI]	240 [3480]	240 [3480]
Max. Speed, RPM	90	90
Cont. Radial Shaft Load**, daN [lbs]	500 [1125]	500 [1125]
Max. Radial Shaft Load***, daN [lbs]	700 [1575]	900 [2030]

* At 0 bar [0 PSI] back pressure.

** At radial shaft load of 500 daN [1125 lbs], applied at center-line of the key and speed of rotation 90 RPM, the bearing life is 1000 hours.

*** The permissible values of radial shaft load may occur for max. 10% of every minute.

DIMENSIONS and MOUNTING DATA



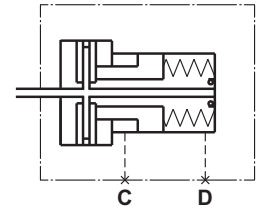
C: Brake Release Port - 7/16-20 UNF SAE J1926-1/ISO 11926-1

D: Drainage Tap - 7/16-20 UNF

HYDRAULIC DISC BRAKES B...T - Wet

B..T brake is designed to be mounted to the wheels of low-speed agricultural and construction vehicles.

The advantage of these brakes is that despite the smallest possible dimensions they preserve long-term life of the bearings at high radial shaft load.



SPECIFICATION DATA

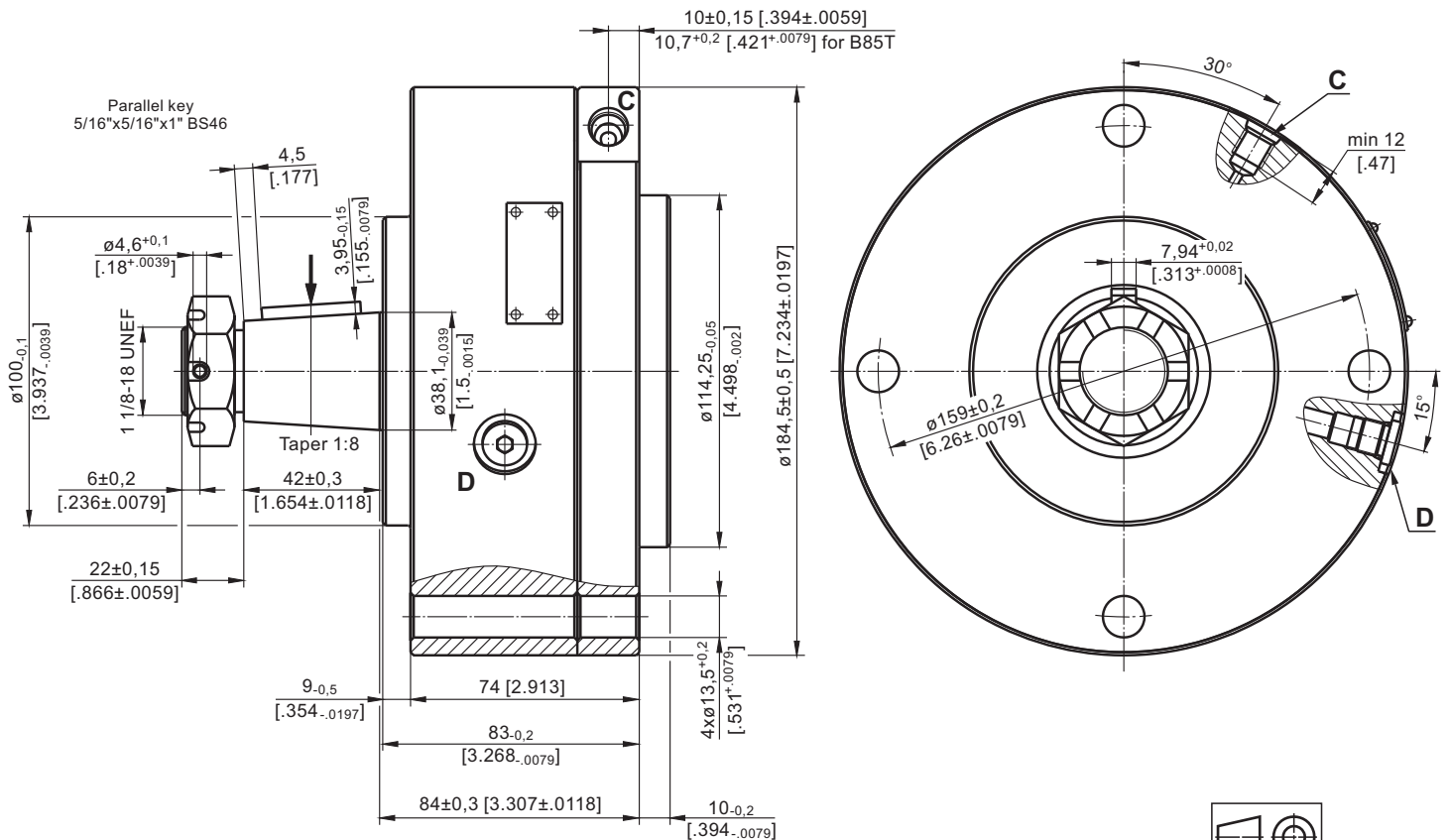
Type	B50T	B55T	B60T	B65T	B85T
Static Torque of Brake*, daNm [lb-in]	50 [4425]	55 [4870]	60 [5310]	65 [5750]	85 [7525]
Initial Release Pressure, bar [PSI]	16 [232]	16 [232]	16 [232]	17 [246]	18 [260]
Full Release Pressure, bar [PSI]	19 [275]	19 [275]	19 [275]	20 [290]	22 [320]
Max. Operating Pressure, bar [PSI]	240 [3480]	240 [3480]	240 [3480]	240 [3480]	240 [3480]
Max. Speed, RPM	60	60	60	60	60
Cont. Radial Shaft Load**, daN [lbs]	1000 [2250]	1000 [2250]	1000 [2250]	1000 [2250]	1500 [3370]
Max. Radial Shaft Load***, daN [lbs]	2150 [4830]	2150 [4830]	2150 [4830]	2150 [4830]	2250 [5060]

* At 0 bar [0 PSI] back pressure.

** At radial shaft load of 1000 daN [2250 lbs], applied at center-line of the key and speed of rotation 60 RPM, the bearing life is 1000 hours.

*** The permissible values of radial shaft load may occur for max. 10% of every minute.

DIMENSIONS and MOUNTING DATA



C: Brake Release Port - 7/16-20 UNF SAE J1926-1/ISO 11926-1

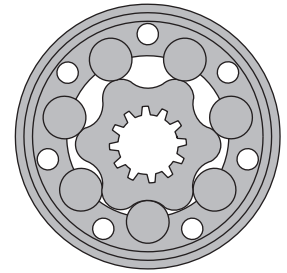
D: Drainage Tap - 7/16-20 UNF

HYDRAULIC MOTOR-BRAKE B/MR



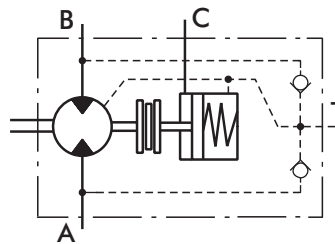
APPLICATION

- » Conveyors
- » Feeding mechanism of robots and manipulators
- » Metal working machines
- » Textile machines
- » Agricultural machines
- » Food industries
- » Grass cutting machinery etc.



CONTENTS

Specification data	22
Dimensions and mounting	23÷24
Shaft extensions	25
Permissible shaft loads	26
Order code	27



OPTIONS

- » Model - Spool valve, roll-gerotor
- » Fully integrated friction disk brake
- » Side port
- » Shafts - straight, tapered, splined
- » BSPP ports
- » Needle bearings
- » Flanges SAE-A, magneto 4 bolts.

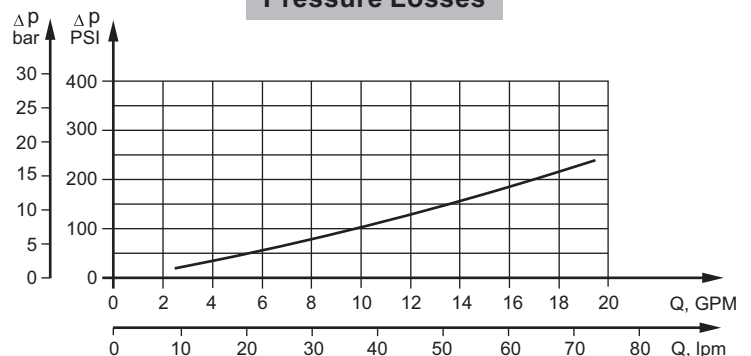
GENERAL

		Min.	Max.
Displacement,	cm ³ /rev [in ³ /rev]	80,3 [4.90]	199,8 [12.19]
Speed,	[RPM]	cont.: 500 int.: 600	cont.: 300 int.: 375
Torque,	daNm [lb-in]	cont.: 19,5 [1725] int.: 22 [1947]	cont.: 45 [3980] int.: 50 [4425]
Output,	kW [HP]	cont.: 8,4 [11.2] int.: 9,6 [12.9]	cont.: 11 [14.8] int.: 13 [17.4]
Pressure Drop,	bar [PSI]	cont.: 175 [2540] int.: 200 [2900]	cont.: 175 [2540] int.: 200 [2900]
Oil Flow,	lpm [GPM]	cont.: 40 [10.5] int.: 48 [12.7]	cont.: 60 [15.9] int.: 75 [19.8]
Min. Speed,	[RPM]	10	
Permissible Shaft Loads,	daNm [lb-in]	P _a =200 [450]	
Pressure fluid		Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)	
Temperature range,	°C [°F]	-40÷140 [-40÷284]	
Optimal Viscosity range,	mm ² /s [SUS]	20÷75 [98÷347]	
Filtration		ISO code 18/16/13	According to ISO 4406 - 1999

Oil flow in drain line

Pressure drop bar [PSI]	Viscosity mm ² /s [SUS]	Oil flow in drain line lpm [GPM]
100 [1450]	20 [98]	2,5 [.660]
	35 [164]	1,8 [.476]
140 [2030]	20 [98]	3,5 [.925]
	35 [164]	2,8 [.740]

Pressure Losses



SPECIFICATION DATA

Type		B/MR 80	B/MR 100	B/MR 125	B/MR 160	B/MR 160 CB	B/MR 200	B/MR 200 CB
Displacement, cm³/rev [in³/rev]		80,3	99,8	125,7	159,6		199,8	
		[4.90]	[6.09]	[7.67]	[9.74]		[12.19]	
Max. Speed, [RPM]	Cont.	500	500	475	375		300	
	Int.*	600	600	600	470		375	
Max. Torque, daNm [lb-in]	Cont.	19,5 [1725]	24 [2125]	30 [2655]	30 [2655]	39 [3450]	30 [2655]	45 [3980]
	Int.*	22 [1947]	28 [2480]	34 [3010]	39 [3450]	43 [3805]	39 [3450]	50 [4425]
	Peak**	27 [2390]	32 [2832]	37 [3275]	46 [4070]	46 [4070]	56 [4955]	56 [4955]
Max. Output, kW [HP]	Cont.	8,4 [11.2]	10,8 [14.5]	12,5 [16.8]	10 [13.4]	11,5 [15.4]	7,8 [10.5]	11 [14.8]
	Int.*	9,6 [12.9]	12 [16.1]	14,5 [19.5]	12,5 [16.8]	14 [18.8]	12,4 [16.6]	13 [17.4]
Max. Pressure Drop, bar [PSI]	Cont.	175 [2540]	175 [2540]	175 [2540]	135 [1960]	175 [2540]	115 [1668]	175 [2540]
	Int.*	200 [2900]	200 [2900]	200 [2900]	175 [2540]	200 [2900]	150 [2175]	200 [2900]
	Peak**	225 [3263]	225 [3263]	225 [3263]	225 [3263]	225 [3263]	225 [3263]	225 [3263]
Max. Oil Flow, lpm [GPM]	Cont.	40 [10.5]	50 [13.2]	60 [15.9]				
	Int.*	48 [12.7]	60 [15.9]	75 [19.8]				
Max. Inlet Pressure, bar [PSI]	Cont.	175 [2540]						
	Int.*	200 [2900]						
	Peak**	225 [3263]						
Max. Starting Pressure, bar [PSI]		10 [145]	10 [145]	9 [130]	7 [102]		5 [73]	
Min. Starting Torque, daNm [lb-in]	At max.press.drop Cont.	15 [1330]	20 [1770]	25 [2215]	24 [2124]	32 [2832]	26 [2301]	41 [3628]
	At max.press.drop Int.*	17 [1505]	23 [2035]	28 [2480]	32 [2832]	37 [3275]	33 [2920]	46 [4071]
Min. Speed***, [RPM]		10						
Static Torque of Brake, daNm [lb-in]		55 [4868]						
Min. Brake Release Pressure****, bar [PSI]		13 [190]						
Max. Opening Pressure, bar [PSI]		200 [2900]						
Weight, kg [lb]		11,0 [24.3]	11,2 [24.7]	11,4 [25.2]	11,6 [25.6]	11,7 [25.8]	12,2 [26.9]	12,3 [27.12]

* Intermittent operation: the permissible values may occur for max. 10% of every minute.

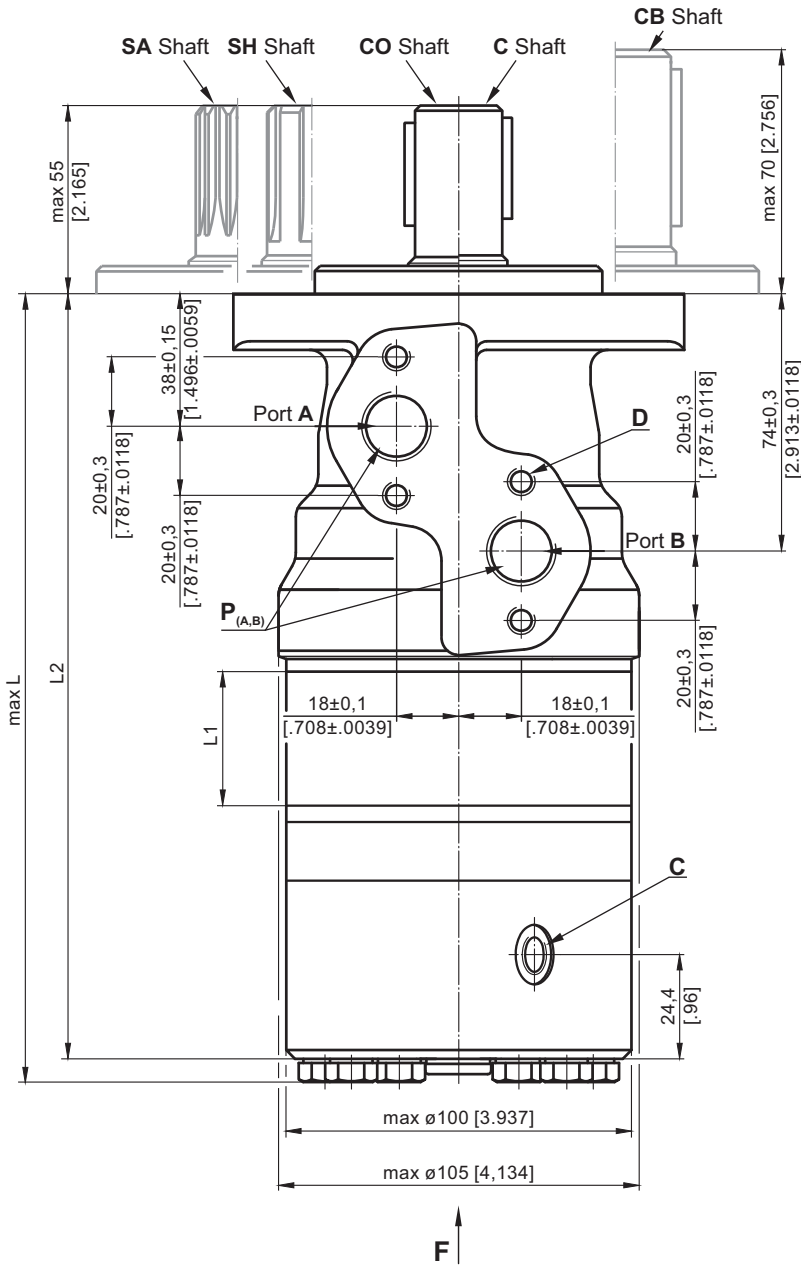
** Peak load: the permissible values may occur for max. 1% of every minute.

*** For speeds lower than given, consult factory or your regional manager.

**** Motor-brakes must always have a drain line. The brake release pressure is the difference between the pressure in the brake release line and the pressure in the drain line

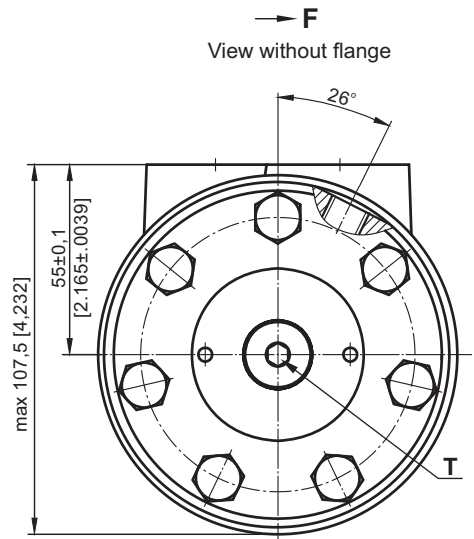
- Intermittent speed and intermittent pressure must not occur simultaneously.
- Recommended filtration is per ISO cleanliness code 18/16/13. A nominal filtration of 25 micron or better.
- Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM (ISO 6743/4).
If using synthetic fluids consult the factory for alternative seal materials.
- Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].
- Recommended maximum system operating temperature is 82°C [180°F].
- To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

DIMENSIONS and MOUNTING DATA



Shaft Dim.
See Page 25

Flange Dim.
See Page 24



- P_(A,B)** : 2xG1/2 - 15 [.59 in] mm depth
- C** : Brake release port G1/4 - 12 [.47 in] mm depth
- T** : Drain port G1/4 - 12 [.47 in] mm depth
- D** : 4xM8 - 13 mm [.51 in] depth

Type	L1, mm [in]	L2, mm [in]	L, mm [in]
B/MR 80	14,0 [.55]	205,5 [8.09]	213,5 [8.41]
B/MR 100	17,4 [.69]	209,0 [8.23]	217,0 [8.54]
B/MR 125	21,8 [.86]	213,5 [8.41]	221,5 [8.72]
B/MR 160	27,8 [1.09]	219,5 [8.64]	227,5 [8.96]
B/MR 200	34,8 [1.37]	226,5 [8.92]	234,5 [9.23]

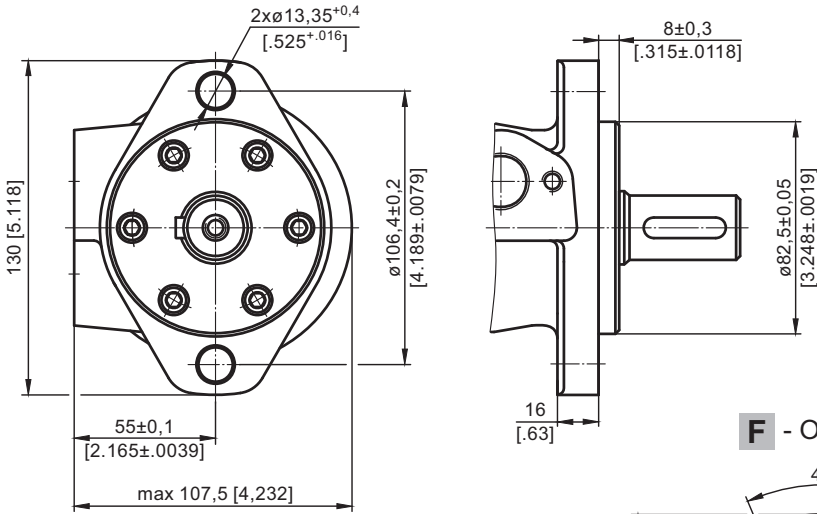
Standard Rotation
Viewed from Shaft End
Port A Pressurized - **CW**
Port B Pressurized - **CCW**

Reverse Rotation
Viewed from Shaft End
Port A Pressurized - **CCW**
Port B Pressurized - **CW**

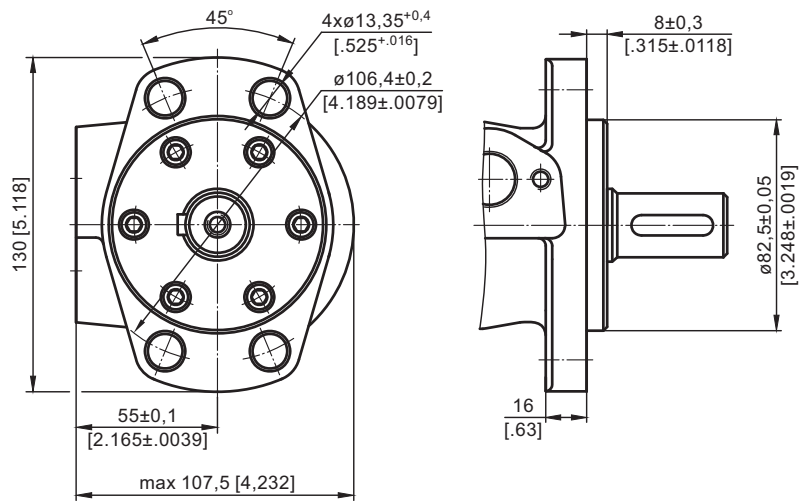


MOUNTING

Oval Mount (2 Holes) similar to SAE-A flange with 2 holes



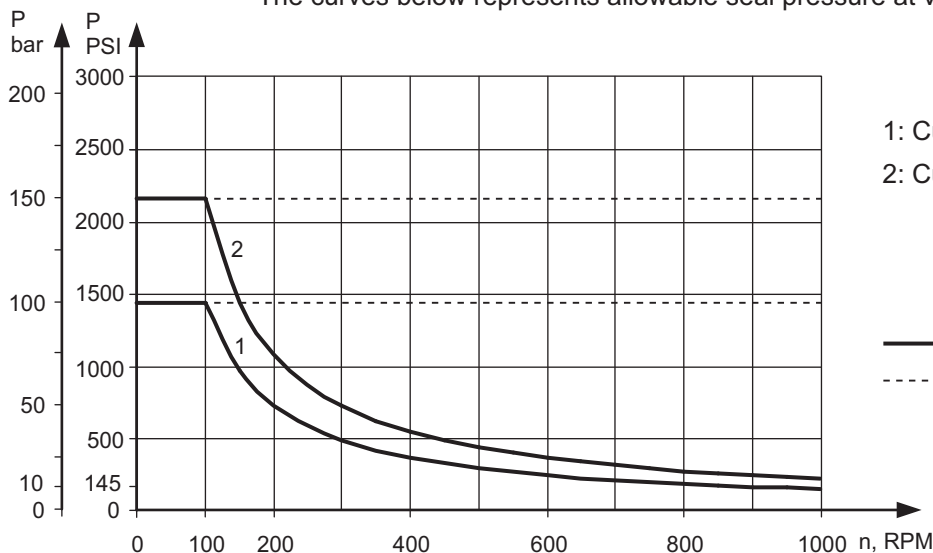
F - Oval Mount (4 Holes) similar to SAE-A flange



MAX. PERMISSIBLE SHAFT SEAL PRESSURE

Maximum return pressure or max. pressure in the drain line. The drain line must be always in use! The brake release pressure is the difference between the pressure in the brake release line and the pressure in the drain line.

The curves below represents allowable seal pressure at various speeds

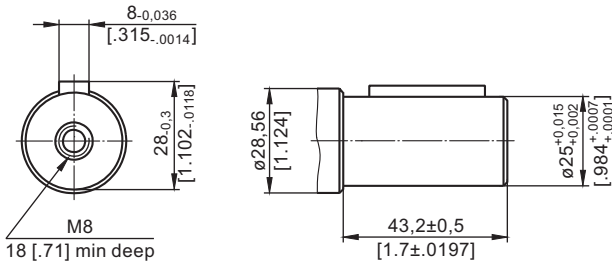


- 1: Curve for shaft type CB.
- 2: Curve for shaft type C, CO, SH and SA.
- - continuous operations
- - - - - intermittent operations

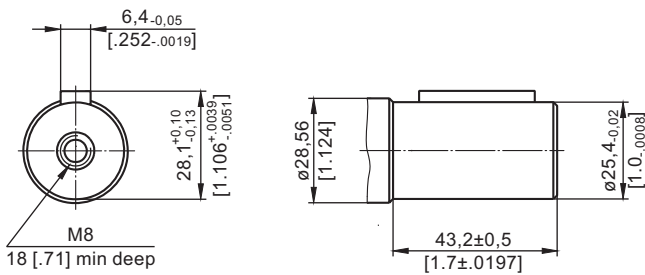
SHAFT EXTENSIONS

C, CO, SH and SA shafts
SHAFT WITH SEAL DIAMETER 28,56 mm

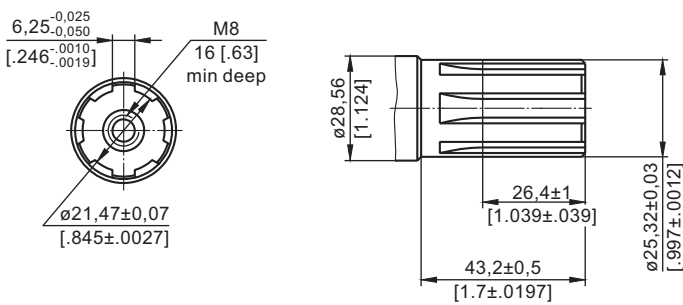
C - $\varnothing 25$ straight, Parallel key A8x7x32 DIN 6885
Max. Torque 34 daNm [3010 lb-in]



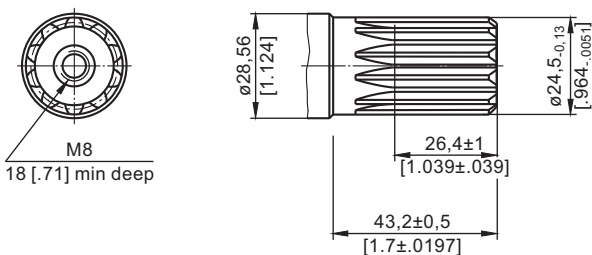
CO - $\varnothing 1$ straight, Parallel key $\frac{1}{4} \times \frac{1}{4} \times 1 \frac{1}{4}$ " BS46
Max. Torque 34 daNm [3010 lb-in]



SH - splined, BS 2059 (SAE 6B)
Max. Torque 40 daNm [3540 lb-in]

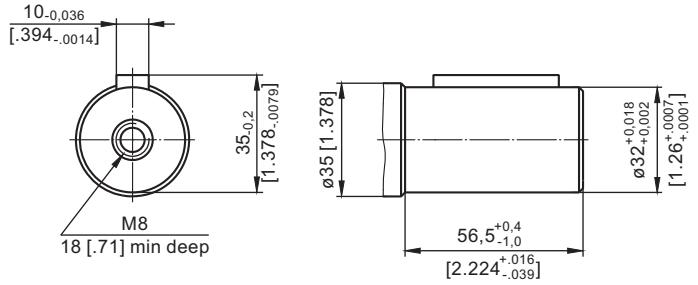


SA - splined, B25x22h9 DIN 5482
Max. Torque 40 daNm [3540 lb-in]



CB shaft
SHAFT WITH SEAL DIAMETER 35 mm /type ...B/

CB - $\varnothing 32$ straight, Parallel key A10x8x45 DIN 6885
Max. Torque 77 daNm [6815 lb-in]

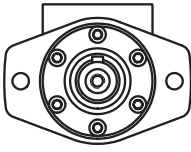
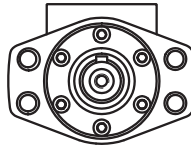


PERMISSIBLE SHAFT LOADS

The permissible radial shaft load P_{rad} depends on the speed n , RPM; distance L from the point of load to the mounting flange and shaft version.

B/MR...

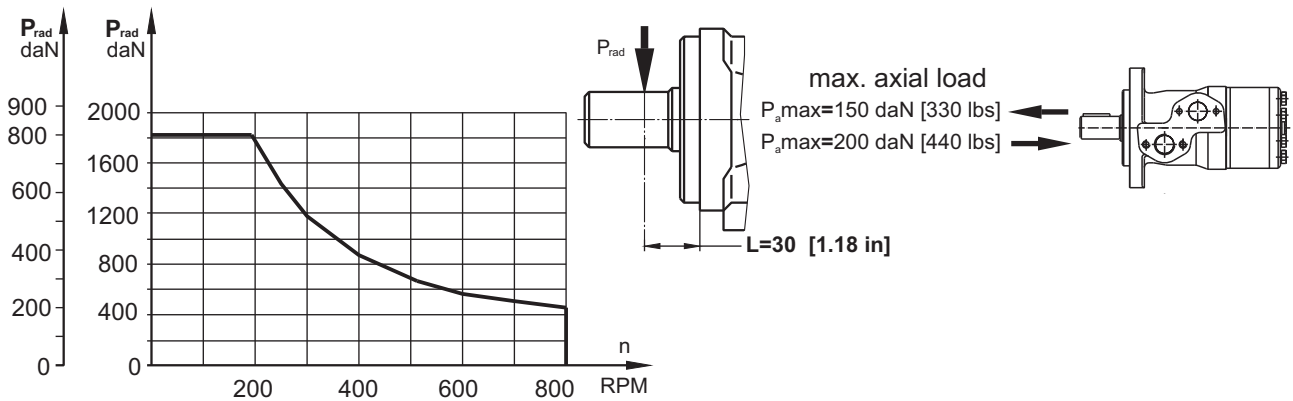
Radial Shaft Load for slide dearing]

Mounting Flange		
Shaft Version	cylindrical - C, CO splined - SH, SA	cylindrical - CB
Radial Shaft Load P_{rad} , in mm	$\frac{800}{n} \times \frac{25000}{95+L}$, daN*	$\frac{800}{n} \times \frac{18750}{95+L}$, daN*
Radial Shaft Load P_{rad} , in inch	$\frac{800}{RPM} \times \frac{2215}{3.74+L}$, lbs*	$\frac{800}{RPM} \times \frac{1660}{3.74+L}$, lbs*

* $n \leq 200$ RPM; max P_{rad} =800 daN [1800 lbs]

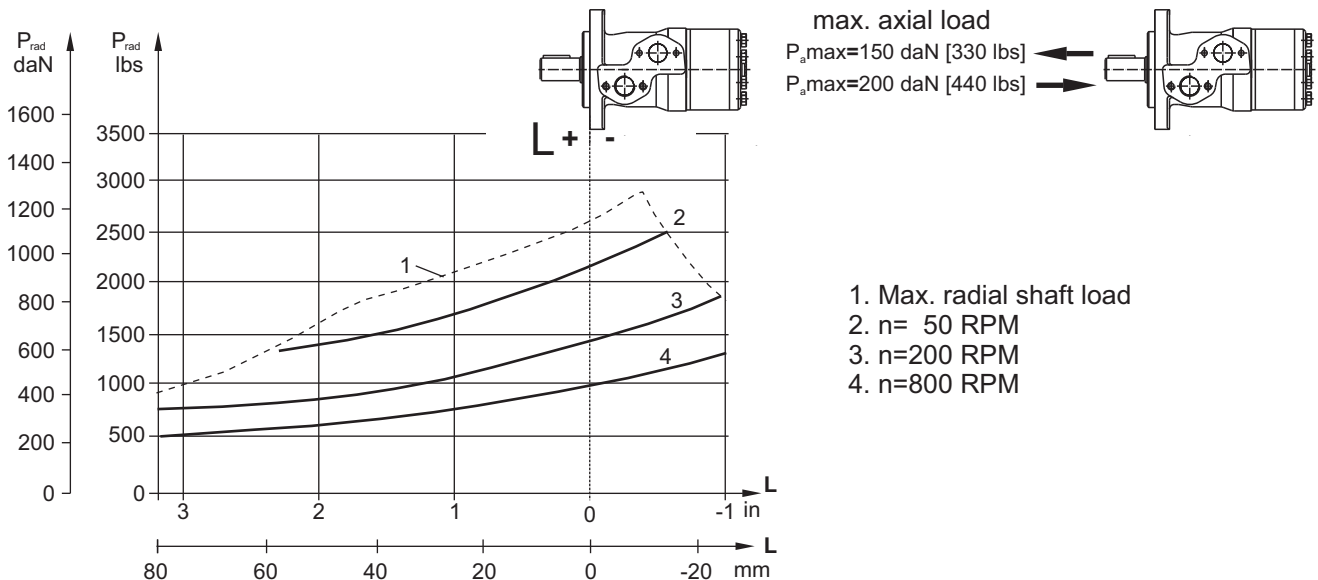
$n \geq 200$ RPM; $L < 55$ mm [2.2 in]

Radial Shaft Load P_{rad} by $L=30$ mm [1.18 in]



B/MR...N...

Radial Shaft Load for needle bearing **pos.2** option N
The curves apply to a B10 bearing life of 2000 hours.



- 1. Max. radial shaft load
- 2. $n = 50$ RPM
- 3. $n = 200$ RPM
- 4. $n = 800$ RPM

ORDER CODE

	1	2	3	4	5	6	7
B/MR							

- Pos.1 - Mounting Flange**
omit - Oval mount, two holes
F - Oval mount, four holes
- Pos.2 - Bearing Option**
omit - slide bearing
N - needle bearings, only for pos.4 option C, CO, SH and SA
- Pos.3 - Displacement code**
- | | |
|------------|---|
| 80 | - 80,3 cm ³ /rev [4.90 in ³ /rev] |
| 100 | - 99,8 cm ³ /rev [6.09 in ³ /rev] |
| 125 | - 125,7 cm ³ /rev [7.67 in ³ /rev] |
| 160 | - 159,6 cm ³ /rev [9.74 in ³ /rev] |
| 200 | - 199,8 cm ³ /rev [12.19 in ³ /rev] |
- Pos.4 - Shaft Extensions***
- | | |
|-----------|--|
| C | - ø25 straight, Parallel key A8x7x32 DIN6885 |
| CO | - ø1" straight, Parallel key ¼"x¼"x1¼" BS46 |
| SH | - ø25,32 splined BS 2059 (SAE 6B) |
| SA | - ø24,5 splined B25x22 DIN 5482 |
- SHAFT WITH SEAL DIAMETER 35 mm /type ...B/
CB - ø32 straight, Parallel key A10x8x45 DIN6885
- Pos.5 - Shaft Seal**
omit - Shaft seal, for pressure and speed check [page 24](#)
- Pos.6 - Additional Options** (see [page 77](#))
- Pos.7 - Design Series**
omit - Factory specified

NOTES: * The permissible output torque for shafts must not be exceeded!

The following combinations are not allowed:- **N** option with "...**B**" shafts

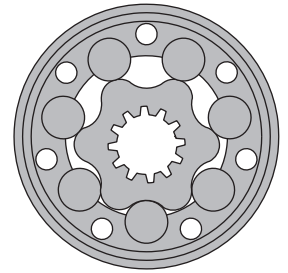
The motor-brakes are mangano-phosphatized as standard.

HYDRAULIC MOTOR-BRAKE BD/MR



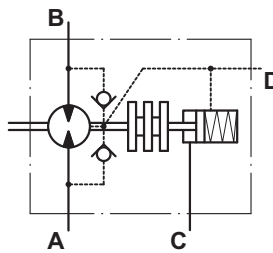
APPLICATION

- » Conveyors
- » Feeding mechanism of robots and manipulators
- » Metal working machines
- » Textile machines
- » Agricultural machines
- » Food industries
- » Mining machinery etc.



CONTENTS

Specification data	27÷28
Dimensions and mounting	29÷30
Shaft extensions	31
Permissible shaft loads	32
Order code	33



OPTIONS

- » Model - Spool valve, roll-gerotor
- » Fully integrated friction disk brake
- » Side port
- » Shafts - straight, tapered, splined
- » BSPP ports
- » Needle bearings
- » Flanges SAE-A, magento 4 bolts.

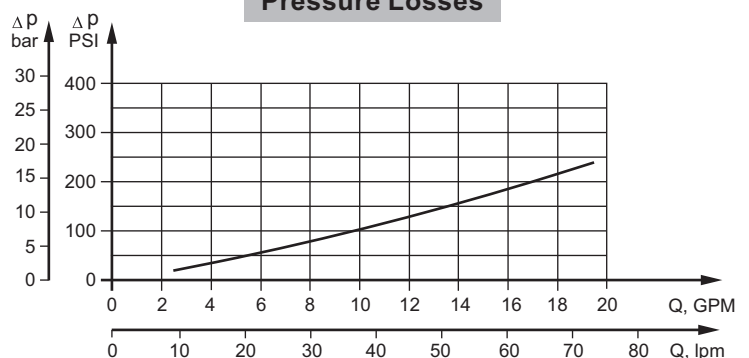
GENERAL

		Min.	Max.
Displacement,	cm ³ /rev [in ³ /rev]	80,3 [4.9]	397 [24.23]
Speed,	[RPM]	cont.: 750 int.: 940	cont.: 150 int.: 190
Torque,	daNm [lb-in]	cont.: 20 [1770] int.: 22 [1947]	cont.: 61 [5398] int.: 69 [6106]
Output,	kW [HP]	cont.: 12,5 [17] int.: 15 [20.1]	cont.: 7,8 [10.6] int.: 10,6 [14.4]
Pressure Drop,	bar [PSI]	cont.: 175 [2540] int.: 200 [2900]	cont.: 110 [1595] int.: 140 [2030]
Oil Flow,	lpm [GPM]	cont.: 60 [16] int.: 75 [20]	
Min. Speed,	[RPM]	10	
Permissible Shaft Loads,	daNm [lb-in]	P _a =200 [450]	
Pressure fluid		Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)	
Temperature range,	°C [°F]	-40÷140 [-40÷284]	
Optimal Viscosity range,	mm ² /s [SUS]	20÷75 [98÷347]	
Filtration		ISO code 18/16/13	According to ISO 4406 - 1999

Oil flow in drain line

Pressure drop bar [PSI]	Viscosity mm ² /s [SUS]	Oil flow in drain line lpm [GPM]
100 [1450]	20 [98]	2,5 [.660]
	35 [164]	1,8 [.476]
140 [2030]	20 [98]	3,5 [.925]
	35 [164]	2,8 [.740]

Pressure Losses



SPECIFICATION DATA

Specification Data for BD/MR... motors with **C, CO, SH, SA, K** and **SB** shafts.

Type		BD/MR 80	BD/MR 100	BD/MR 125	BD/MR 160	BD/MR 200	BD/MR 250	BD/MR 315	BD/MR 400
Displacement, cm³/rev [in³/rev]		80,3 [4.9]	99,8 [6.09]	125,7 [7.67]	159,6 [9.74]	199,8 [12.19]	250,1 [15.26]	315,7 [19.26]	397 [24.4]
Max. Speed, [RPM]	Cont.	750	600	475	375	300	240	190	150
	Int.*	940	750	600	470	375	300	240	190
Max. Torque, daNm [lb-in]	Cont.	20 [1770]	24 [2124]	30 [2655]	39 [3452]	38,5 [3407]	39 [3452]	36 [3186]	38 [3363]
	Int.*	22 [1947]	28 [2478]	34 [3010]	43 [3805]	46 [4070]	47 [4160]	47 [4160]	47 [4160]
	Peak**	27 [2390]	32 [2832]	37 [3275]	46 [4070]	56 [4960]	60 [5310]	61 [5399]	61 [5399]
Max. Output, kW [HP]	Cont.	12,5 [17]	13 [17.4]	12,5 [16.8]	11,5 [15.4]	9,0 [12.2]	8 [10.9]	6 [8.2]	4,8 [6.5]
	Int.*	15 [20.1]	15 [20.1]	14,5 [19.4]	14 [18.8]	12 [16.3]	9,5 [13]	8 [10.9]	6,8 [9.2]
Max. Pressure Drop, bar [PSI]	Cont.	175 [2540]	175 [2540]	175 [2540]	175 [2540]	140 [2030]	110 [1595]	85 [1232]	65 [943]
	Int.*	200 [2900]	200 [2900]	200 [2900]	200 [2900]	175 [2540]	140 [2030]	115 [1668]	90 [1305]
	Peak**	225 [3260]	225 [3260]	225 [3260]	225 [3260]	225 [3260]	200 [2900]	150 [2176]	115 [1668]
Max. Oil Flow, lpm [GPM]	Cont.	60 [16]	60 [16]	60 [16]	60 [16]	60 [16]	60 [16]	60 [16]	60 [16]
	Int.*	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]	75 [20]
Max. Inlet Pressure, bar [PSI]	Cont.	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]
	Int.*	200 [2900]	200 [2900]	200 [2900]	200 [2900]	200 [2900]	200 [2900]	200 [2900]	200 [2900]
	Peak**	225 [3260]	225 [3260]	225 [3260]	225 [3260]	225 [3260]	225 [3260]	225 [3260]	225 [3260]
Max. Starting Pressure with Unloaded Shaft and released brake, bar [PSI]		10 [145]	10 [145]	9 [130]	7 [102]	5 [73]	4 [58]	3 [44]	3 [44]
Min. Starting Torque, daNm [lb-in]	At max.press. drop Cont.	15 [1330]	20 [1770]	24 [2124]	32 [2832]	33 [2920]	31 [2744]	31,5 [2788]	31,5 [2788]
	At max.press. drop Int.*	17 [1505]	23 [2035]	28 [2480]	37 [3275]	46 [4070]	55 [4870]	66 [5840]	61 [5400]
Min. Holding Torque, daNm [lb-in]		40 [3540]							
Min. Release Pressure****, bar [PSI]		21 [305]							
Max. Brake Release Pressure****, bar [PSI]		200 [2900]							
Min. Speed***, [RPM]		10	10	10	10	10	10	10	10
Weight, kg [lb]		11,5 [25.35]	12 [26.45]	12,3 [27.12]	12,5 [27.56]	13 [28.66]	13,5 [29.76]	14 [30.86]	14,5 [31.97]

* Intermittent operation: the permissible values may occur for max. 10% of every minute.

** Peak load: the permissible values may occur for max. 1% of every minute.

*** For speeds lower than given, consult factory or your regional manager.

**** Motor-brakes must always have a drain line. The brake release pressure is the difference between the pressure in the brake release line and the pressure in the drain line

- Intermittent speed and intermittent pressure must not occur simultaneously.
- Recommended filtration is per ISO cleanliness code 18/16/13. A nominal filtration of 25 micron or better.
- Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM (ISO 6743/4).
If using synthetic fluids consult the factory for alternative seal materials.
- Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].
- Recommended maximum system operating temperature is 82°C [180°F].
- To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

SPECIFICATION DATA (continued)

Specification Data for BD/MR... motors with **CB**, **HB**, **KB** and **OB** shafts.

Type		BD/MR 80	BD/MR 100	BD/MR 125	BD/MR 160	BD/MR 200	BD/MR 250	BD/MR 315	BD/MR 400
Displacement, cm³/rev [in³/rev]		80,3 [4.90]	99,8 [6.09]	125,7 [7.67]	159,6 [9.74]	199,8 [12.19]	250,1 [15.26]	315,7 [19.26]	397 [24.4]
Max. Speed, [RPM]	Cont.	750	600	475	375	300	240	190	150
	Int.*	940	750	600	470	375	300	240	190
Max. Torque, daNm [lb-in]	Cont.	20 [1770]	24 [2125]	30 [2655]	39 [3450]	45 [4000]	54 [4780]	55 [4870]	61 [5400]
	Int.*	22 [1950]	28 [2480]	34 [3010]	43 [3805]	50 [4425]	61 [5400]	69 [6110]	69 [6110]
	Peak**	27 [2390]	32 [2830]	37 [3275]	46 [4070]	56 [4960]	71 [6280]	84 [7435]	87 [7700]
Max. Output, kW [HP]	Cont.	12,5 [16.8]	13 [17.4]	12,5 [16.8]	11,5 [15.4]	11 [14.8]	10 [13.4]	9 [12]	7,8 [10.5]
	Int.*	15 [20.1]	15 [20.1]	14,5 [19.5]	14 [18.8]	13 [17.4]	12 [16.1]	10 [13.4]	10,6 [14.2]
Max. Pressure Drop, bar [PSI]	Cont.	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]	135 [1960]	110 [1600]
	Int.*	200 [2900]	200 [2900]	200 [2900]	200 [2900]	200 [2900]	200 [2900]	175 [2540]	140 [2030]
	Peak**	225 [3260]	225 [3260]	225 [3260]	225 [3260]	225 [3260]	225 [3260]	210 [3045]	175 [2540]
Max. Oil Flow, lpm [GPM]	Cont.	60 [15.8]	60 [15.8]	60 [15.8]	60 [15.8]	60 [15.8]	60 [15.8]	60 [15.8]	60 [15.8]
	Int.*	75 [19.8]	75 [19.8]	75 [19.8]	75 [19.8]	75 [19.8]	75 [19.8]	75 [19.8]	75 [19.8]
Max. Inlet Pressure, bar [PSI]	Cont.	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]
	Int.*	200 [2900]	200 [2900]	200 [2900]	200 [2900]	200 [2900]	200 [2900]	200 [2900]	200 [2900]
	Peak**	225 [3260]	225 [3260]	225 [3260]	225 [3260]	225 [3260]	225 [3260]	225 [3260]	225 [3260]
Max. Starting Pressure with Unloaded Shaft and released brake, bar [PSI]		10 [145]	10 [145]	9 [130]	7 [102]	5 [73]	4 [58]	3 [44]	3 [44]
Min. Starting Torque, daNm [lb-in]	At max.press. drop Cont.	15 [1330]	20 [1770]	24 [2124]	32 [2832]	33 [2920]	31 [2744]	31,5 [2788]	31,5 [2788]
	At max.press. drop Int.*	17 [1505]	23 [2035]	28 [2480]	37 [3275]	46 [4070]	55 [4870]	66 [5840]	61 [5400]
Min. Holding Torque, daNm [lb-in]		40 [3540]							
Min. Release Pressure****, bar [PSI]		21 [305]							
Max. Brake Release Pressure****, bar [PSI]		200 [2900]							
Min. Speed***, [RPM]		10	10	10	10	10	10	10	10
Weight, kg [lb]		11,5 [25.35]	12 [26.45]	12,3 [27.12]	12,5 [27.56]	13 [28.66]	13,5 [29.76]	14 [30.86]	14,5 [31.97]

* Intermittent operation: the permissible values may occur for max. 10% of every minute.

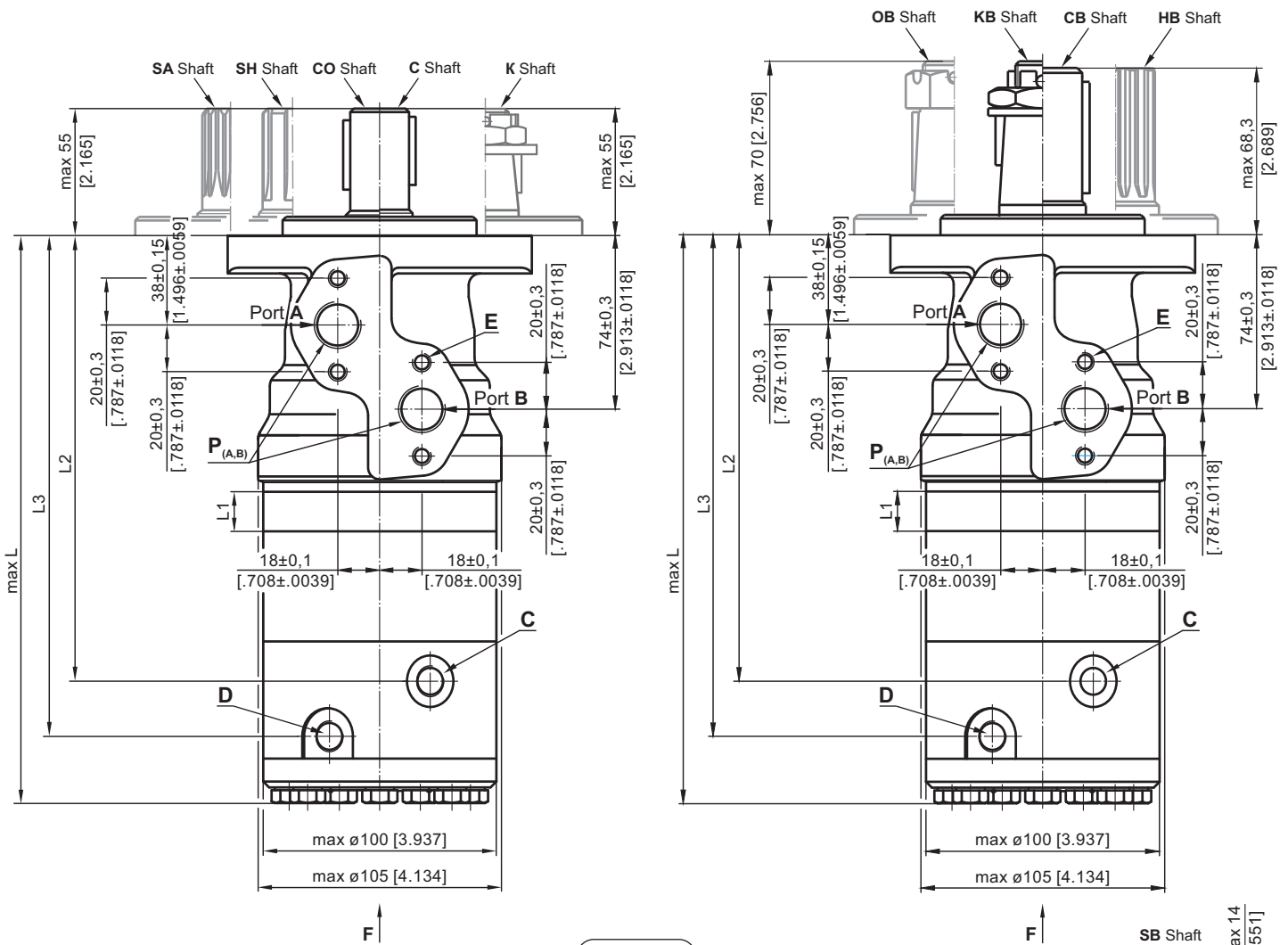
** Peak load: the permissible values may occur for max. 1% of every minute.

*** For speeds lower than given, consult factory or your regional manager.

**** Motor-brakes must always have a drain line. The brake release pressure is the difference between the pressure in the brake release line and the pressure in the drain line

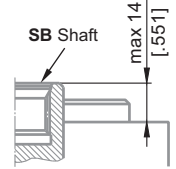
- Intermittent speed and intermittent pressure must not occur simultaneously.
- Recommended filtration is per ISO cleanliness code 18/16/13. A nominal filtration of 25 micron or better.
- Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM (ISO 6743/4).
If using synthetic fluids consult the factory for alternative seal materials.
- Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].
- Recommended maximum system operating temperature is 82°C [180°F].
- To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

DIMENSIONS and MOUNTING DATA



Shaft Dim.
See Page 33

Flange Dim.
See Page 32

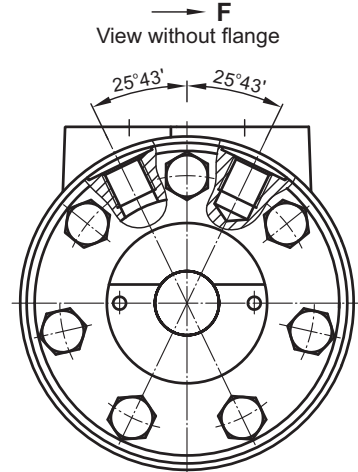


Standard Rotation
Viewed from Shaft End
Port A Pressurized - CW
Port B Pressurized - CCW

Reverse Rotation
Viewed from Shaft End
Port A Pressurized - CCW
Port B Pressurized - CW

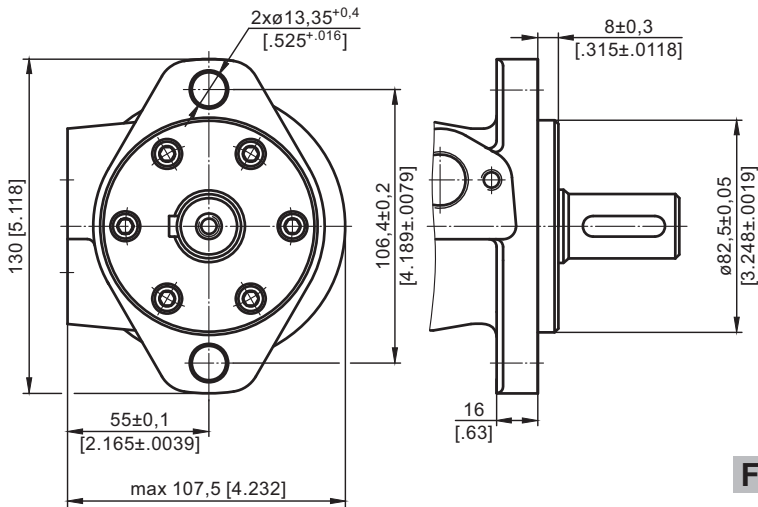
- P_(A,B)** : 2xG1/2, 15 mm [.59 in] depth
- C** : Brake release port, G1/4, 12 mm [.47 in] depth
- D** : Drain port, G1/4, 12 mm [.47 in] depth
- E** : 4xM8, 13 mm [.51 in] depth

Type	L1, mm [in]	L2, mm [in]	L3, mm [in]	Lmax, mm [in]
BD/MR 80	14,0 [.55]	187,2 [7.37]	210,7 [8.30]	240,0 [9.45]
BD/MR 100	17,4 [.69]	190,6 [7.50]	214,1 [8.43]	243,0 [9.57]
BD/MR 125	21,8 [.86]	195,0 [7.68]	218,5 [8.60]	247,5 [9.74]
BD/MR 160	27,8 [1.09]	201,0 [7.91]	224,5 [8.84]	253,5 [9.98]
BD/MR 200	34,8 [1.37]	208,0 [8.19]	231,5 [9.11]	260,5 [10.26]
BD/MR 250	43,5 [1.71]	216,7 [8.53]	240,2 [9.46]	269,0 [10.59]
BD/MR 315	54,8 [2.16]	228,0 [8.98]	251,5 [9.90]	280,5 [11.04]
BD/MR 400	69,4 [2.73]	242,6 [9.55]	266,1 [10.48]	295,0 [11.61]

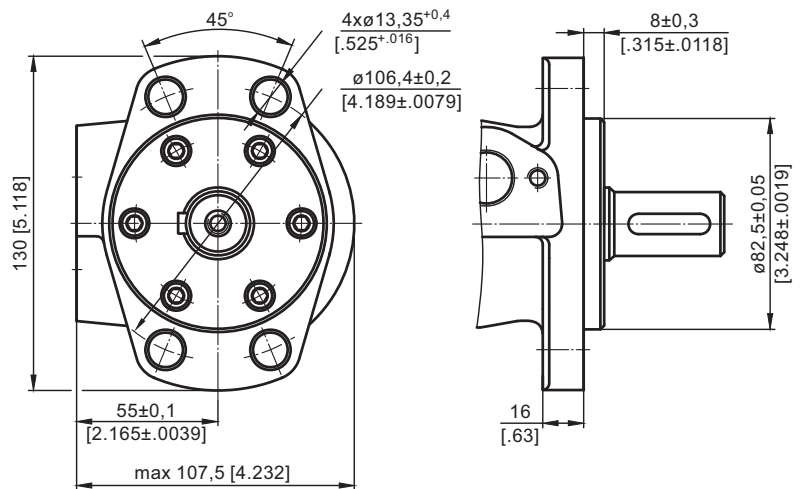


MOUNTING

Oval Mount (2 Holes) similar to SAE-A flange with 2 holes



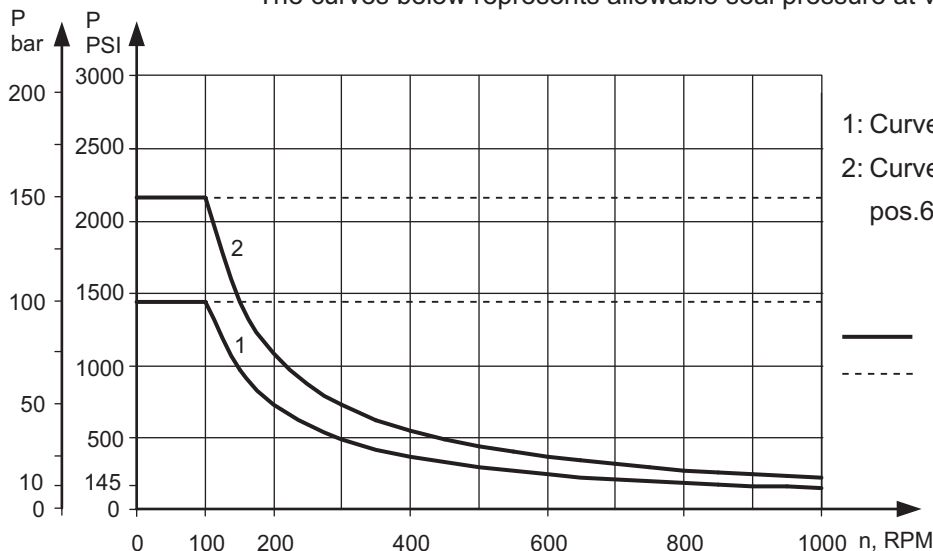
F - Oval Mount (4 Holes) similar to SAE-A flange



MAX. PERMISSIBLE SHAFT SEAL PRESSURE

Maximum return pressure or max. pressure in the drain line. The drain line must be always in use! The brake release pressure is the difference between the pressure in the brake release line and the pressure in the drain line.

The curves below represents allowable seal pressure at various speeds



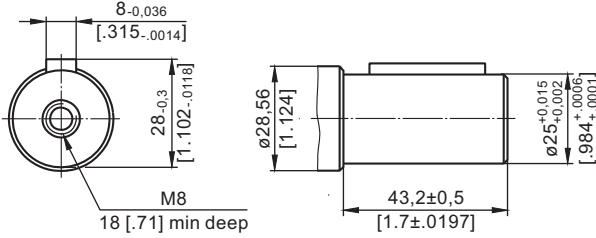
- 1: Curve for shaft type CB, SB, HB, KB and OB.
- 2: Curve for shaft type C, CO, SH, SA and K pos.6 option D.
- - continuous operations
- - - - - intermittent operations

SHAFT EXTENSIONS

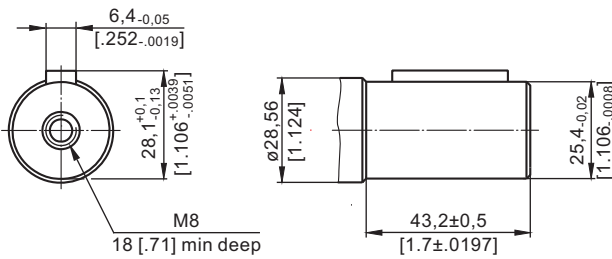
C, CO, SH, SA and K shafts

SHAFT with SEAL DIAMETER 28,56 mm [1.124 in]

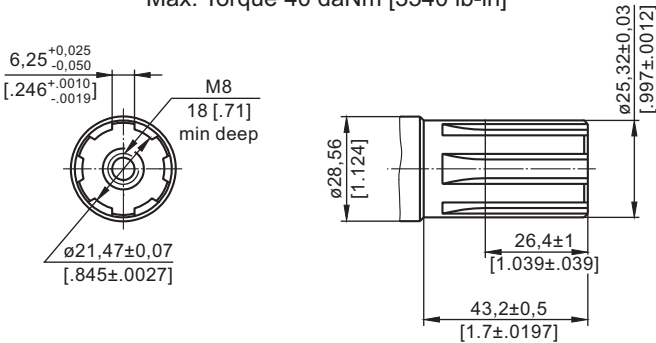
C - $\varnothing 25$ straight, Parallel key A8x7x32 DIN 6885
Max. Torque 34 daNm [3010 lb-in]



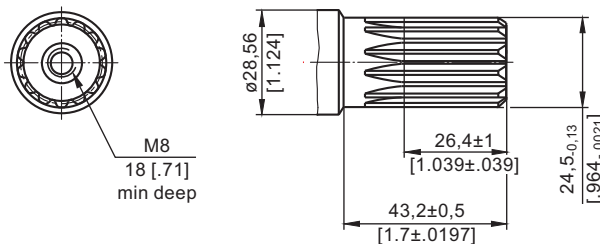
CO - $\varnothing 1$ " straight, Parallel key $\frac{1}{4}$ "x $\frac{1}{4}$ "x $\frac{1}{4}$ " BS46
Max. Torque 34 daNm [3010 lb-in]



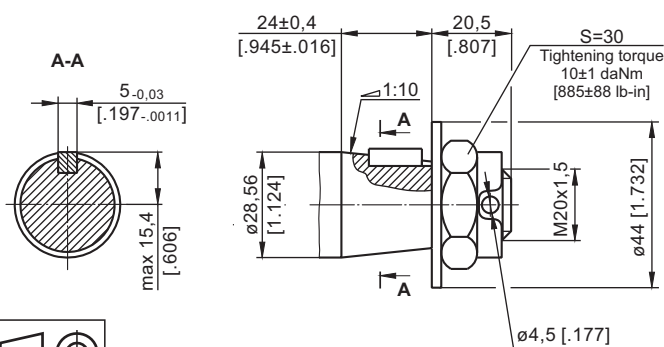
SH - splined, BS 2059 (SAE 6B)
Max. Torque 40 daNm [3540 lb-in]



SA - splined, B25x22h9 DIN 5482
Max. Torque 40 daNm [3540 lb-in]



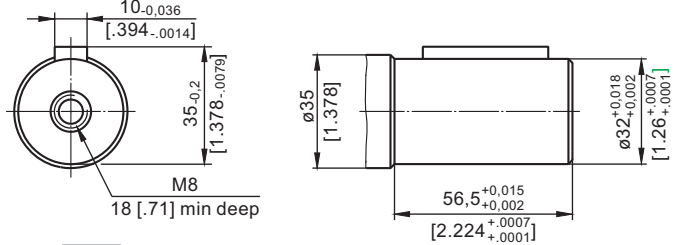
K - tapered 1:10, Parallel key B5x5x14 DIN 6885
Max. Torque 40 daNm [3540 lb-in]



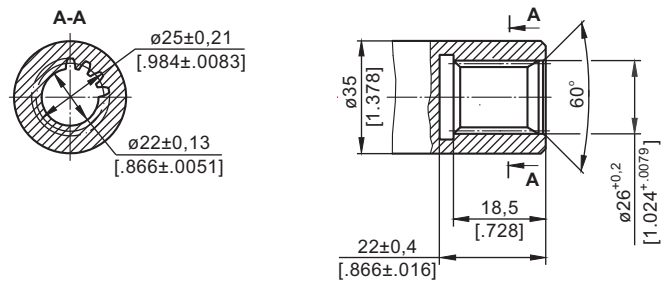
CB, SB, HB, KB and OB shafts

SHAFT with SEAL DIAMETER 35 mm [1.378 in] /type ...B/

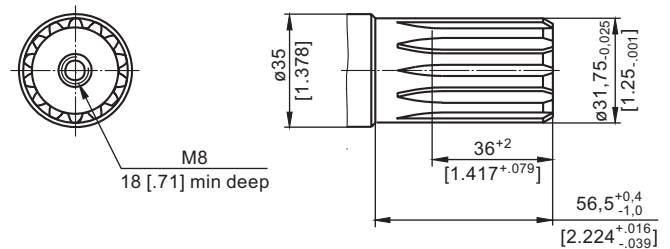
CB - $\varnothing 32$ straight, Parallel key A10x8x45 DIN 6885
Max. Torque 77 daNm [6815 lb-in]



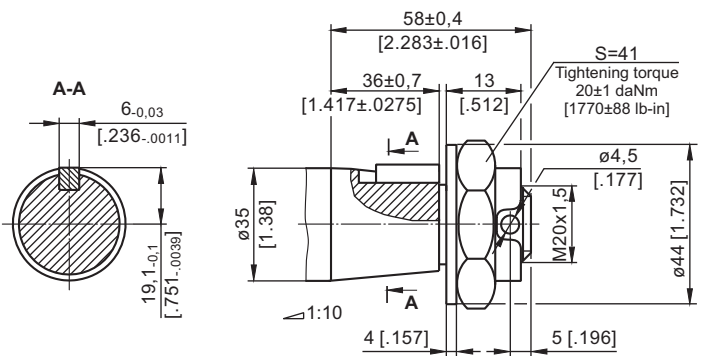
SH - splined, A25x22xH10 DIN 5482
Max. Torque 34 daNm [3010 lb-in]



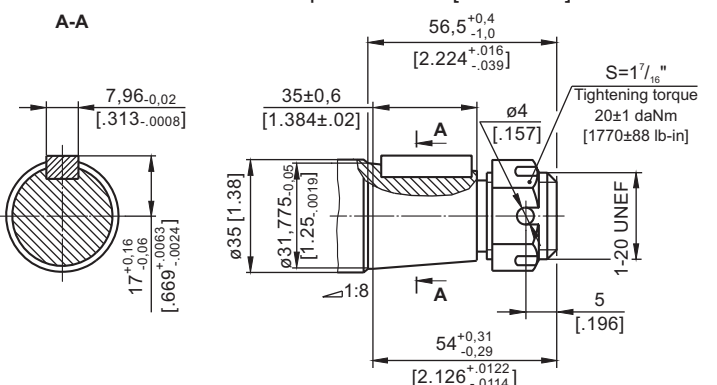
HB - $\varnothing 1\frac{1}{4}$ " splined 14T, ANSI B92.1-1976 Norm
Max. Torque 77 daNm [6815 lb-in]



KB - tapered 1:10, Parallel key B6x6x20 DIN 6885
Max. Torque 77 daNm [6815 lb-in]



OB - tapered 1:8 SAE J501, Parallel key $\frac{5}{16}$ "x $\frac{5}{16}$ "x $\frac{1}{4}$ " BS46
Max. Torque 34 daNm [3010 lb-in]





PERMISSIBLE SHAFT LOADS for BD/MR MOTOR - BRAKES

The permissible radial shaft load P_{rad} depends on the speed n , RPM, distance L from the point of load to the mounting flange and shaft version.

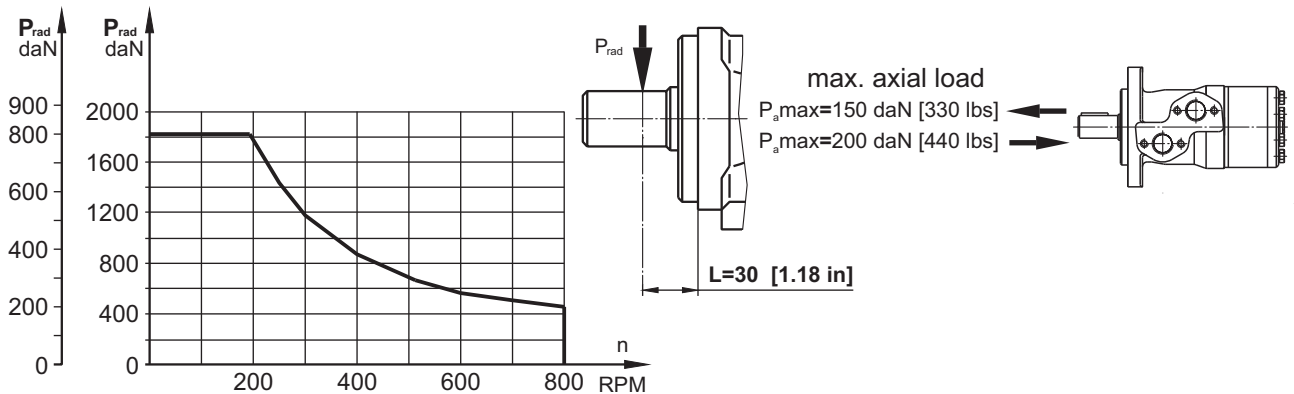
BD/MR...

Radial Shaft Load for slide bearing

Mounting Flange		
Shaft Extensions	cylindrical - C, CO tapered - K, splined - SH, SA	cylindrical - CB, splined - HB tapered - KB, OB
Radial Shaft Load P_{rad} in mm	$\frac{800}{n} \times \frac{25000}{95+L}$, daN*	$\frac{800}{n} \times \frac{18750}{95+L}$, daN*
Radial Shaft Load P_{rad} in inch	$\frac{800}{RPM} \times \frac{2215}{3.74+L}$, lbs*	$\frac{800}{RPM} \times \frac{1660}{3.74+L}$, lbs*

* $n \leq 200$ RPM; max $P_{rad} = 800$ daN [1800 lbs]
 $n \geq 200$ RPM; $L < 55$ mm [2.2 in]

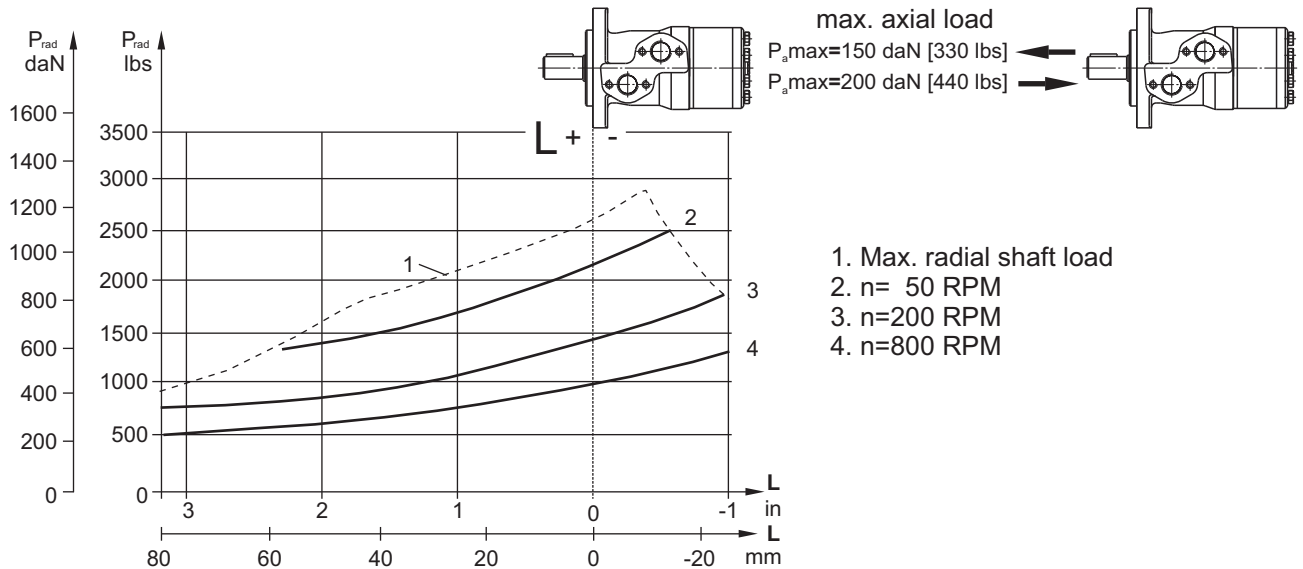
Radial Shaft Load P_{rad} by $L=30$ mm [1.18 in]



BD/MR...N...

Radial Shaft Load for needle bearing **pos.2** option **N**

The curves apply to a B10 bearing life of 2000 hours.



ORDER CODE

	1	2	3	4	5	6	7
BD/MR							

Pos.1 - Mounting Flange

omit - Oval mount, two holes

F - Oval mount, four holes

Pos.2 - Bearing Option

omit - slide bearing

N - needle bearings, only for pos.4 option C, CO, SH, K and SA

Pos.3 - Displacement code

80	- 80,3 cm ³ /rev [4.90 in ³ /rev]
100	- 99,8 cm ³ /rev [6.09 in ³ /rev]
125	- 125,7 cm ³ /rev [7.67 in ³ /rev]
160	- 159,6 cm ³ /rev [9.74 in ³ /rev]
200	- 199,8 cm ³ /rev [12.19 in ³ /rev]
250	- 250,1 cm ³ /rev [15.26 in ³ /rev]
315	- 315,7 cm ³ /rev [19.26 in ³ /rev]
400	- 397,0 cm ³ /rev [24.40 in ³ /rev]

Pos.4 - Shaft Extensions*

C - ø25 straight, Parallel key A8x7x32 DIN6885

CO - ø1" straight, Parallel key ¼"x¼"x1¼" BS46

SH - ø25,32 splined BS 2059 (SAE 6B)

K - ø28,56 tapered 1:10, Parallel key B5x5x14 DIN6885

SA - ø24,5 splined B25x22 DIN 5482

SHAFT WITH SEAL DIAMETER 35 mm /type ...B/

CB - ø32 straight, Parallel key A10x8x45 DIN6885

KB - ø35 tapered 1:10, Parallel key B6x6x20 DIN6885

SB - splined A 25x22 DIN 5482

OB - ø1¼" tapered 1:8, Parallel key 5/16"x5/16"x1¼" Bs46

HB - ø1¼" splined 14T ANSI B92.1 - 1976

Pos.5 - Shaft Seal

omit - Shaft seal for "type...B" shaft, pos.4 option CB, KB, SB, OB and HB

D - Shaft seal for pos.4 option C, CO, SH, K and SA

Pos.6 - Additional Options (see page 77)

Pos.7 - Design Series

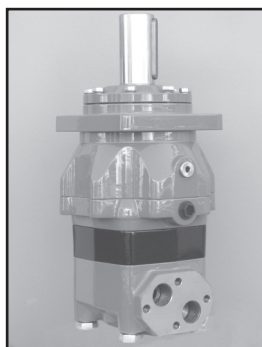
omit - Factory specified

NOTES: * The permissible output torque for shafts must not be exceeded!

The following combinations are not allowed: - **N** option with "...B" shafts

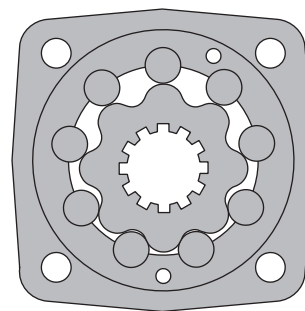
The motor-brakes are mangano-phosphatized as standard.

HYDRAULIC MOTOR-BRAKE MT/B



APPLICATION

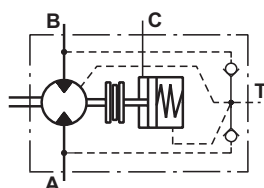
- » Conveyors
- » Metal working machines
- » Agricultural machines
- » Road building machines
- » Mining machinery
- » Food industries
- » Special vehicles
- » Plastic and rubber machinery etc.



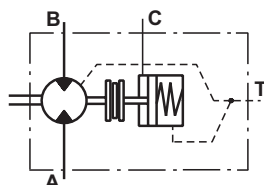
CONTENTS

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Dimensions and mounting	38
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Shaft extensions	39
Order code	39

With check valves



Without check valves "1"



OPTIONS

- » Model - Disc valve, roll-gerotor
- » Fully integrated friction disk brake
- » Side ports
- » Shafts - straight, tapered, splined
- » BSPP ports
- » Other special features

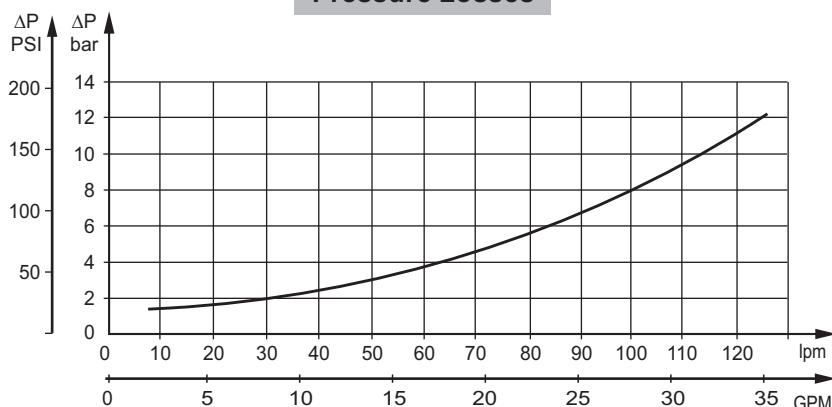
GENERAL

Max. Displacement,	cm ³ /rev [in ³ /rev]	724,3 [44.2]
Max. Speed,	[RPM]	780
Max. Torque,	daNm [lb-in]	cont.: 130 [11505] int.: 148 [13100]
Max. Output,	kW [HP]	40 [54]
Max. Pressure Drop,	bar [PSI]	cont.: 200 [2900] int.: 240 [3450]
Max. Oil Flow,	lpm [GPM]	150 [40]
Min. Speed,	[RPM]	5
Permissible Shaft Loads,	daNm [lb-in]	P _a =1000 [2248]
Pressure fluid		Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)
Temperature range,	°C [°F]	-40÷140 [-40÷284]
Optimal Viscosity range,	mm ² /s [SUS]	20÷75 [98÷347]
Filtration		ISO code 20/16 (Min. recommended fluid filtration of 25 microns)

Oil flow in drain line

Pressure drop bar [PSI]	Viscosity mm ² /s [SUS]	Oil flow in drain line lpm [GPM]
140 [2030]	20 [98]	2,5 [.66]
	35 [164]	1,5 [.39]
210 [3045]	20 [98]	5 [1.32]
	35 [164]	3 [.79]

Pressure Losses



SPECIFICATION DATA

Type	MT/B 160	MT/B 200	MT/B 250	MT/B 315	MT/B 400	MT/B 500	MT/B 630	MT/B 725	
Displacement, cm³/rev [in³/rev]	161,1 [9.83]	201,4 [12.29]	251,8 [15.36]	326,3 [19.90]	410,9 [25.06]	523,6 [31.95]	631,2 [38.5]	724,3 [44.2]	
Max. Speed, [RPM]	Cont.	625	625	500	380	305	240	197	172
	Int.*	780	750	600	460	365	285	234	209
Max. Torque, daNm [lb-in]	Cont.	47 [4160]	59 [5220]	73 [6460]	95 [8410]	108 [9560]	122 [10800]	130 [11505]	127 [11240]
	Int.*	56 [4960]	71 [6285]	88 [7790]	114 [10090]	126 [11150]	137 [12125]	148 [13100]	147 [13010]
Max. Output, kW [HP]	Cont.	26,5 [36]	33,5 [45]	33,5 [45]	33,5 [45]	30 [40]	26,5 [36]	24,3 [33]	20,2 [27]
	Int.*	32 [43]	40 [54]	40 [54]	40 [54]	35 [45]	30 [40]	27,5 [37]	26,8 [36]
Max. Pressure Drop bar [PSI]	Cont.	200 [2900]	200 [2900]	200 [2900]	200 [2900]	180 [2600]	160 [2300]	140 [2030]	120 [1740]
	Int.*	240 [3450]	240 [3450]	240 [3450]	240 [3450]	210 [3050]	180 [2600]	160 [2300]	140 [2030]
Max. Oil Flow, lpm [GPM]	Cont.	100 [26.5]	125 [33]	125 [33]	125 [33]	125 [33]	125 [33]	125 [33]	125 [33]
	Int.*	125 [33]	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]
Max. Inlet Pressure, bar [PSI]	Cont.	210 [3050]	210 [3050]	210 [3050]	210 [3050]	210 [3050]	210 [3050]	210 [3050]	210 [3050]
	Int.*	250 [3600]	250 [3600]	250 [3600]	250 [3600]	250 [3600]	250 [3600]	250 [3600]	250 [3600]
Max. Return Pressure with Drain line, bar [PSI]	Cont.	140 [2030]	140 [2030]	140 [2030]	140 [2030]	140 [2030]	140 [2030]	140 [2030]	140 [2030]
	Int.*	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]
Max. Starting Pressure with Unloaded Shaft, bar [PSI]	10 [150]	10 [150]	10 [150]	10 [150]	10 [150]	10 [150]	10 [150]	10 [150]	
Min. Starting Torque, daNm [lb-in]	At max. pressure drop Cont.	34 [3010]	43 [3800]	53 [4690]	74 [6550]	84 [7435]	95 [8410]	95 [8410]	95 [8410]
	At max. pressure drop Int.*	41 [3630]	52 [4600]	63 [5580]	89 [7880]	97 [8585]	106 [9380]	110 [9735]	115 [10180]
Min. Speed**, [RPM]	10	9	8	7	6	5	5	5	
Static Torque of Brake, daNm [lb-in]	143 [12657]								
Min. Brake Release Pressure***, bar [PSI]	32-35 [464-507]								
Max. Opening Pressure, bar [PSI]	280 [4060]								
Max. Pressure in Drain Line, bar [PSI]	5 [73]								
Weight, kg [lb]	27,5 [60.6]	28 [61.7]	28,5 [62.8]	29,5 [65]	30,5 [67.2]	31,5 [69.4]	31 [68.3]	32 [70.5]	

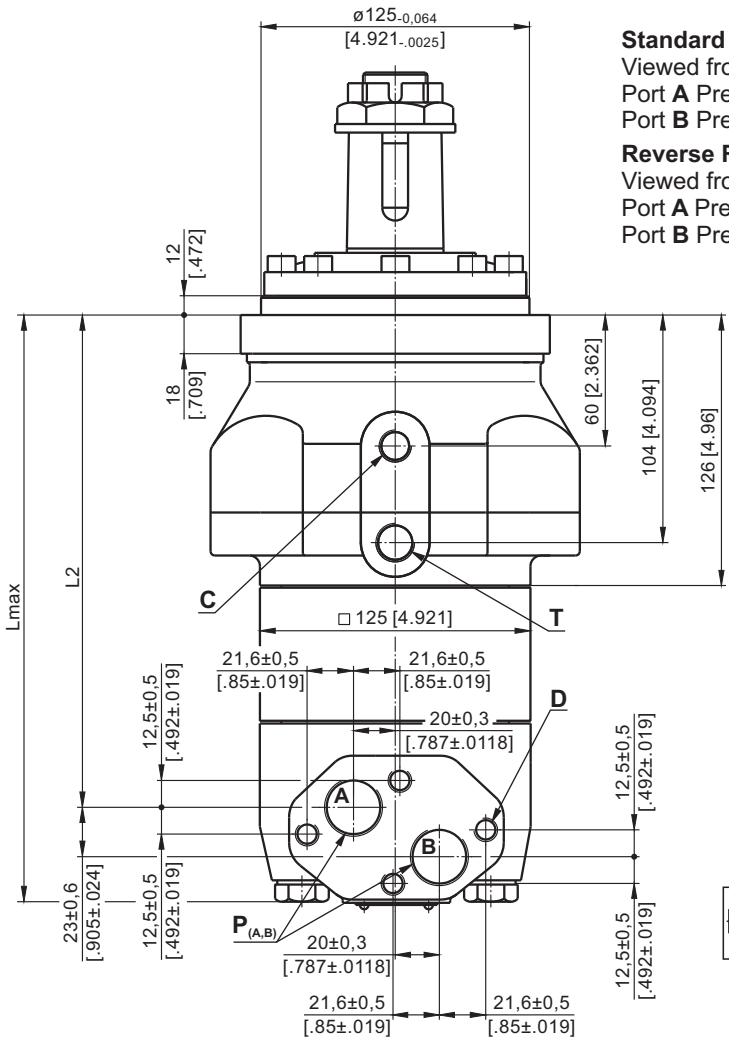
* Intermittent operation: the permissible values may occur for max. 10% of every minute.

** For speeds lower than given, consult factory or your regional manager.

*** Motor-brakes must always have a drain line. The brake release pressure is the difference between the pressure in the brake release line and the pressure in the drain line.

- Intermittent speed and intermittent pressure must not occur simultaneously.
- Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.
- Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM (ISO 6743/4).
If using synthetic fluids consult the factory for alternative seal materials.
- Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].
- Recommended maximum system operating temperature is 82°C [180°F].
- To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

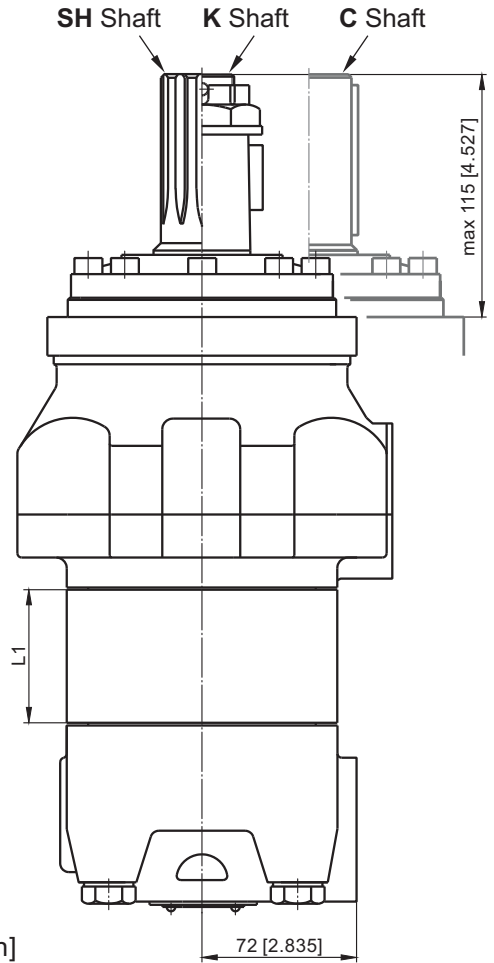
DIMENSIONS and MOUNTING DATA



Standard Rotation
Viewed from Shaft End
Port **A** Pressurized - **CW**
Port **B** Pressurized - **CCW**

Reverse Rotation
Viewed from Shaft End
Port **A** Pressurized - **CCW**
Port **B** Pressurized - **CW**

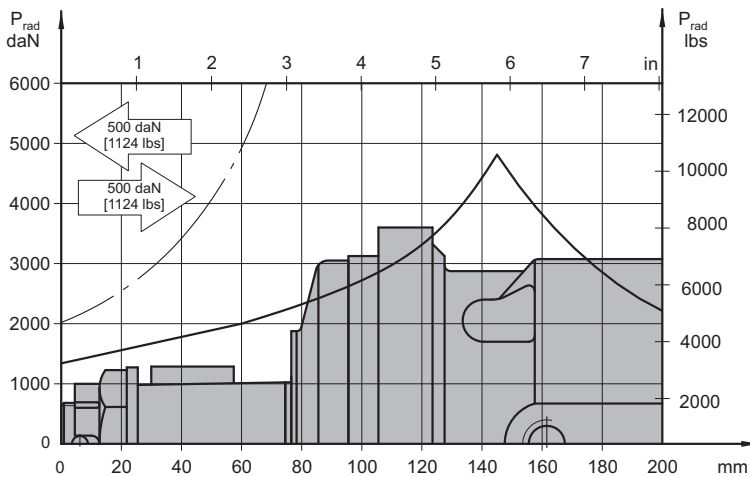
Shaft Dim.
See Page 35



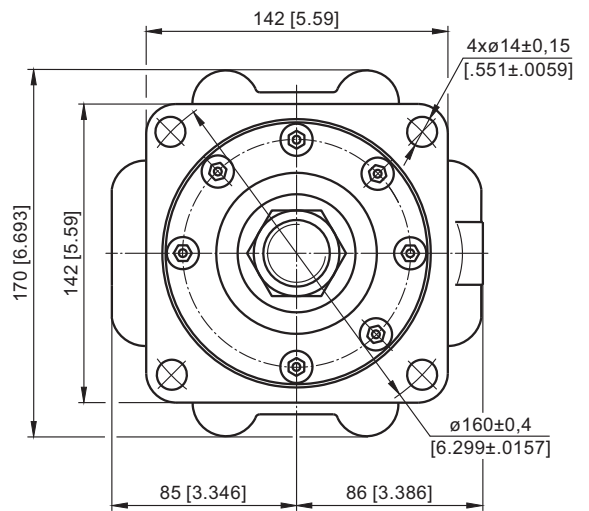
- P_(A,B)** - 2xG3/4, 17 mm [.669] depth
- C** - Brake release port, G1/4, 12 mm [.472 in] depth
- T** - Drainage tap, G3/8, 13 mm [.512] depth
- D** - 4xM10, 10 mm [.394] depth

PERMISSIBLE SHAFT LOADS

The curve applies to a B10 bearing life of 3000 hours at 200 RPM.
Max. permissible radial shaft load with a safety factor of 3:1.



Warning: Drain line should always be used.



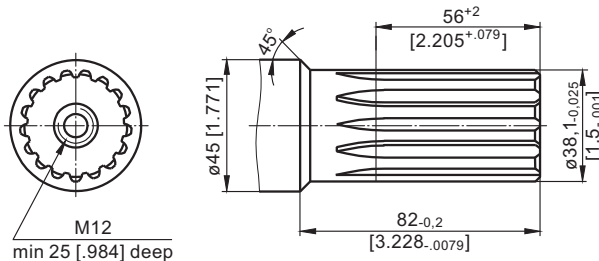
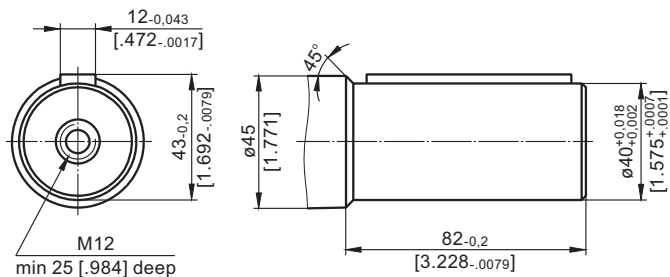
Type	*L ₁ , mm [in]	L ₂ , mm [in]	L _{max} , mm [in]
MT/B 160	17,0 [.67]	178,0 [7.01]	228 [8.98]
MT/B 200	22,0 [.87]	183,0 [7.21]	233 [9.17]
MT/B 250	28,3 [1.11]	189,3 [7.45]	239 [9.41]
MT/B 315	37,5 [1.48]	198,5 [7.81]	248 [9.76]
MT/B 400	48,0 [1.89]	209,0 [8.23]	259 [10.2]
MT/B 500	62,0 [2.44]	223,0 [8.78]	273 [10.8]
MT/B 630	58,0 [2.28]	219,0 [8.62]	269 [10.6]
MT/B 725	67,0 [2.64]	228,0 [8.98]	278 [10.9]

* The width of the gerotor is 3,5 mm [.138 in] greater than L₁.

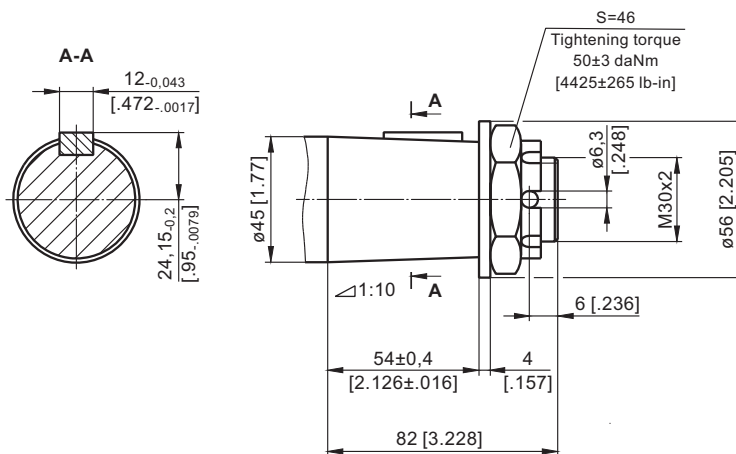
SHAFT EXTENSIONS

C - $\varnothing 40$ straight, Parallel key A12x8x70 DIN 6885
Max. Torque 123 daNm [10886 lb-in]

SH - $\varnothing 1\frac{1}{2}$ " splined 17T, DP 12/24 ANSI B92.1-1976
Max. Torque 123 daNm [10886 lb-in]



K - tapered 1:10, Parallel key B12x8x28 DIN 6885
Max. Torque 210 daNm [18587 lb-in]



ORDER CODE

1	2	3	4	5
MT/B				

Pos.1	Displacement code
160	- 161,1 cm ³ /rev [9.83 in ³ /rev]
200	- 201,4 cm ³ /rev [12.29 in ³ /rev]
250	- 251,8 cm ³ /rev [15.36 in ³ /rev]
315	- 326,3 cm ³ /rev [19.90 in ³ /rev]
400	- 410,9 cm ³ /rev [25.06 in ³ /rev]
500	- 523,6 cm ³ /rev [31.95 in ³ /rev]
630	- 631,2 cm ³ /rev [38.50 in ³ /rev]
725	- 724,3 cm ³ /rev [44.20 in ³ /rev]

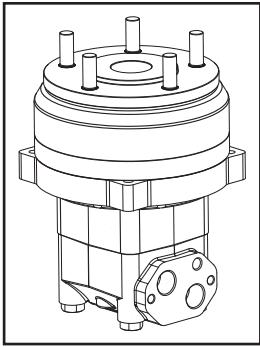
Pos.2	Shaft Extensions*
C	- $\varnothing 40$ straight, Parallel key A12x8x70 DIN6885
SH	- $\varnothing 1\frac{1}{2}$ " splined 17 DP12/24 ANS B922.1-76
K	- $\varnothing 45$ tapered 1:10, Parallel key B12x8x28 DIN 6885
Pos.3	Check Valves
omit	- with check valves
1	- without check valves
Pos.4	Additional Options (see page 77)
Pos.5	Design Series
omit	- Factory specified

NOTES:

* The permissible output torque for shafts must not be exceeded!

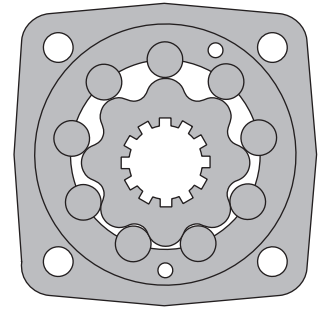
The motor-brakes are manganophosphatized as standard.

HYDRAULIC MOTOR-BRAKE MT/BX



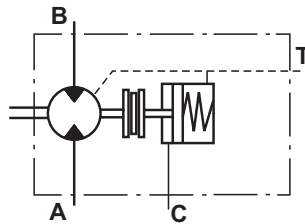
APPLICATION

- » Conveyors
- » Metal working machines
- » Agricultural machines
- » Road building machines
- » Mining machinery
- » Food industries
- » Special vehicles
- » Plastic and rubber machinery etc.



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OPTIONS

- » Model - Disc valve, roll-gerotor
- » Fully integrated friction disk brake
- » Side ports
- » Shafts - straight, tapered, splined
- » BSPP ports
- » Other special features

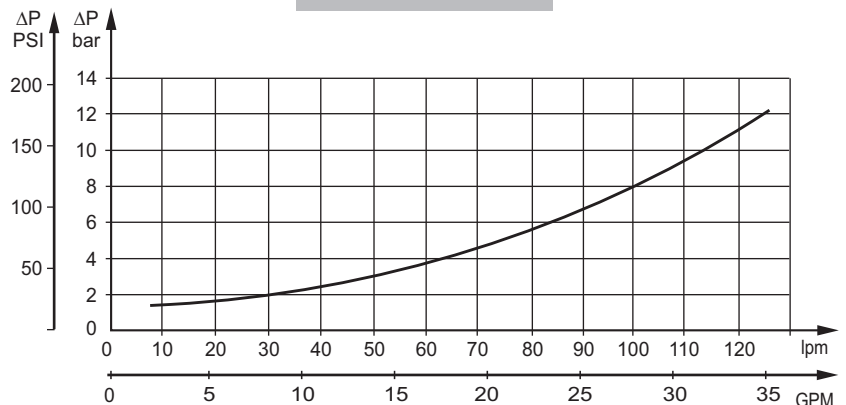
GENERAL

Max. Displacement, cm ³ /rev [in ³ /rev]	523,6 [31.95]
Max. Speed, [RPM]	780
Max. Torque, daNm [lb-in]	cont.: 122 [10780] int.: 137 [12125]
Max. Output, kW [HP]	40 [54]
Max. Pressure Drop, bar [PSI]	cont.: 200 [2900] int.: 240 [3450]
Max. Oil Flow, lpm [GPM]	150 [40]
Min. Speed, [RPM]	5
Permissible Shaft Loads, daNm [lb-in]	P _a =1000 [2248]
Pressure fluid	Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)
Temperature range, °C [°F]	-40÷140 [-40÷284]
Optimal Viscosity range, mm ² /s [SUS]	20÷75 [98÷347]
Filtration	ISO code 20/16 (Min. recommended fluid filtration of 25 microns)

Oil flow in drain line

Pressure drop bar [PSI]	Viscosity mm ² /s [SUS]	Oil flow in drain line lpm [GPM]
140 [2030]	20 [98]	2,5 [.66]
	35 [164]	1,5 [.39]
210 [3045]	20 [98]	5 [1.32]
	35 [164]	3 [.79]

Pressure Losses



SPECIFICATION DATA

Type		MT/BX 160	MT/BX 200	MT/BX 250	MT/BX 315	MT/BX 400	MT/BX 500
Displacement, cm³/rev [in³/rev]		161,1 [9.83]	201,4 [12.29]	251,8 [15.36]	326,3 [19.90]	410,9 [25.06]	523,6 [31.95]
Max. Speed, [RPM]	Cont.	625	625	500	380	305	240
	Int.*	780	750	600	460	365	285
Max. Torque daNm [lb-in]	Cont.	47 [4160]	59 [5220]	73 [6460]	95 [8410]	108 [9560]	122 [10800]
	Int.*	56 [4960]	71 [6285]	88 [7790]	114 [10090]	126 [11150]	137 [12125]
Max. Output kW [HP]	Cont.	26,5 [36]	33,5 [45]	33,5 [45]	33,5 [45]	30 [40]	26,5 [36]
	Int.*	32 [43]	40 [54]	40 [54]	40 [54]	35 [45]	30 [40]
Max. Pressure Drop bar [PSI]	Cont.	200 [2900]	200 [2900]	200 [2900]	200 [2900]	180 [2600]	160 [2300]
	Int.*	240 [3450]	240 [3450]	240 [3450]	240 [3450]	210 [3050]	180 [2600]
Max. Oil Flow lpm [GPM]	Cont.	100 [26.5]	125 [33]	125 [33]	125 [33]	125 [33]	125 [33]
	Int.*	125 [33]	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]
Max. Inlet Pressure bar [PSI]	Cont.	210 [3050]	210 [3050]	210 [3050]	210 [3050]	210 [3050]	210 [3050]
	Int.*	250 [3600]	250 [3600]	250 [3600]	250 [3600]	250 [3600]	250 [3600]
Max. Return Pressure with Drain Line, bar [PSI]	Cont.	140 [2030]	140 [2030]	140 [2030]	140 [2030]	140 [2030]	140 [2030]
	Int.*	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]	175 [2540]
Max. Starting Pressure with Unloaded Shaft, bar [PSI]		10 [150]	10 [150]	10 [150]	10 [150]	10 [150]	10 [150]
Min. Starting Torque daNm [lb-in]	At max. press. drop Cont.	34 [3010]	43 [3800]	53 [4690]	74 [6550]	84 [7435]	95 [8410]
	At max. press. drop Int.*	41 [3630]	52 [4600]	63 [5580]	89 [7880]	97 [8585]	106 [9380]
Min. Speed**, [RPM]		10	9	8	7	6	5
Static Torque of Brake, daNm [lb-in]		120 [10620]					
Min. Brake Release Pressure***, bar [PSI]		12 [174]					
Max. Opening Pressure, bar [PSI]		30 [435]					
Max. Pressure in Drain Line, bar [PSI]		5 [73]					
Max. Pressure in Release Port C, bar [PSI]		75 [1088]					
Weight, kg [lb]	MT/BX A...	32,8 [72.3]	33,3 [73.4]	34,0 [74.9]	35,0 [77.2]	36,3 [80.0]	37,6 [82.9]
	MT/BX B...	32,2 [70.9]	32,8 [72.3]	33,5 [73.9]	34,5 [76.1]	35,8 [78.9]	37,1 [81.8]

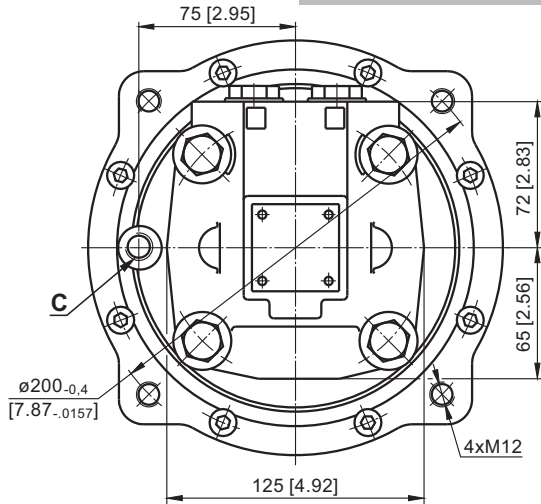
* Intermittent operation: the permissible values may occur for max. 10% of every minute.

** Peak load: the permissible values may occur for max. 1% of every minute.

*** Motor-brakes must always have a drain line. The brake release pressure is the difference between the pressure in the brake release line and the pressure in the drain line.

1. Intermittent speed and intermittent pressure must not occur simultaneously.
2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM (ISO 6743/4).
If using synthetic fluids consult the factory for alternative seal materials.
4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].
5. Recommended maximum system operating temperature is 82°C [180°F].
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

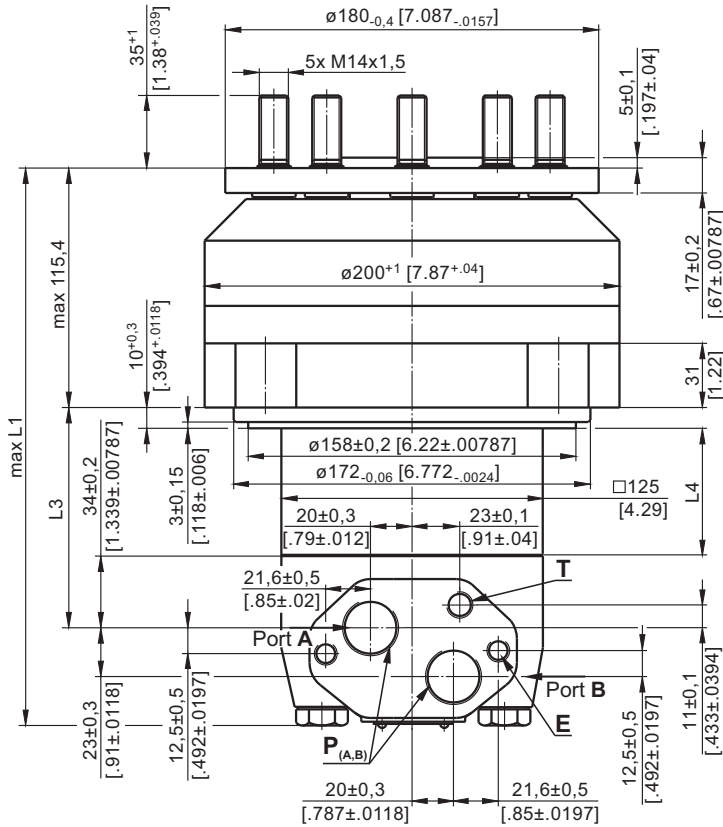
DIMENSIONS and MOUNTING DATA



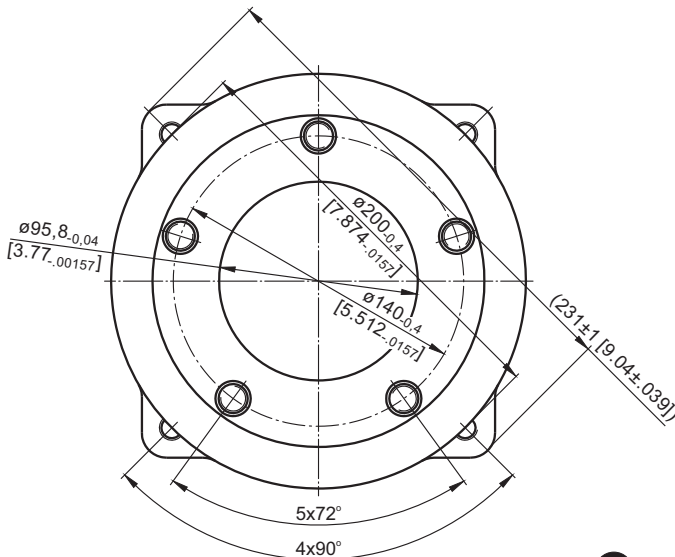
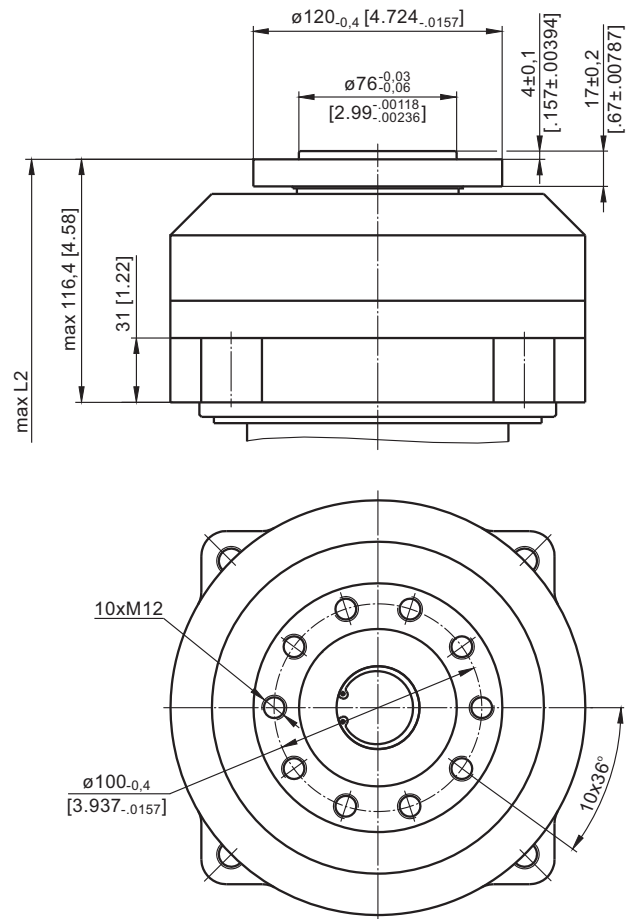
A Wheel bolt flange

Type	L1, mm [in]	L2, mm [in]	L3, mm [in]	*L4, mm [in]
MT/BX 160	227 [8.94]	228 [8.98]	62,5 [2.46]	16,5 [.65]
MT/BX 200	232 [9.13]	233 [9.17]	67,5 [2.66]	21,5 [.85]
MT/BX 250	238 [9.37]	239 [9.41]	73,8 [2.91]	27,8 [1.09]
MT/BX 315	247 [9.72]	248 [9.76]	83,0 [3.27]	37,0 [1.46]
MT/BX 400	258 [10.16]	259 [10.20]	93,5 [3.68]	47,5 [1.87]
MT/BX 500	272 [10.71]	273 [10.75]	107,5 [4.23]	61,5 [2.42]

* The width of the gerolor is 3,5 mm [.14 in] greater than L4.



B Threaded hole flange



	Versions	
	2	4
P _(A,B)	2xG3/4	2x1 ¹ / ₁₆ -12 UN
T - Drainage tap	G1/4	9/16-18 UNF
C - Brake release port	G1/4	9/16-18 UNF
E	2xM10	2xM10

Standard Rotation
Viewed from Shaft End
Port A Pressurized - CW
Port B Pressurized - CCW

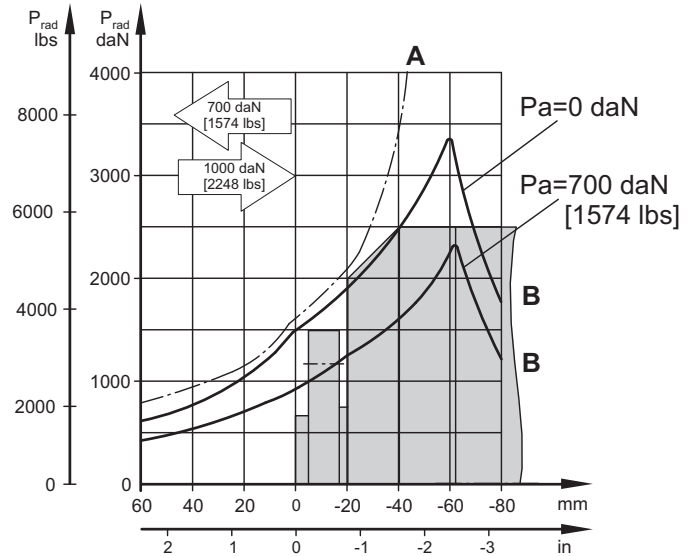
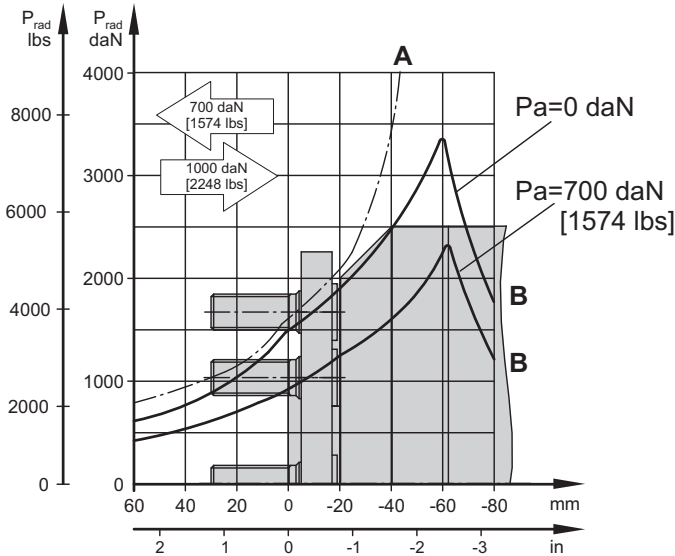
Reverse Rotation
Viewed from Shaft End
Port A Pressurized - CCW
Port B Pressurized - CW

PERMISSIBLE SHAFT LOADS

The load diagram is valid for an average bearings life of 3000 hours at 50 RPM

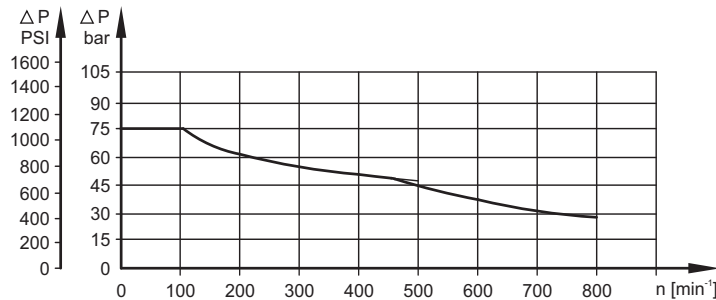
A - Permissible radial shaft load.

B - Max. radial shaft load. Any shaft load exceeding the values shown in the curve will involve a risk of breakage



Warning: Drain line should always be used.

MAX. PERMISSIBLE SHAFT SEAL PRESSURE



ORDER CODE

	1	2	3	4	5
MT/BX					

Pos.1 - Mounting Flange

- A** - Wheel bolt flange 5xM14 on ø180
- B** - Threated hole flange 10xM12 on ø120

Pos.2 - Displacement code

- 160** - 161,1 cm³/rev [9.83 in³/rev]
- 200** - 201,4 cm³/rev [12.29 in³/rev]
- 250** - 251,8 cm³/rev [15.36 in³/rev]
- 315** - 326,3 cm³/rev [19.90 in³/rev]
- 400** - 410,9 cm³/rev [25.06 in³/rev]
- 500** - 523,6 cm³/rev [31.95 in³/rev]

Pos.3 - Port Size/Type [standard manifold to each]

- 2** - side ports, 2xG3/4, G1/4, BSP thread, ISO 228
- 4** - side ports, 2x1 1/16-12 UN, O-ring, 9/16-18 INF

Pos.4 - Additional Options (see page 77)

Pos.5 - Design Series

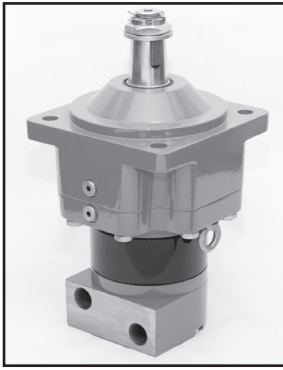
- omit - Factory specified

NOTES:

* Color at customer's request.

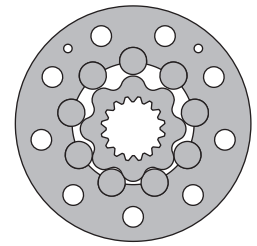
The motor-brakes are mangano-phosphatized as standard.

HYDRAULIC MOTOR-BRAKE MTM/B



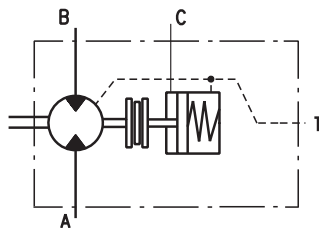
APPLICATION

- » Skid Steer Loaders
- » Metal working machines
- » Trenchers
- » Augers
- » Agricultural machines
- » Road building machines
- » Special vehicles
- » Mine machines
- » Woodworking and sawmill machinery
- » Conveyors etc.



CONTENTS

Specification data	45
Dimensions and mounting ...	46÷47
Shaft extensions	48
Permissible shaft loads	49
Order code	49



OPTIONS

- » Model- Disc valve, roll-gerotor
- » Fully integrated friction disk brake
- » Side ports
- » Shafts- straight, splined and tapered
- » BSPP ports;
- » Other special features.

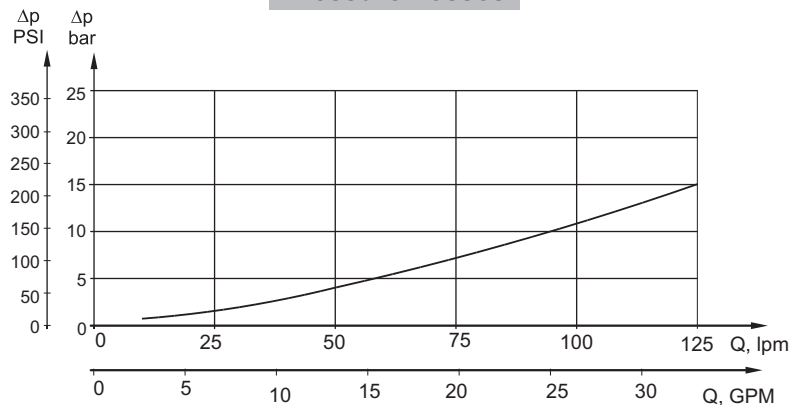
GENERAL

Max. Displacement,	cm ³ /rev [in ³ /rev]	724,3 [44.2]
Max. Speed,	[RPM]	780
Max. Torque,	daNm [lb-in]	cont.: 175 [15490] int.: 215 [16030]
Max. Output,	kW [HP]	70 [94]
Max. Pressure Drop,	bar [PSI]	cont.: 250 [3600] int.: 350 [5080]
Max. Oil Flow,	lpm [GPM]	150 [40]
Permissible Shaft Loads,	daNm [lb-in]	P _a =1000 [2248]
Pressure fluid		Mineral based- HLP(DIN 51524) or HM(ISO 6743/4)
Temperature range,	°C [°F]	-40÷140 [-40÷284]
Optimal Viscosity range,	mm ² /s [SUS]	20÷75 [98÷347]
Filtration		ISO code 20/16 (Min. recommended fluid filtration of 25 microns)

Oil flow in drain line

Pressure drop bar [PSI]	Viscosity mm ² /s [SUS]	Oil flow in drain line lpm [GPM]
200 [2900]	20 [98]	2,5 [.660]
	35 [164]	1,5 [.400]
275 [3990]	20 [98]	4 [1.057]
	35 [164]	2,5 [.660]

Pressure Losses



SPECIFICATION DATA

Type	MTM/B 200	MTM/B 250	MTM/B 315	MTM/B 400	MTM/B 470	MTM/B 500	MTM/B 630	MTM/B 725	
Displacement, cm³/rev [in³/rev]	201,4 [12.29]	251,8 [15.36]	326,3 [19.9]	410,9 [25.06]	475 [28.97]	494,9 [30.17]	631,2 [38.5]	724,3 [44.2]	
Max. Speed, [RPM]	Cont.	625	500	380	305	260	250	196	170
	Int.*	750	600	460	365	315	300	235	215
Max. Torque, daNm [lb-in]	Cont.	72 [6375]	90 [7965]	116 [10265]	147 [13010]	171 [15135]	172 [15225]	175 [15490]	160 [14160]
	Int.*	102 [9030]	128 [11330]	163 [14425]	206 [18232]	215 [16030]	215 [16030]	215 [16030]	192 [17000]
	Peak**	115 [10180]	144 [12745]	186 [16460]	235 [20800]	240 [21240]	240 [21240]	255 [22570]	240 [21240]
Max. Output, kW [HP]	Cont.	41 [55]	41 [55]	41 [55]	41 [55]	41 [55]	37,5 [50]	29 [39]	26 [35]
	Int.*	65 [87]	70 [94]	70 [94]	70 [94]	55 [74]	51 [68]	45 [60]	40 [54]
Max. Pressure Drop, bar [PSI]	Cont.	250 [3600]	250 [3600]	250 [3600]	250 [3600]	250 [3600]	230 [3340]	185 [2680]	160 [2320]
	Int.*	350 [5080]	350 [5080]	350 [5080]	350 [5080]	315 [4570]	280 [4060]	225 [3260]	210 [3045]
	Peak**	400 [5800]	400 [5800]	400 [5800]	400 [5800]	350 [5080]	320 [4640]	270 [3985]	260 [3770]
Max. Inlet Pressure, bar [PSI]	Cont.	270 [3920]	270 [3920]	270 [3920]	270 [3920]	270 [3920]	270 [3920]	270 [3920]	270 [3920]
	Int.*	370 [5370]	370 [5370]	370 [5370]	370 [5370]	370 [5370]	370 [5370]	370 [5370]	370 [5370]
	Peak**	420 [6100]	420 [6100]	420 [6100]	420 [6100]	420 [6100]	420 [6100]	420 [6100]	420 [6100]
Max. Oil Flow, lpm [GPM]	Cont.	125 [33]	125 [33]	125 [33]	125 [33]	125 [33]	125 [33]	125 [33]	125 [33]
	Int.*	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]	150 [40]
Max. Starting Pressure with Unloaded Shaft, bar [PSI]	6 [87]	6 [87]	6 [87]	6 [87]	6 [87]	6 [87]	6 [87]	6 [87]	
Min. Starting Torque, daNm [lb-in]	60 [5310]	75 [6640]	97 [8585]	122 [10800]	142 [12570]	143 [12655]	144 [12745]	148 [13100]	
Static Torque of Brake, daNm [lb-in]	200 [17700]								
Min. Brake Release Pressure***, bar [PSI]	14 [203]								
Full Opening Pressure, bar [PSI]	40 [580]								
Max. Pressure in Release Port C, bar [PSI]	120 [1740]								
Weight, kg [lb]	37,5 [82.7]	37,9 [83.6]	39,1 [86.2]	41,3 [91.1]	44,1 [97.2]	46,0 [101.4]	49,1 [108.2]	52,0 [114.6]	

* Intermittent operation: the permissible values may occur for max. 10% of every minute.

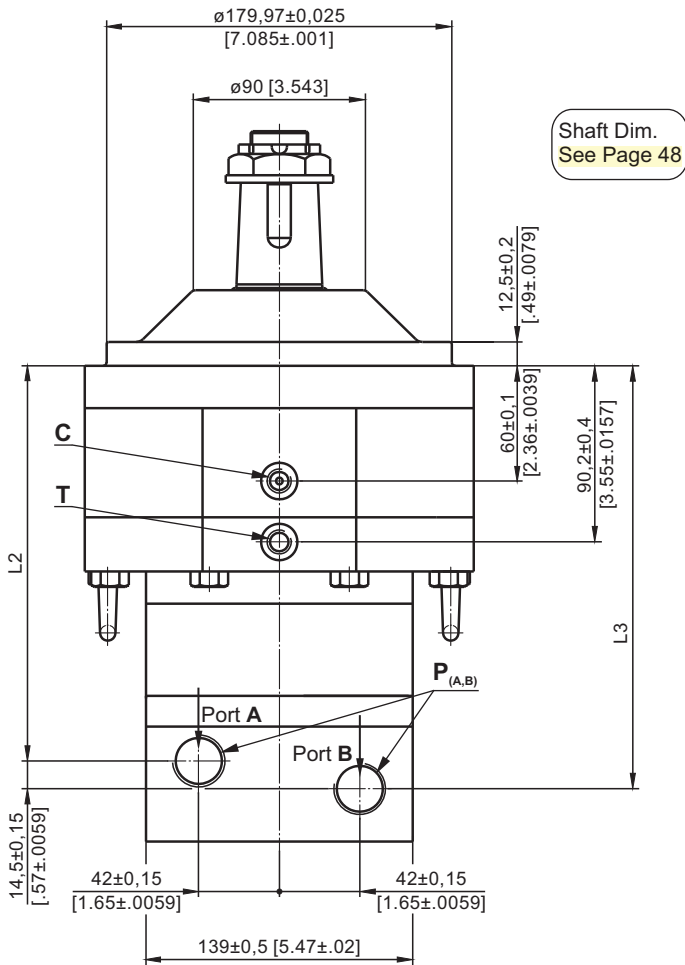
** Peak load: the permissible values may occur for max. 1% of every minute.

*** Motor-brakes must always have a drain line. The brake release pressure is the difference between the pressure in the brake release line and the pressure in the drain line.

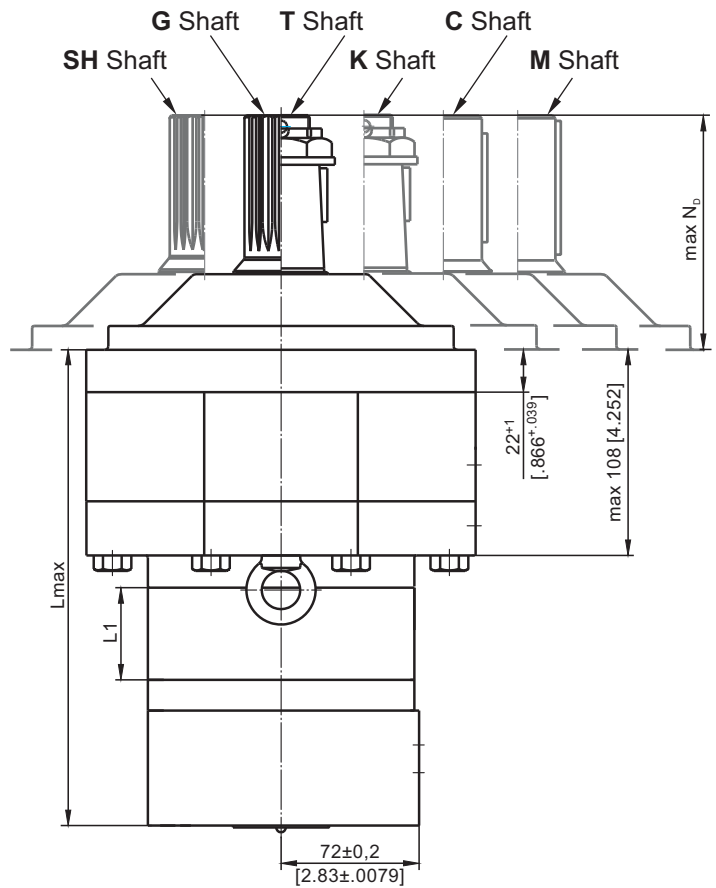
1. Intermittent speed and intermittent pressure must not occur simultaneously.
2. Recommended filtration is per ISO cleanliness code 20/16. A nominal filtration of 25 micron or better.
3. Recommend using a premium quality, anti-wear type mineral based hydraulic oil HLP(DIN51524) or HM (ISO 6743/4).
If using synthetic fluids consult the factory for alternative seal materials.
4. Recommended minimum oil viscosity 13 mm²/s [70 SUS] at 50°C [122°F].
5. Recommended maximum system operating temperature is 82°C [180°F].
6. To assure optimum motor life fill with fluid prior to loading and run at moderate load and speed for 10-15 minutes.

DIMENSIONS and MOUNTING DATA - MTM/B D

D Bolt flange 4x \varnothing 18.5 mm [.73 in]
spigot diameter 180 mm [7.086 in]

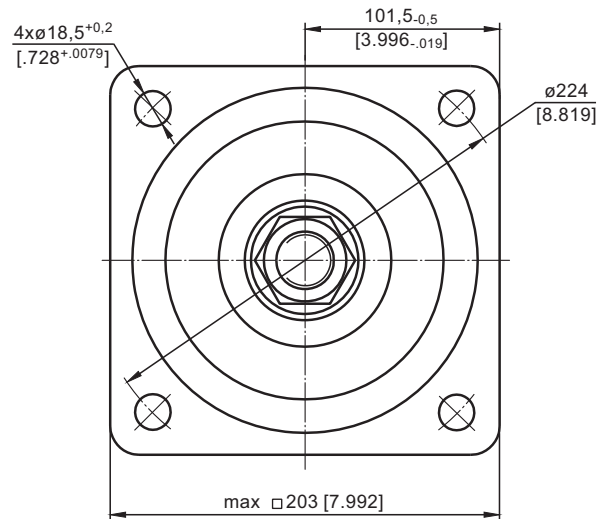


Shaft Dim.
See Page 48



Standard Rotation
Viewed from Shaft End
Port A Pressurized - CW
Port B Pressurized - CCW

Reverse Rotation
Viewed from Shaft End
Port A Pressurized - CCW
Port B Pressurized - CW



Note: For N_b see page 39

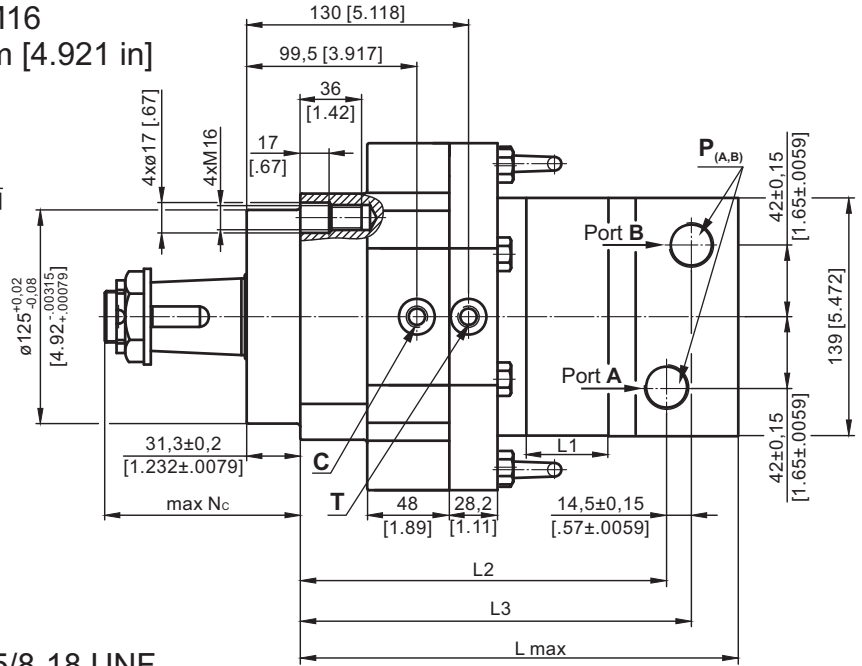
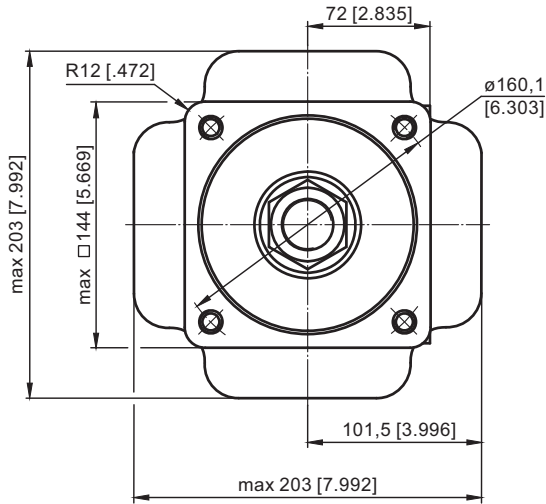
C: Brake release port
T: Drainage tap

Type	L, mm [in]	L ₂ , mm [in]	L ₃ , mm [in]	L ₁ , mm [in]
MTM/B D 200	226,0 [8.90]	184,0 [7.24]	198,5 [7.86]	25,0 [.98]
MTM/B D 250	232,5 [9.15]	190,0 [7.48]	204,5 [8.05]	31,3 [1.23]
MTM/B D 315	241,5 [9.51]	199,5 [7.85]	214,0 [8.43]	40,5 [1.59]
MTM/B D 400	252,0 [9.92]	210,0 [8.27]	224,5 [8.84]	51,0 [2.01]
MTM/B D 470	260,0 [10.24]	218,0 [8.58]	232,5 [9.15]	59,0 [2.32]
MTM/B D 500	249,0 [9.80]	207,0 [8.15]	221,5 [8.72]	48,0 [1.89]
MTM/B D 630	262,0 [10.32]	220,0 [8.66]	234,5 [9.23]	61,0 [2.40]
MTM/B D 725	271,0 [10.67]	229,0 [9.02]	243,5 [9.59]	70,0 [2.76]

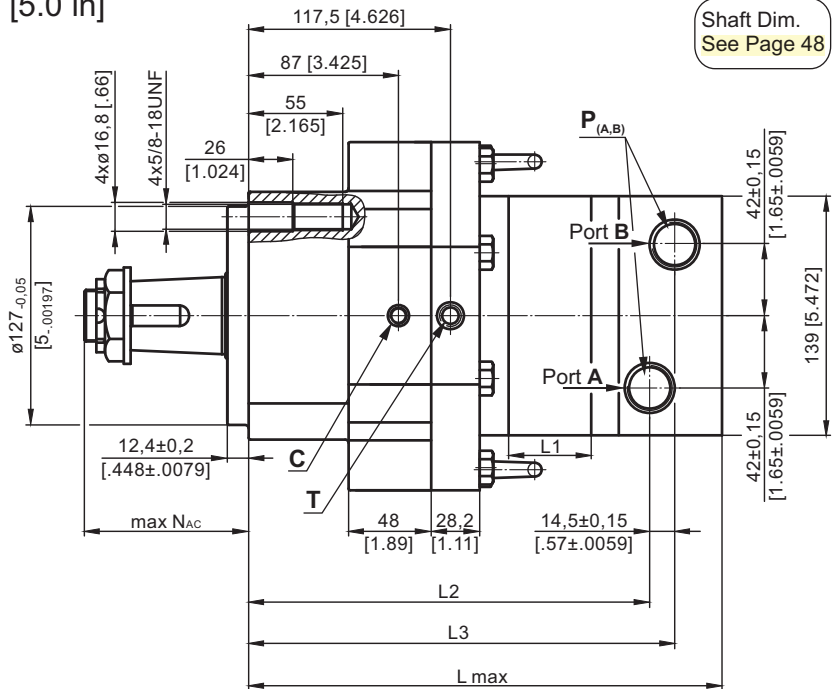
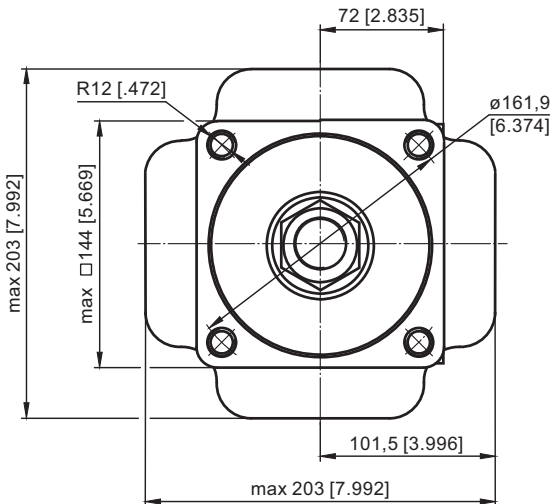
	Versions	
	2	4
P _(A,B)	2xG ³ / ₄	2x1 ¹ / ₁₆ -12UN
T	G ¹ / ₄	9 ¹ / ₁₆ -18 UNF
C	G ¹ / ₄	7 ¹ / ₁₆ -20 UNF

DIMENSIONS and MOUNTING DATA MTM/B C and MTM/B AC

C Thread hole flange 4xM16
spigot diameter 125 mm [4.921 in]



AC Thread hole flange 4x5/8-18 UNF
spigot diameter 127 mm [5.0 in]



Shaft Dim.
See Page 48

C : Brake release port
T : Drainage tap

	Versions	
	2	4
P (A,B)	2xG ³ / ₄	2x1 ¹ / ₁₆ -12UN
T	G ¹ / ₄	9 ¹ / ₁₆ -18UNF
C	G ¹ / ₄	7 ¹ / ₁₆ -20 UNF

Note: For N_c and N_{Ac} see page 39

Standard Rotation
Viewed from Shaft End
Port A Pressurized - **CW**
Port B Pressurized - **CCW**

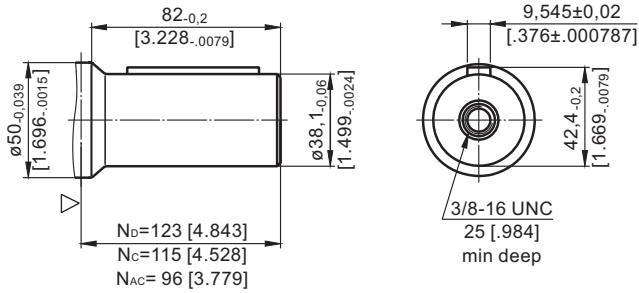
Reverse Rotation
Viewed from Shaft End
Port A Pressurized - **CCW**
Port B Pressurized - **CW**



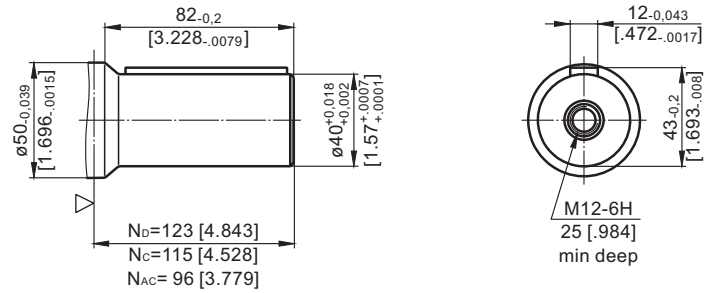
Type	L, mm [in]	L2, mm [in]	L3, mm [in]	Type	L, mm [in]	L2, mm [in]	L3, mm [in]	L1, mm [in]
MTM/B C 200	233,0 [9.17]	191,0 [7.92]	205,5 [8.09]	MTM/B AC 200	252,0 [9.92]	210,0 [8.27]	224,5 [8.84]	25,0 [.98]
MTM/B C 250	239,3 [9.42]	197,3 [7.77]	211,8 [8.34]	MTM/B AC 250	258,5 [10.18]	216,5 [8.25]	231,0 [9.09]	31,3 [1.23]
MTM/B C 315	248,5 [9.48]	206,5 [8.13]	221,0 [8.70]	MTM/B AC 315	267,5 [10.53]	225,5 [8.88]	240,0 [9.45]	40,5 [1.59]
MTM/B C 400	259,0 [10.19]	217,0 [8.54]	231,5 [9.11]	MTM/B AC 400	278,0 [10.94]	236,0 [9.29]	250,5 [9.19]	51,0 [2.01]
MTM/B C 470	267,0 [10.51]	225,0 [8.86]	239,5 [9.43]	MTM/B AC 470	286,0 [11.26]	244,0 [9.61]	258,5 [10.18]	59,0 [2.32]
MTM/B C 500	256,0 [10.08]	214,0 [8.43]	228,5 [8.99]	MTM/B AC 500	275,0 [10.83]	233,0 [9.17]	247,5 [9.74]	48,0 [1.89]
MTM/B C 630	269,0 [10.59]	227,0 [8.94]	241,5 [9.51]	MTM/B AC 630	288,0 [11.34]	246,0 [9.68]	260,5 [10.26]	61,0 [2.40]
MTM/B C 725	278,0 [10.94]	236,0 [9.29]	250,5 [9.86]	MTM/B AC 725	297,0 [11.69]	255,0 [10.04]	269,5 [10.61]	70,0 [2.76]

SHAFT EXTENSIONS

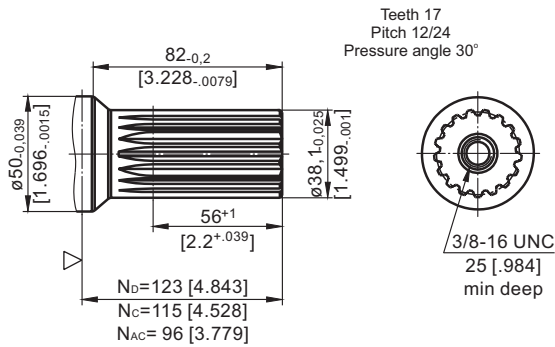
C - 1/2" [38,1] straight, Parallel key 3/8"x3/8"x 2 1/4" BS46
Max. Torque 133 daNm [11770 lb-in]



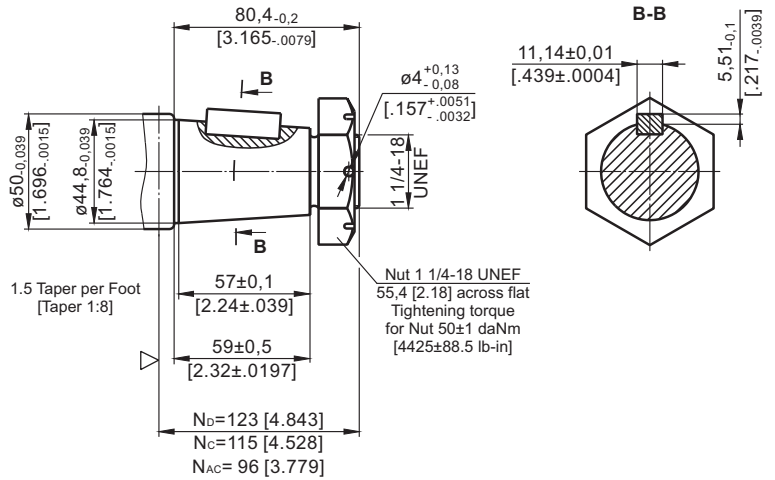
M - $\phi 40$ straight, Parallel key A12x8x70
Max. Torque 133 daNm [11770 lb-in]



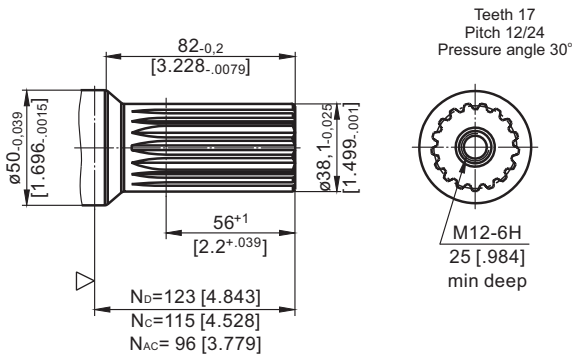
G - 17T Splined, 1 1/2" [38,1] ANS B92.1-1976
Max. Torque 210 daNm [18580 lb-in]



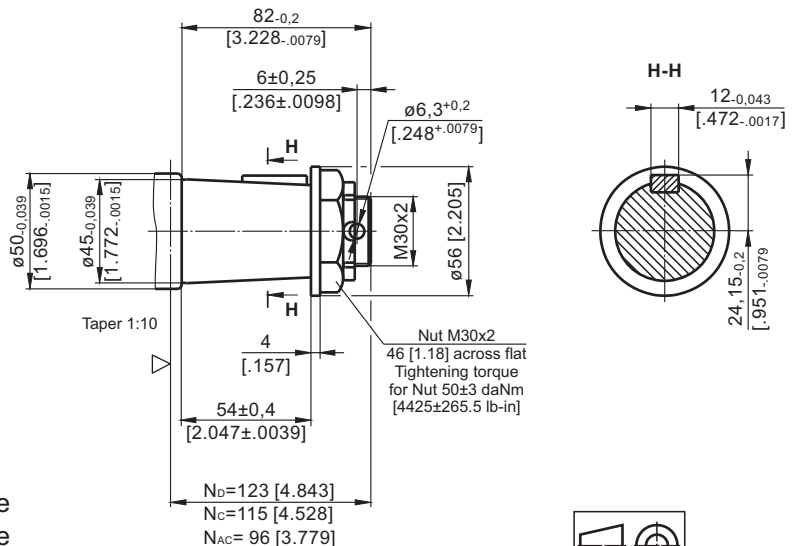
T - 1 3/4" [44,5] SAE J501 Tapered 1:8
Parallel key 7/16"x 1 1/4" BS46
Max. Torque 210 daNm [18580 lb-in]



SH - 17T Splined, 1 1/2" [38,1] ANS B92.1-1976
Max. Torque 210 daNm [18580 lb-in]



K - $\phi 45$ Tapered 1:10, Parallel key 12x8x28 DIN 6885
Max. Torque 210 daNm [18580 lb-in]



▽ - Motor Mounting Surface

N_D - for D flange
N_C - for C flange
N_{Ac} - for AC flange

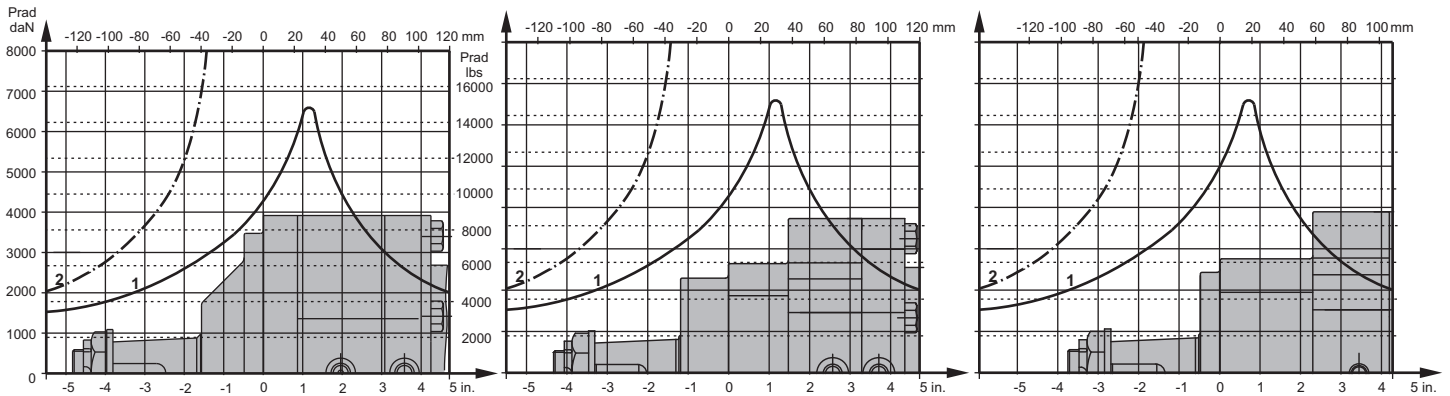


PERMISSIBLE RADIAL SHAFT LOADS

MTM/B D...

MTM/B C...

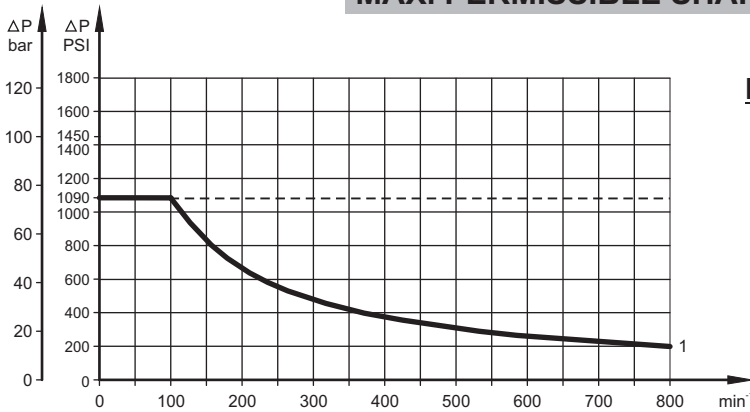
MTM/B AC...



1 - Bearing curve: The curve applies to a B10 bearing life of 2000 hours at 100 RPM.

2 - Shaft curve: The curve represents Max. permissible radial shaft load with safety factor 2:1.

MAX. PERMISSIBLE SHAFT SEAL PRESSURE



Max. return pressure without drain line or max. pressure in the drain line

1: Drawing for Standard Shaft Seal

- - continuous operations
- - intermittent operations

ORDER CODE

1	2	3	4	5	6
MTM/B					

Pos.1 - Mounting Flange

- AC** - Flange 4x5/8-18 UNC, spigot dia. \varnothing 127 mm [5 in]
- C** - Flange 4xM16, spigot dia. \varnothing 125 mm [4.92 in]
- D** - Flange 4x \varnothing 18,5 [.73], spigot dia. \varnothing 180 mm [7.09 in]

Pos.2 - Displacement code

- 200** - 201,4 cm³/rev [12.29 in³/rev]
- 250** - 251,8 cm³/rev [15.36 in³/rev]
- 315** - 326,3 cm³/rev [19.90 in³/rev]
- 400** - 410,9 cm³/rev [25.06 in³/rev]
- 470** - 475,0 cm³/rev [28.97 in³/rev]
- 500** - 494,9 cm³/rev [30.17 in³/rev]
- 630** - 631,2 cm³/rev [38.52 in³/rev]
- 725** - 724,3 cm³/rev [44.20 in³/rev]

Pos.3 - Shaft Extensions*

- C** - 1½" [38,1] straight, Parallel key 3/8x3/8x2 1/4"
- G** - 1½" [38,1] 17T Splined (3/8-16 UNC)
- M** - 40 mm straight, Parallel key 12x8x70
- T** - 1:8 Tapered, Parallel key 7/16x7/16x1 1/4"
- SH** - 1½" [38,1] 17T Splined (M12)
- K** - 1:10 Tapered, Parallel key 12x8x28

Pos.4 - Port Size/Type

- 2** - side ports, 2xG 3/4, G1/4, BSP thread, ISO 228
- 4** - side ports, 2x1¹/₁₆-12 UN, O-ring, ⁹/₁₆-18 UNF, 7/16-20UNF

Pos.5 - Additional Options

- HD** - Reinforced motor HD** (always)
For Other **Additional Options** see page 77

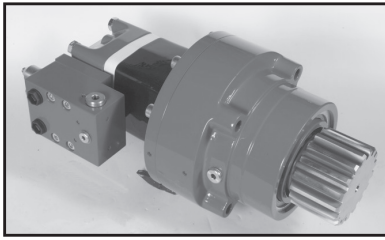
Pos.6 - Design Series

- omit - Factory specified

Notes: * The permissible output torque for shafts must not be exceeded!
** The drain line must always be opened!

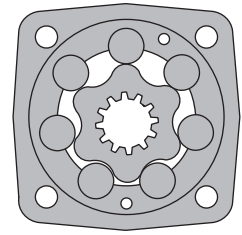
The motor-brakes are mangano-phosphatized as standard.

HYDRAULIC MOTOR-BRAKES SW500B350V



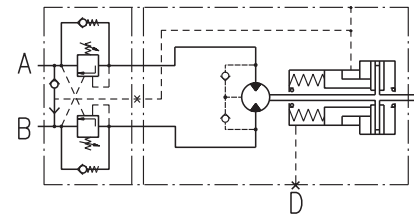
APPLICATION

- » Wheel drives
- » Conveyors
- » Rotators
- » Positioners
- » Winches
- » Swing drives
- » Door openers



CONTENTS

Specification data	50
Dimensions and mounting	51
Permissible shaft loads	51
Function diagrams	52
Order code	52



SPECIFICATION DATA

Type	SW500B350V
Displacement, cm³/rev [in³/rev]	475 [29]
Max. Speed, RPM	Cont. 16
	Int.* 25
Max. Torque, daNm [lb-in]	Cont. 82 [7260]
	Int.* 95 [8420]
Max. Output, kW [HP]	Cont. 0,9 [1.3]
	Int.* 2,4 [3.3]
Max. Pressure Drop, bar [PSI]	Cont. 125 [1800]
	Int.* 145 [2100]
Max. Oil Flow, lpm [GPM]	Cont. 8 [2]
	Int.* 12 [3]
Max. Return Pressure without Drain Line or Max. Pressure in Drain Line, bar [PSI]	100 [1450]
Min. Starting Torque, daNm [lb-in]	At max. press. drop Cont. 72 [6400]
	At max. press. drop Int.* 75 [6650]
Min. Speed**, RPM	5
Static Torque for the Brake***, daNm [lb-in]	164 [14515]
Release Pressure ±10%, bar [PSI]	initial 25...28 [363...406]
	full 31 [449.6]
Max. Steering Pressure, bar [PSI]	245 [3553]
Max. Pressure in Drain Space for the Brake, bar [PSI]	0,5 [7]
Pilot Ratio for the Valve	4,25:1

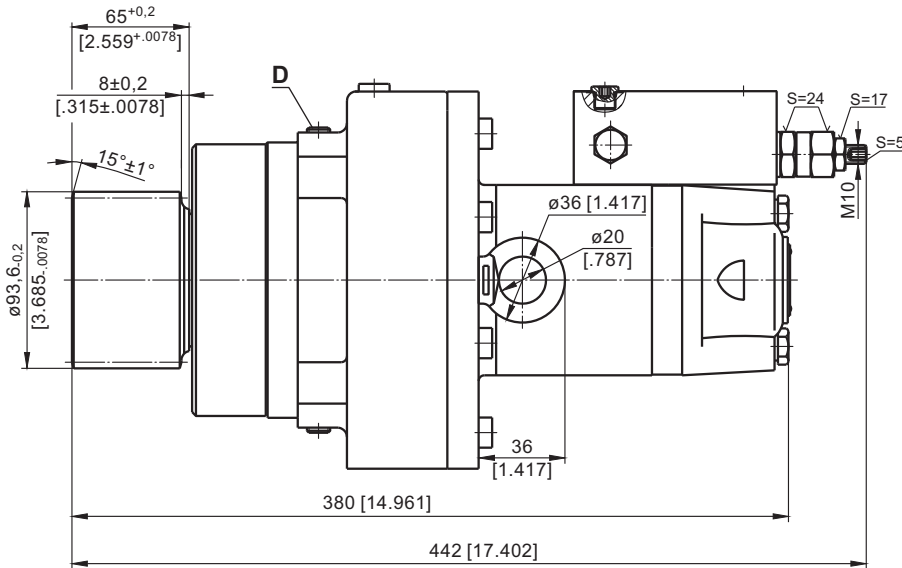
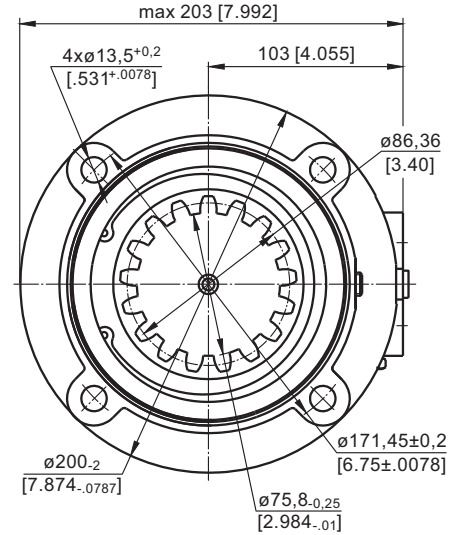
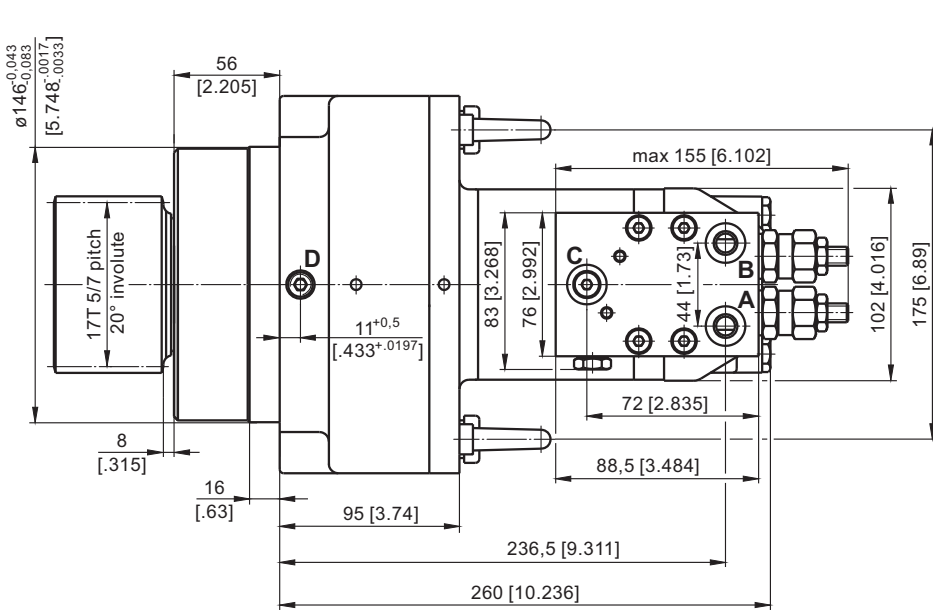
* Intermittent operation: the permissible values may occur for max. 10% of every minute.

** For speeds of 5 RPM lower than given, consult factory or your regional manager.

*** Static torque is obtained at working pressure - 0 PSI [0 bar].

Space is filled with 125±20 cm³ [7.63±1.22 in³] mineral oil HLP (DIN 51524) or HM (ISO 6743/4).

DIMENSIONS and MOUNTING



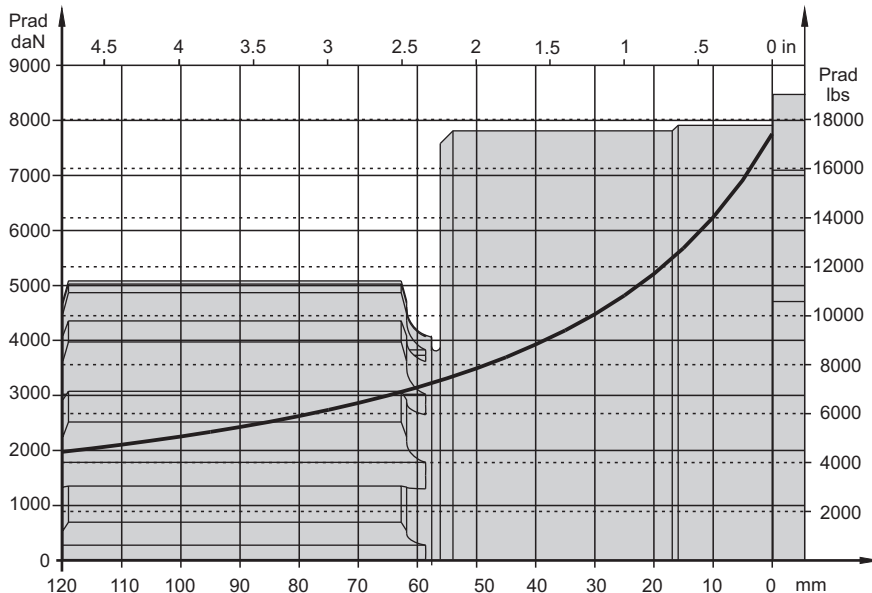
A,B: 7/16-20 UNF
D : 1/4-18 NPTF

Note: For different port's thread contact with "M+S Hydraulic".



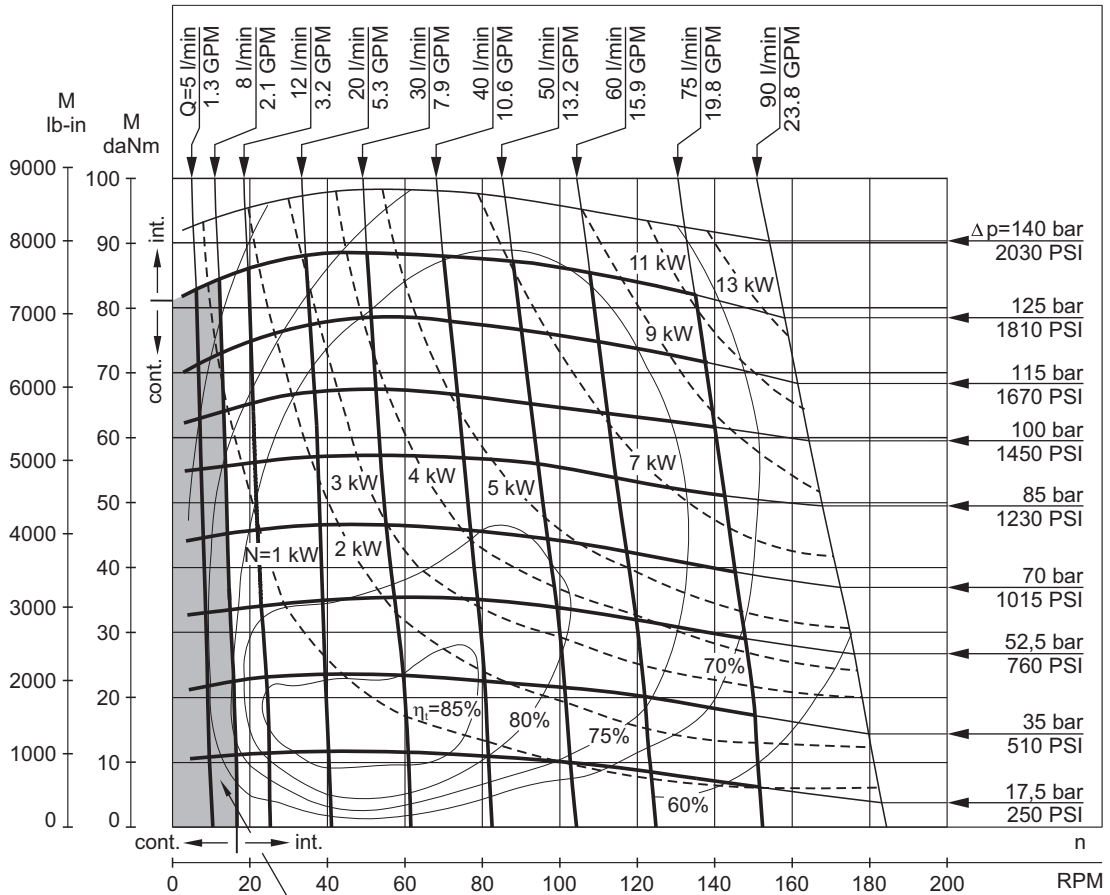
PERMISSIBLE SHAFT LOADS

The curve applies to a B10 bearing life of 3000 hours at 40 RPM



FUNCTION DIAGRAMS

SW 500



The working area
for SW500B350V

ORDER CODE

1	2	3	4	5	6	7	8
S	W	500	B	350		V	

Pos.1 - Type

S - Motor MLHS

Pos.2 - Displacement code

Pos.3 - Brake

Pos.4 - Brake Type

Pos.5 - Shaft Extension

omit - 17T PITCH splined

Pos.6 - Valve

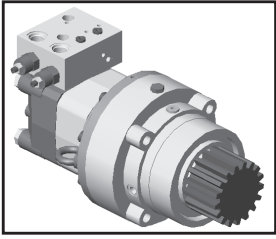
Pos.7 - Additional Options (see page 77)

Pos.8 - Design Series

omit - Factory specified

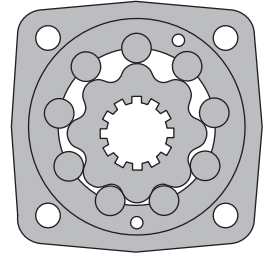
The motor-brakes are mangano-phosphatized as standard.

HYDRAULIC MOTOR-BRAKES TW500B350...V



APPLICATION

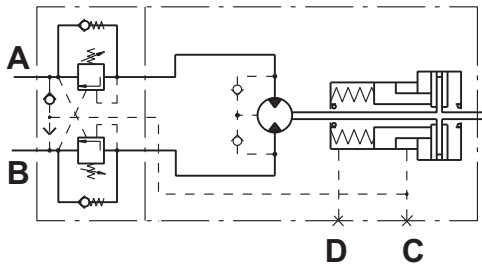
- » Wheel drives
- » Conveyors
- » Rotators
- » Positioners
- » Winches
- » Swing drives
- » Door openers



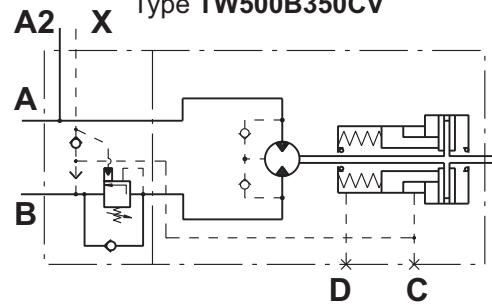
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Motor-Brake
Type TW500B350V



Motor-Brake
Type TW500B350CV



SPECIFICATION DATA

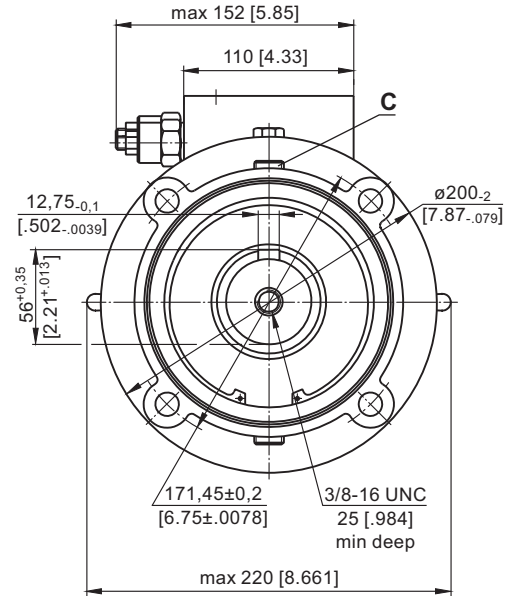
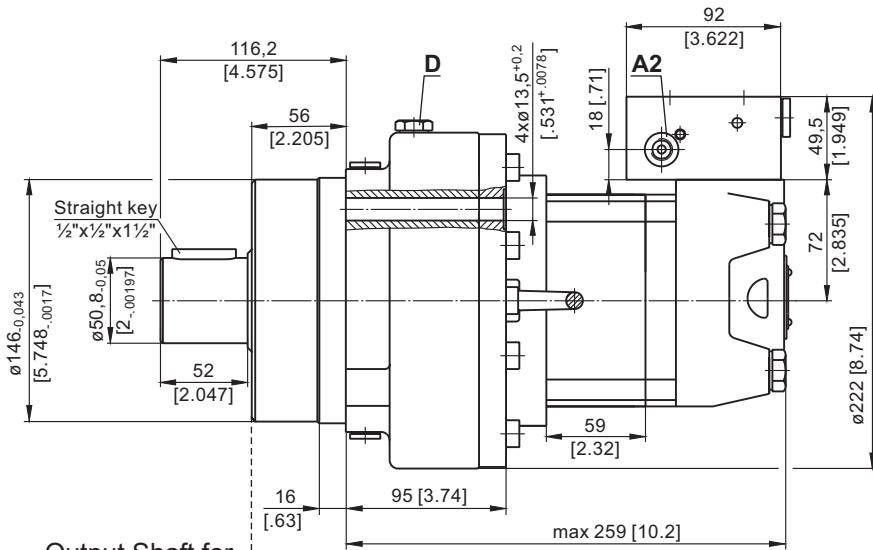
Type	TW500B350...V	
Displacement, cm³/rev [in³/rev]	475 [29]	
Max. Speed, RPM	Cont.	40
	Int.*	60
Max. Torque, daNm [lb-in]	Cont.	114 [10 000]
	Int.*	135 [12 000]
Max. Output, kW [HP]	Cont.	4,1 [5.4]
	Int.*	7,0 [9.39]
Max. Pressure Drop, bar [PSI]	Cont.	170 [2500]
	Int.*	200 [2900]
Max. Oil Flow, lpm [GPM]	Cont.	20 [5.3]
	Int.*	35 [9.2]
Max. Return Pressure without Drain Line or Max. Pressure in Drain Line, bar [PSI]	75 [1088]	
Min. Starting Torque, daNm [lb-in]	At max. press. drop Cont.	95 [8400]
	At max. press. drop Int.*	112 [9940]
Min. Speed**, RPM	5	
Static Torque for the Brake***, daNm [lb-in]	164 [14515]	
Release Pressure ±10%, bar [PSI]	initial	22,5...27,5 [326...400]
	full	28...34 [406...493]
Max. Steering Pressure, bar [PSI]	245 [3553]	
Max. Pressure in Drain Space for the Brake, bar [PSI]	0,5 [7]	
Pilot Ratio for the Valve	4,25:1	

* Intermittent operation: the permissible values may occur for max. 10% of every minute.

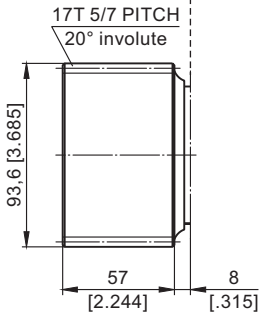
** For speeds of 5 RPM lower than given, consult factory or your regional manager.

*** Static torque is obtained at working pressure - 0 PSI [0 bar].

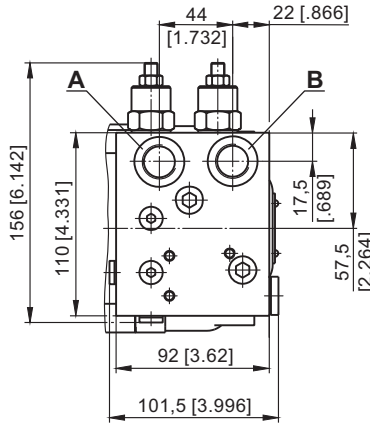
DIMENSIONS and MOUNTING



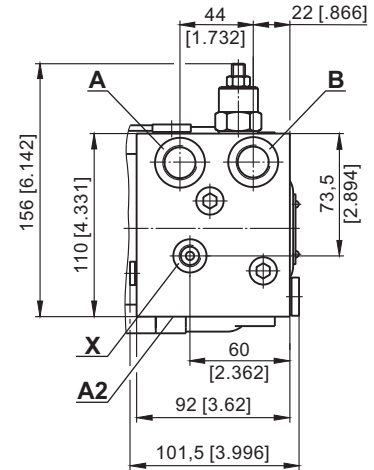
Output Shaft for TW500B350V



Valve Block for TW500B350V



Valve Block for TW500B350CV

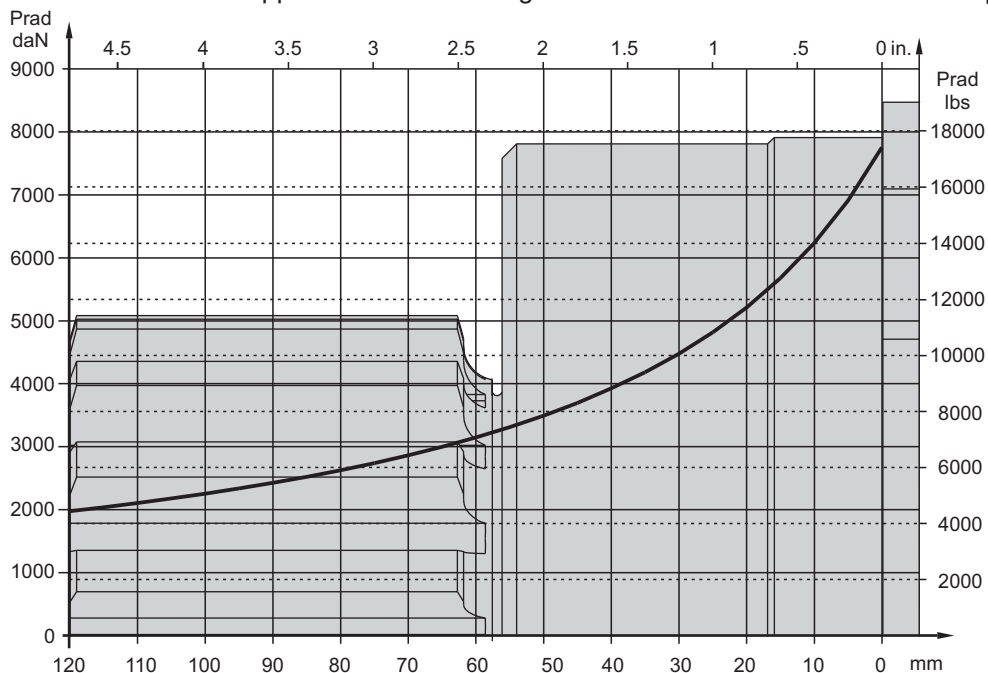


- A, B** : 2x7/8-14 UNF, 17,5 [.65] deep
- D** : 7/16-20 UNF
- C** : G1/4
- A2, X** : 7/16-18 UNF, 12 [.475] deep

Note: For different port's thread contact with "M+S Hydraulic".

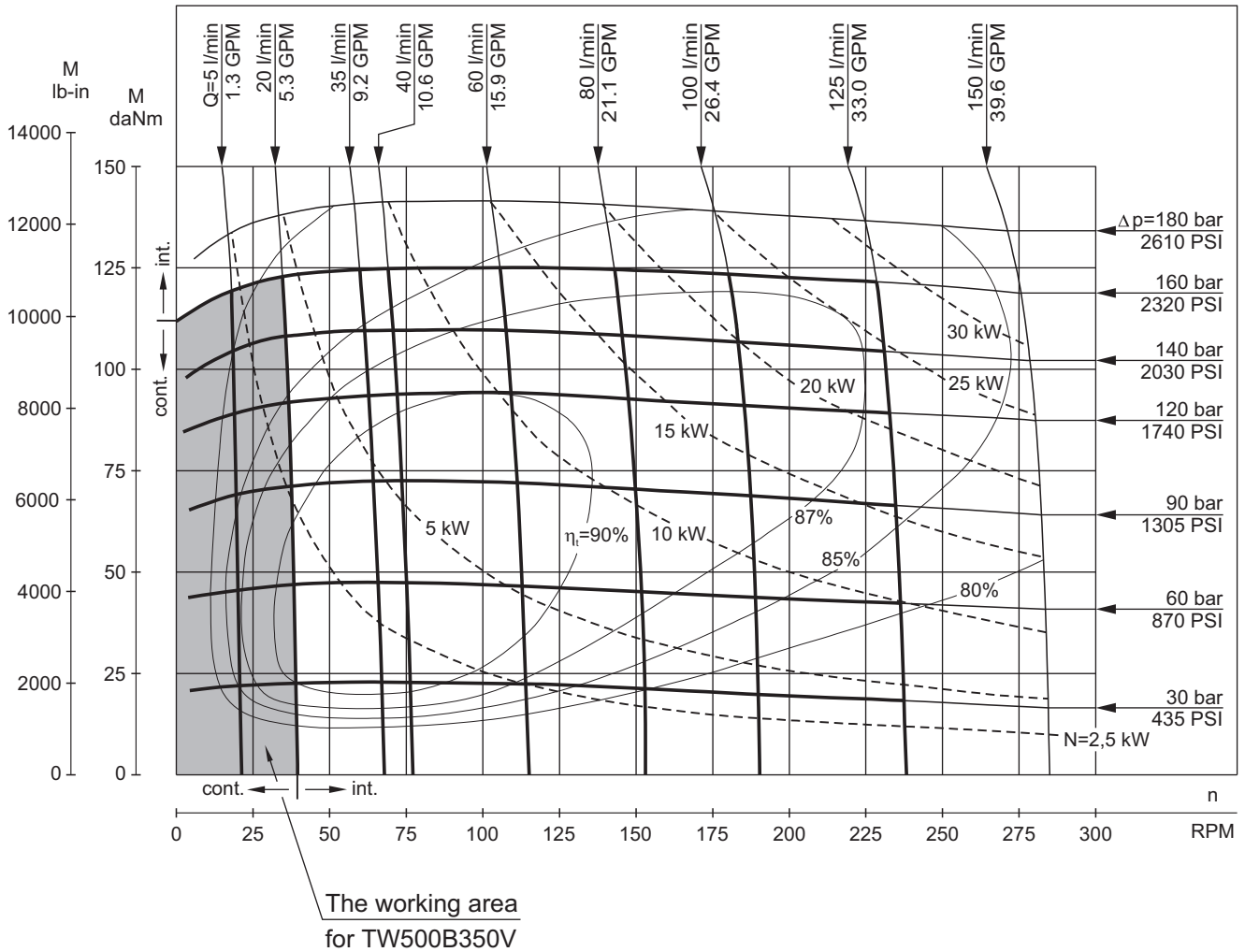
PERMISSIBLE SHAFT LOADS

The curve applies to a B10 bearing life of 3000 hours at 40 RPM.



FUNCTION DIAGRAMS

TW 500



ORDER CODE

1	2	3	4	5	6	7	8
T	W	500	B	350		V	

Pos.1 - Type

T - Motor MLHT

Pos.2 - Displacement code

Pos.3 - Brake

Pos.4 - Brake Type

Pos.5 - Shaft Extension

omit - 17T 5/7 PITCH 20° involute

C - Straight key 1/2"x1/2"x1 1/2"

Pos.6 - Valve

Pos.7 - Additional Options (see page 77)

Pos.8 - Design Series

omit - Factory specified

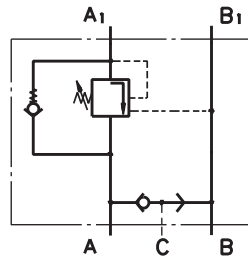
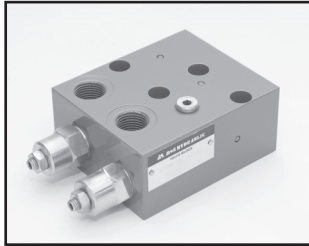
The motor-brakes are mangano-phosphatized as standard.

VALVES FOR HYDRAULIC MOTORS

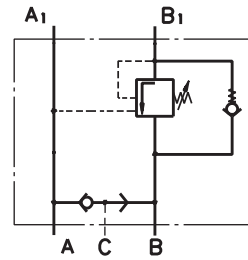
CONTENTS

Valves for MP, MR and MH type KPBR ...	57	Crossover Relief Valves	66
Valves for MS type KPBS	58	Valves for MP, MR and MH type KP...R	67
Valves for MT type KPBT	59	Valves for MS type KP...S	67
Valves for MV type KPBV	60	Valves for MT type KP...T	68
Valves for RW and HW type KPBW	61	Valves for MV type KP...V	70
Valves for HP and HR type KPBHR...E ...	62	Valves for RW and HW type KP...W	72
Valves for HP and HR type KPBHR...D ...	63	Valves for HR and RK type KPDHR and KPDRK ...	74
Switch valves type KPWR and KPWS ...	64	Order Code	75+76
Switch valves type KPWT and KPWW	65		

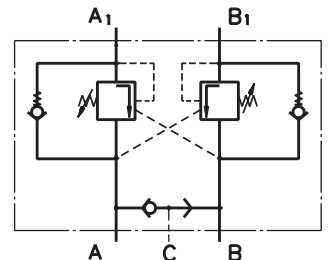
OVERCENTER VALVES with BRAKE CONTROL



Single Overcenter Valves with Brake Control type KPBR ... AE



Single Overcenter Valves with Brake Control type KPBR ... BE



Dual Overcenter Valves with Brake Control type KPBR ... D

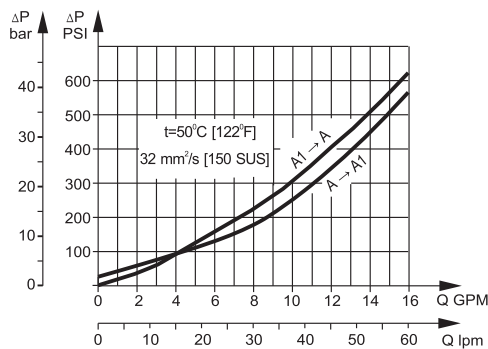
SPECIFICATION DATA

Parameters	Type											
	KPBR...E	KPBS...E	KPBR...D	KPBS...D	KPBW...E	KPBW...D	KPBHR...E	KPBHR...D	KPBT...E	KPBT...D	KPBV...E	KPBV...D
Flow Rate, lpm [GPM]	60 [15.85]						100 [26.4]		200 [52.8]			
Rated Pressure*, bar [PSI]	60÷280 [870÷4060]						70÷250 [1015÷3625]					
Pilot Ratio	4,25:1											
Weight, kg [lb]	3,020 [6.658]	2,900 [6.39]	3,060 [6.746]	2,920 [6.437]	3,050 [7.724]	3,140 [6.923]	2,300 [5.071]	2,400 [5.291]	5,400 [11.905]	5,800 [12.787]	9,200 [20.283]	9,750 [21.495]

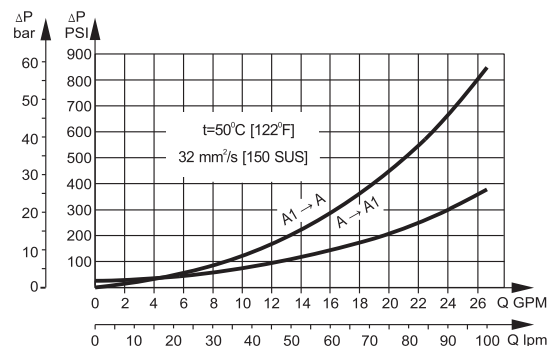
*Pressure Settings are at flow rate of 5 lpm [1.3 GPM] and viscosity 32 mm²/s [150 SUS] at 50 °C [122° F].

PRESSURE LOSSES

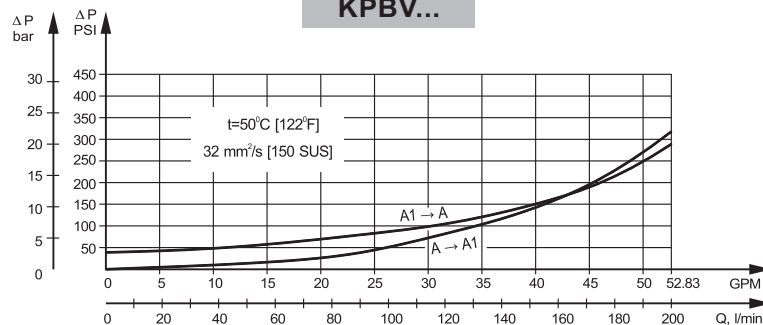
KPBR..., KPBS..., KPBW..., KPBHR...



KPBT...

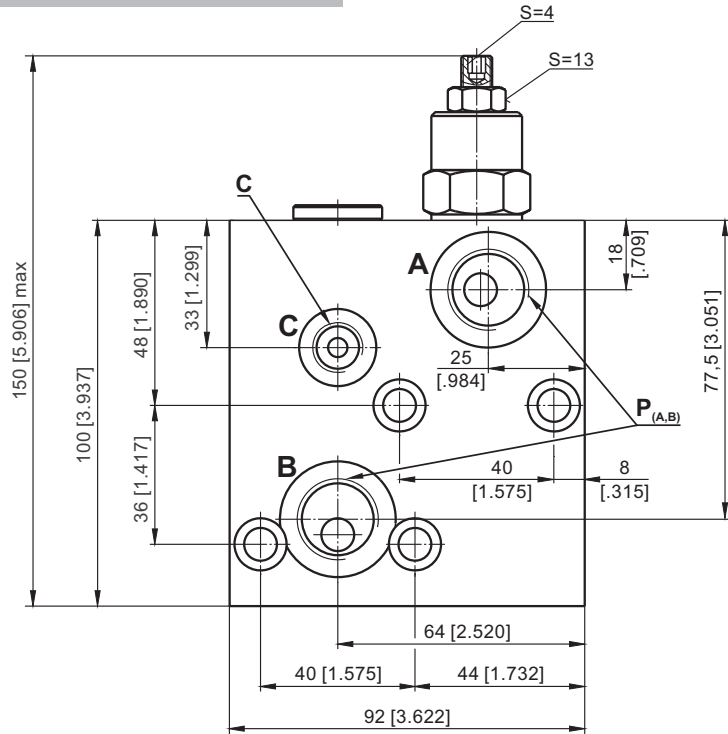
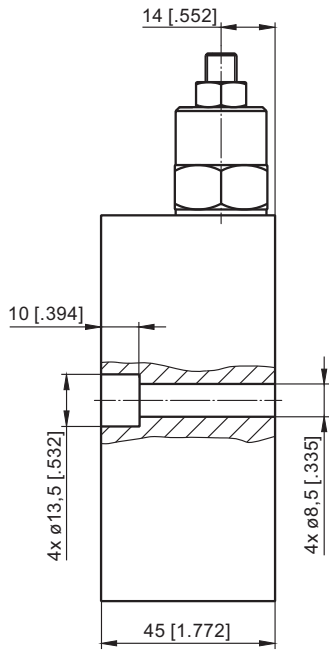


KPBV...

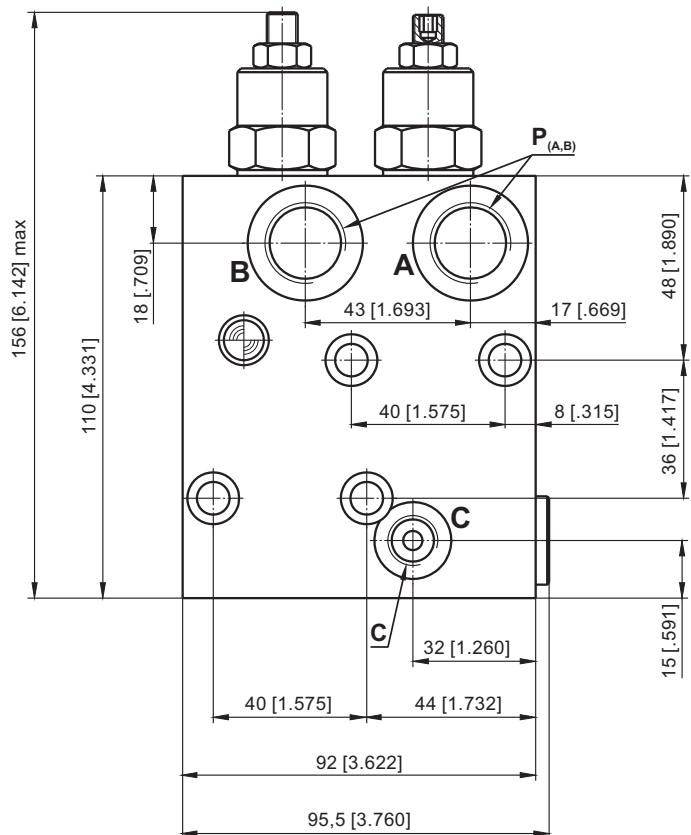
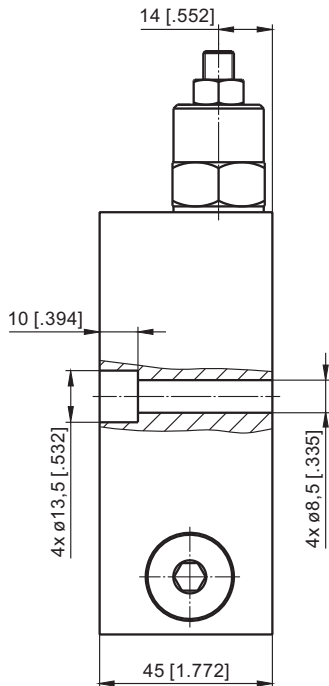


VALVES for MP, MR and MH HYDRAULIC MOTORS

SINGLE VALVE KPBR-250/1/E...



DUAL VALVE KPBR-250/1/D...



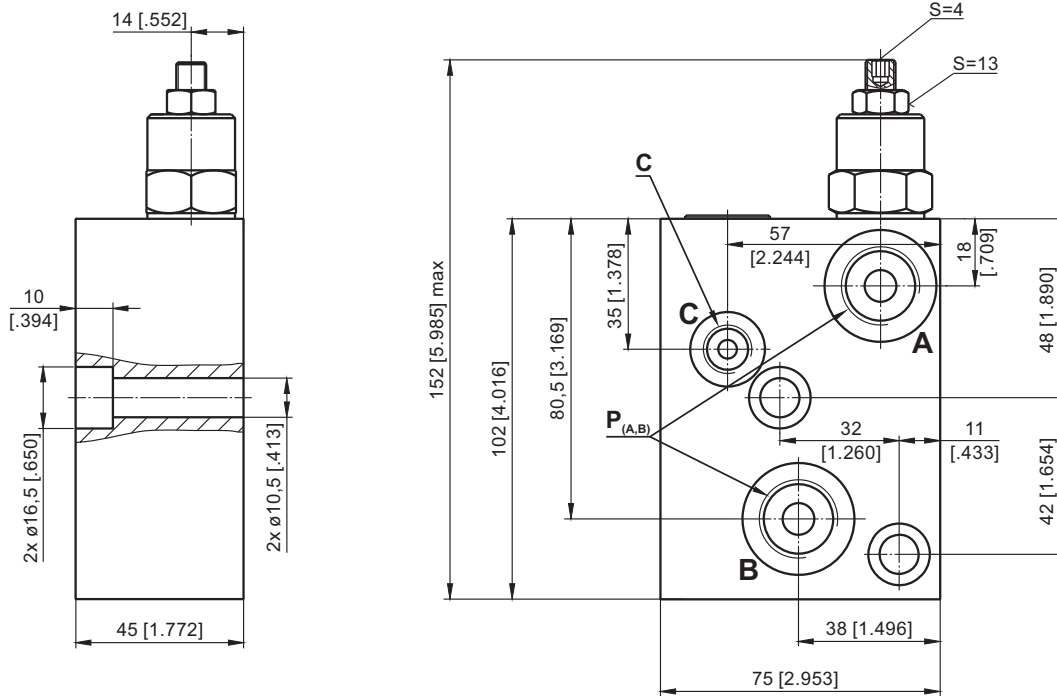
	Thread Ports - P _(A,B)	Thread Ports - C
-	G1/2 16 [.63] depth	G1/4 12 [.47] depth
M	M22x1,5 16 [.63] depth	M14x1,5 12 [.47] depth
A	7/8 - 14 UNF O-ring 16 [.63] depth	7/16 - 20 UNF O-ring 12,7 [.50] depth



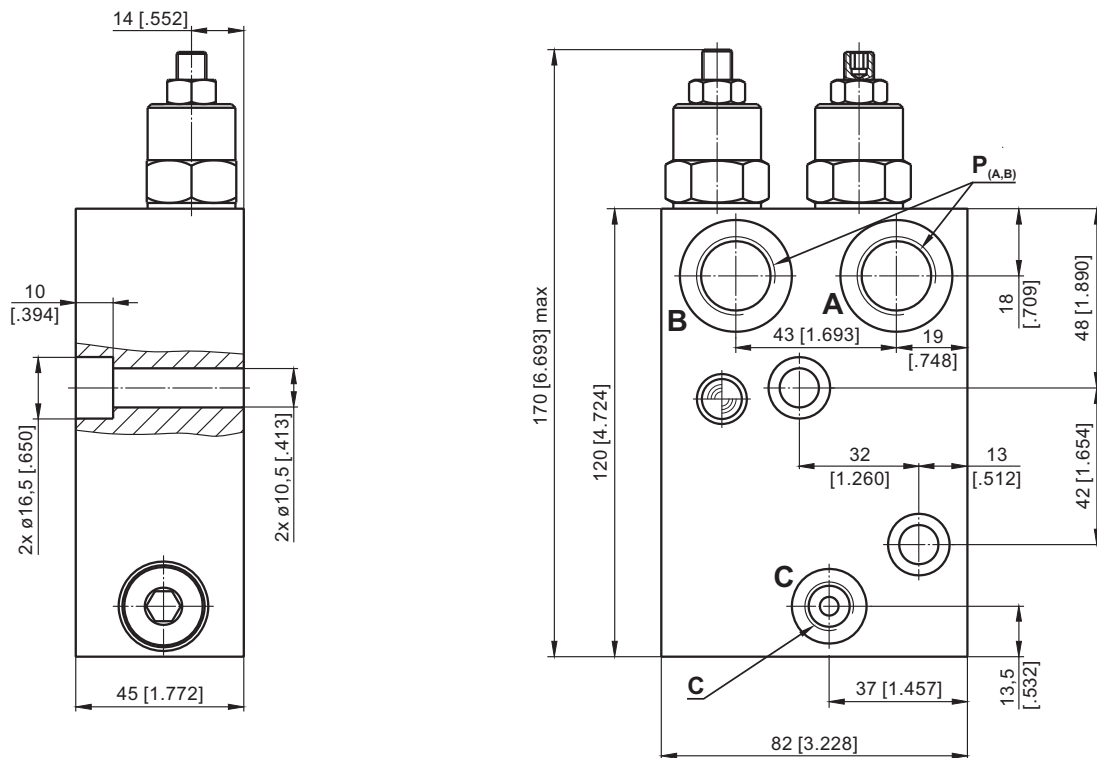
Note: KPBR Blocks are installed directly on MP, MR and MH Motors with four screws M8x45 - 8.8 DIN 912 or 5/16-18 UNC, 1.75 long ANSI B 18.3 . Tightening torque 2,0^{+0,5} daNm [177⁺⁴⁴ lb-in].

VALVES for MS HYDRAULIC MOTORS

SINGLE VALVE KPBS-250/1/E...



DUAL VALVE KPBS-250/1/D...



	Thread Ports - P _(A,B)	Thread Ports - C
-	G1/2 16 [.63] depth	G1/4 12 [.47] depth
M	M22x1,5 16 [.63] depth	M14x1,5 12 [.47] depth
A	7/8 - 14 UNF O-ring 16 [.63] depth	7/16 - 20 UNF O-ring 12,7 [.50] depth

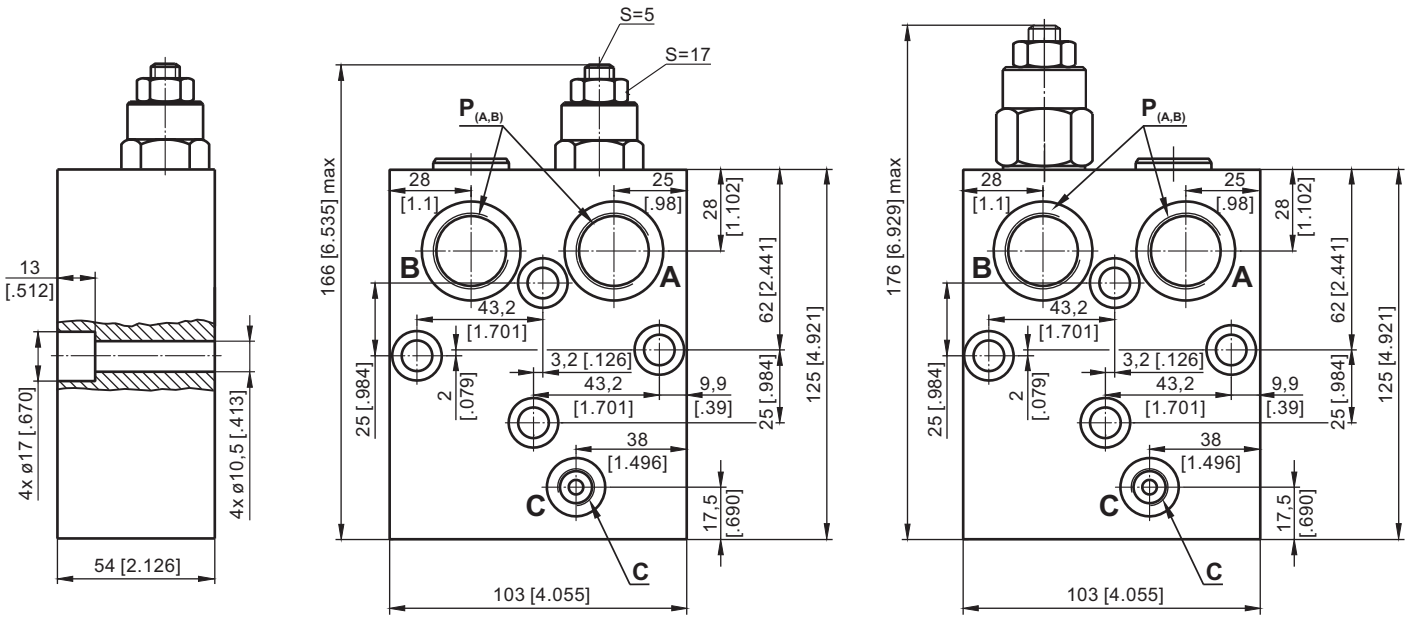


Note: KPBS Blocks are installed directly on MS Motors with two screws M10x45 - 8.8 DIN 912 or 3/8-16UNC, 1.75 long ANSI B 18.3 . Tightening torque 3,5 daNm [310 lb-in].

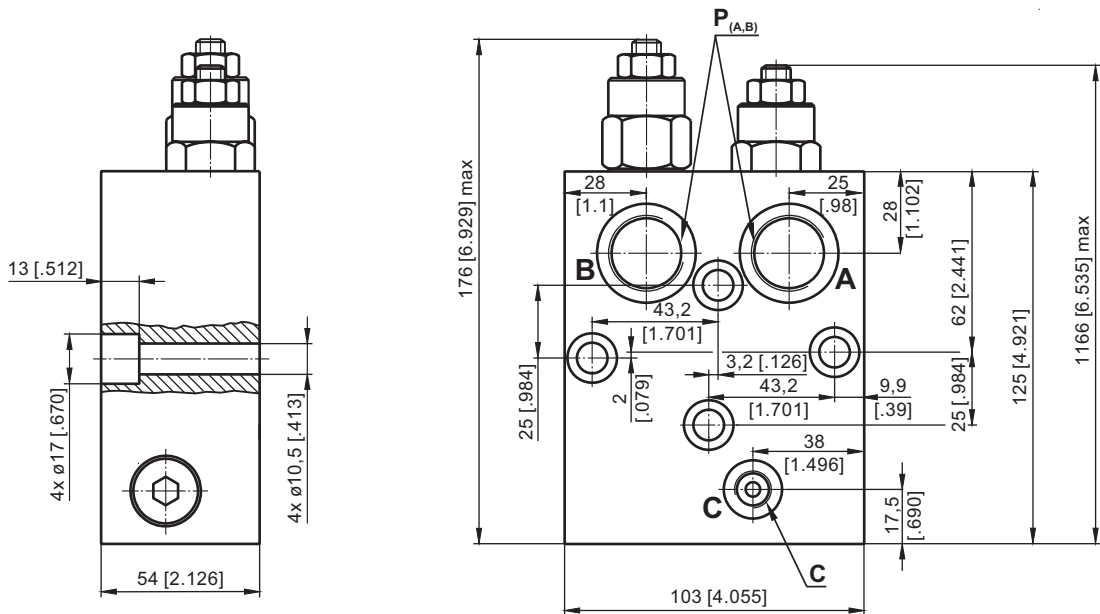
VALVES for MT HYDRAULIC MOTORS

SINGLE VALVE KPBT-250/1/AE...

SINGLE VALVE KPBT-250/1/BE...



DUAL VALVE KPBT-250/1/D...



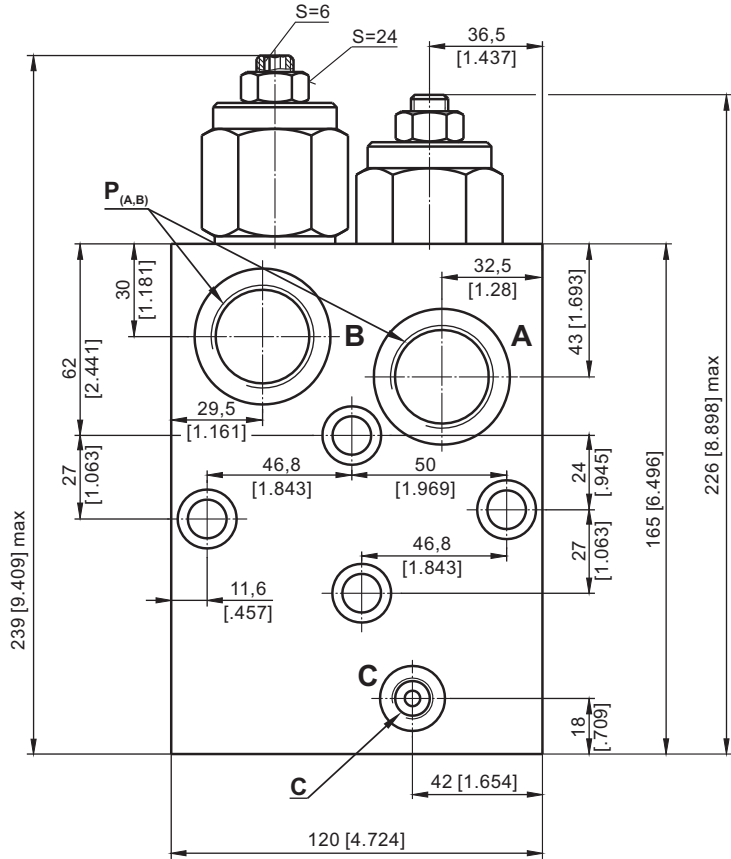
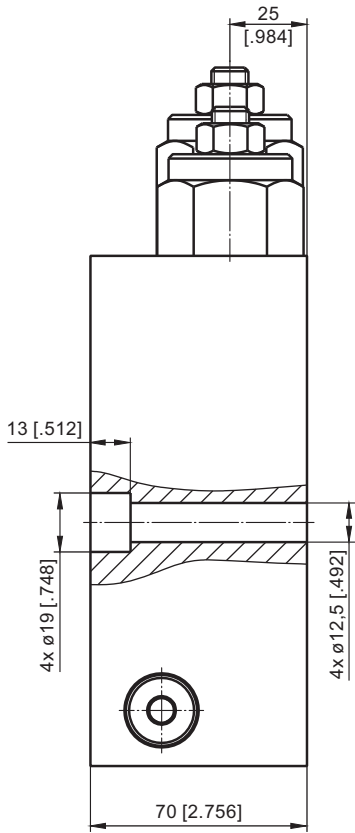
	Thread Ports - P _(A,B)	Thread Ports - C
-	G3/4 17 [.67] depth	G1/4 14 [.55] depth
M	M27x2 17 [.67] depth	M14x1,5 14 [.55] depth
A	1 1/16 - 12 UN O-ring 17 [.67] depth	7/16 - 20 UNF O-ring 12,7 [.50] depth



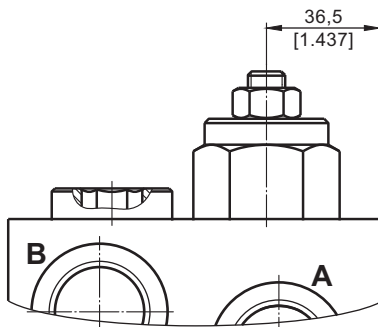
Note: KPBT Blocks are installed directly on MT Motors with four screws M10x50 - 8.8 DIN 912. Tightening torque 3,5 daNm [310 lb-in].

VALVES for MV HYDRAULIC MOTORS

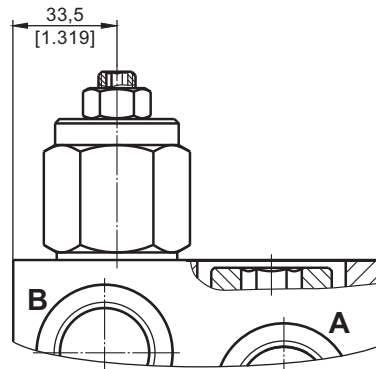
DUAL VALVE KPBV-250/1/D...



SINGLE VALVE KPBV-250/1/AE...



SINGLE VALVE KPBV-250/1/BE...



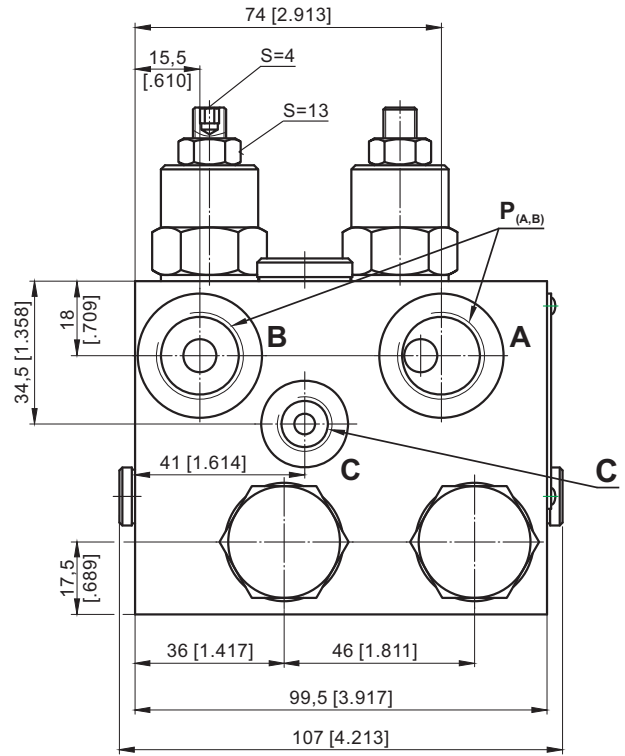
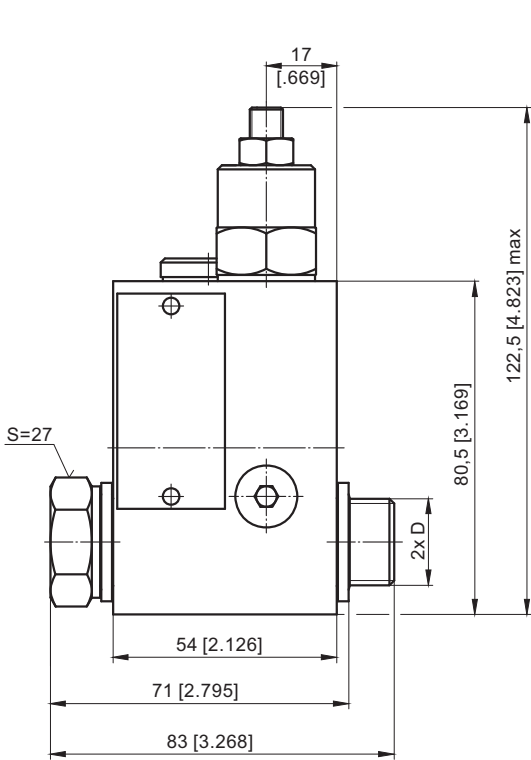
	Thread Ports - P _(A,B)	Thread Ports - C
-	G 1 20 [.79] depth	G1/4 14 [.55] depth
M	M33x2 20 [.79] depth	M14x1,5 14 [.55] depth
A	1 5/16 - 12 UN O-ring 20 [.79] depth	7/16 - 20 UNF O-ring 12,7 [.50] depth



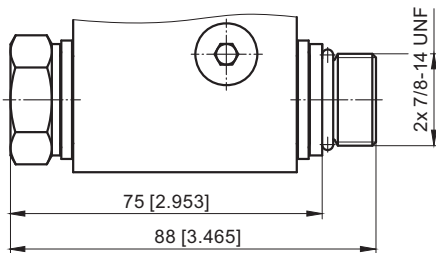
Note: KPBV Blocks are installed directly on MV Motors with four screws M12x70 - 8.8 DIN 912. Tightening torque 6,5 daNm [575 lb-in].

VALVES for RW and HW HYDRAULIC MOTORS

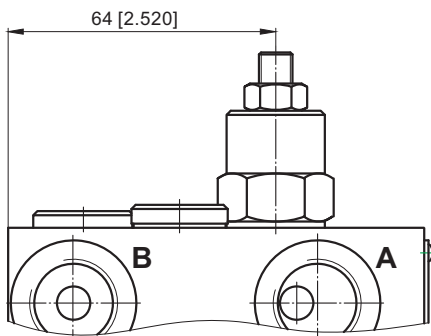
DUAL VALVE KPBW-250/1/D...



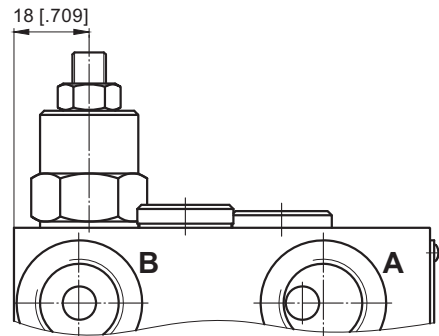
KPBW-...A



SINGLE VALVE KPBW-250/1/AE...



SINGLE VALVE KPBW-250/1/BE...

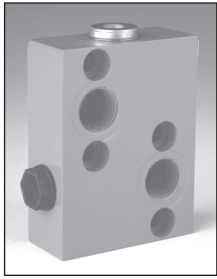


	Thread Ports - P _(A,B)	Thread Port - C	Thread Ports - D
-	G1/2 16 [.63] depth	G1/4 12 [.47] depth	G1/2 12 [.47] length
M	M22x1,5 16 [.63] depth	M14x1,5 12 [.47] depth	M22x1,5 12 [.47] length
A	7/8 - 14 UNF O-ring 116 [.63] depth	7/16 - 20 UNF O-ring 12,7 [.50] depth	7/8 - 14 UNF O-ring 13 [.51] length



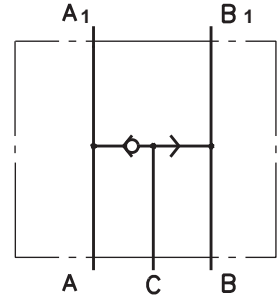
Note: KPBW Blocks assembly to RW or HW motors is done with two screws (thread D) included in the valve set. Tightening torque 8 daNm [710 lb-in].

SWITCH VALVE



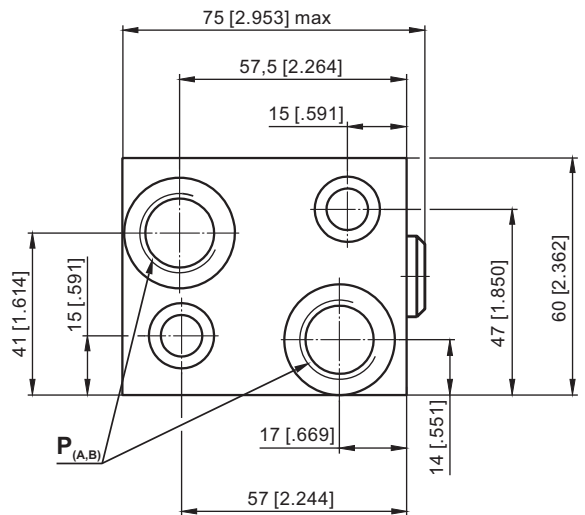
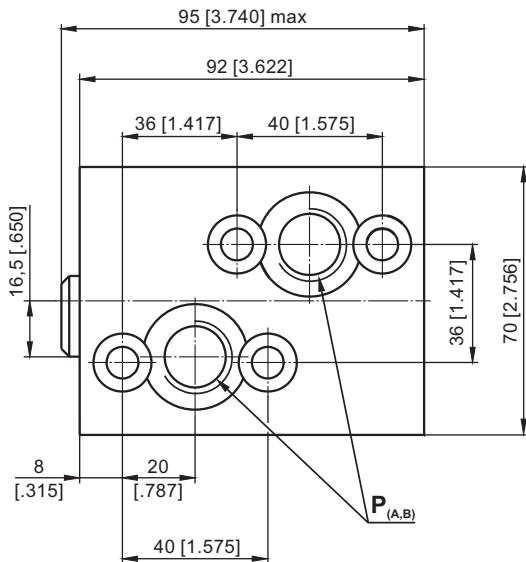
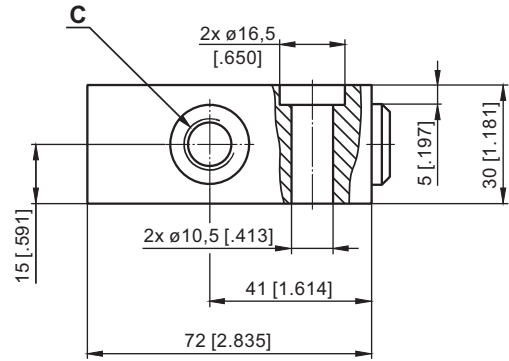
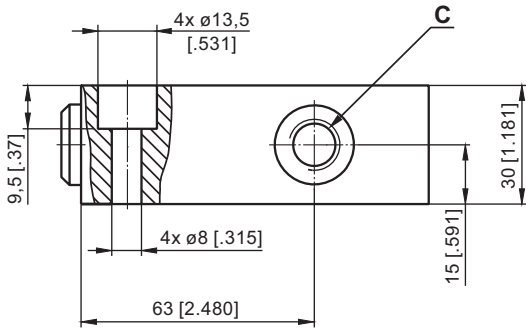
SPECIFICATION DATA

Parameters	Type	
	KPWR	KPWS
Flow Rate, lpm [GPM]	60	[15.85]
Pressure Range*, bar [PSI]	250	[3625]
Weight, kg	0,850	0,670
	[lb]	[1.874]



**VALVE for MP, MR, MH HYDRAULIC MOTORS
KPWR**

**VALVE for MS HYDRAULIC MOTORS
KPWS**



	Thread Ports - P _(A,B)	Thread Ports - C
-	G1/2 17 [.67] depth	G1/4 14 [.55] depth
M	M22x1,5 17 [.67] depth	M14x1,5 14 [.55] depth
A	7/8 - 14 UNF O-ring 17 [.67] depth	7/16 - 20 UNF O-ring 12,7 [.50] depth

Note: **KPWR** Blocks are installed directly on MP, MR and MH Motors with four screws M8x30 - 8.8 DIN 912 or 5/16-18UNC, 1.25 [.049] long ANSI B 18.3 .
Tightening torque 2,0^{+0,5} daNm [177⁺⁴⁴ lb-in].

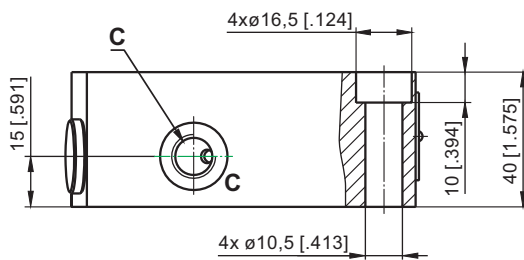
KPWS Blocks are installed directly on MS Motors with two screws M10x35 - 8.8 DIN 912 or 3/8-16UNC, 1.5 [.059] long ANSI B 18.3 .
Tightening torque 3,5 daNm [336 lb-in].

SWITCH VALVE (continued)

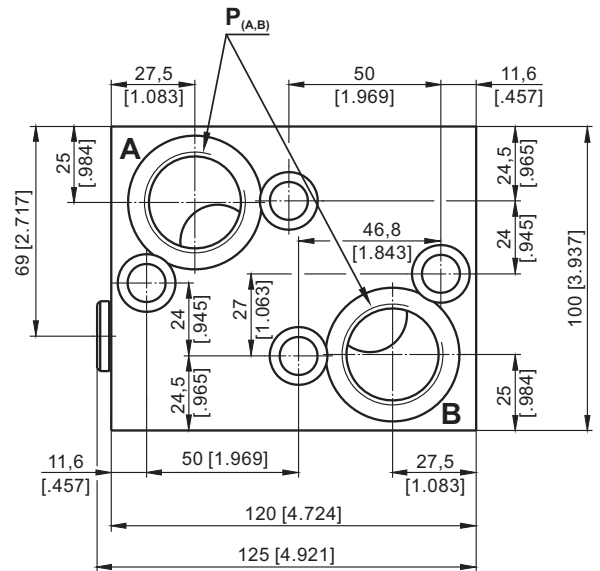
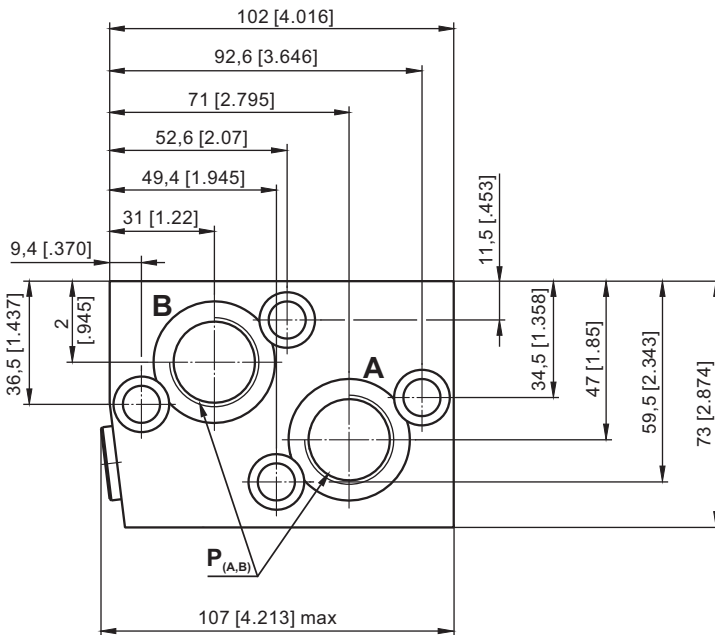
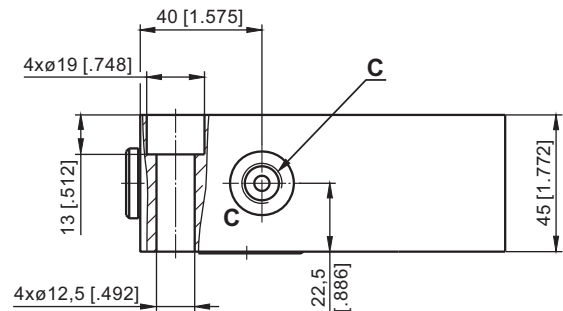
SPECIFICATION DATA

Parameters		Type	
		KPWT	KPWW
Flow Rate,	lpm [GPM]	100 [26.4]	2100 [52.8]
Pressure Range,	bar [PSI]	250	[3625]
Weight,	kg	1,800	3,150
	[lb]	[3.968]	[6.945]

**VALVE for MT HYDRAULIC MOTORS
KPWT**



**VALVE for MV HYDRAULIC MOTORS
KPWW**



	Thread Ports - P (A,B)	Thread Ports - C
-	G3/4 17 [.67] depth	G1/4 14 [.55] depth
M	M27x2 17 [.67] depth	M14x1,5 14 [.55] depth
A	1 1/16 - 12 UN O-ring 17 [.67] depth	7/16 - 20 UNF O-ring 12,7 [.50] depth

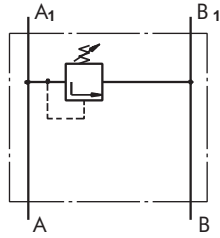


	Thread Ports - P (A,B)	Thread Ports - C
-	G 1 20 [.79] depth	G1/4 14 [.55] depth
M	M33x2 20 [.79] depth	M14x1,5 14 [.55] depth
A	1 5/16 - 12 UN O-ring 20 [.79] depth	7/16 - 20 UNF O-ring 12,7 [.50] depth

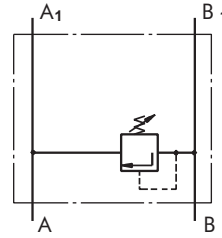
Note: KPWT Blocks are installed directly on MT Motors with four screws M10x40 - 8.8 DIN 912. Tightening torque 3,5 daNm [336 lb-in].

KPWW Blocks are installed directly on MV Motors with four screws M12x45 - 8.8 DIN 912. Tightening torque 6,5 daNm [425 lb-in].

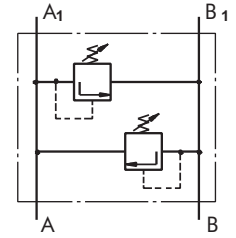
CROSSOVER RELIEF VALVES



Single Crossover Relief Valve type KPE ...



Single Crossover Relief Valve type KPE ...



Dual Crossover Relief Valve type KPD ...

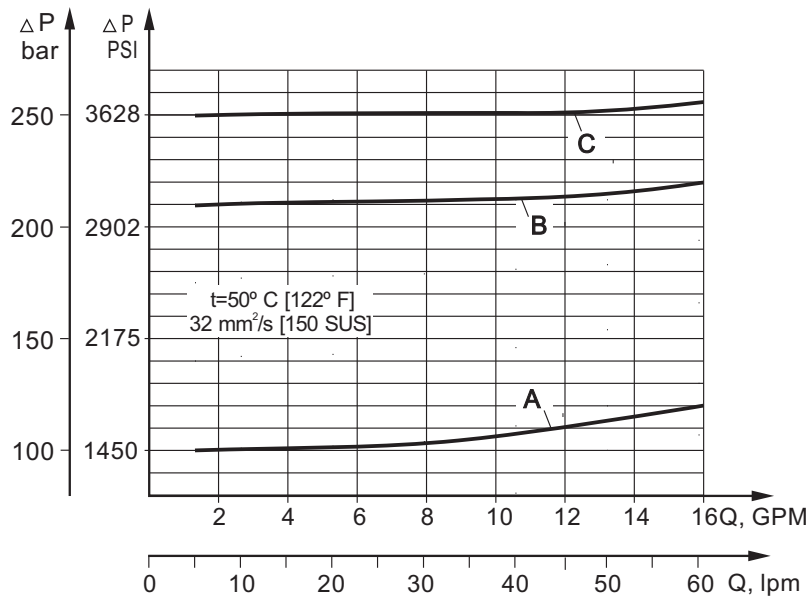
SPECIFICATION DATA

Parameters	Type			
	KPER	KPDR	KPES	KPDS
Flow Rate, lpm [GPM]	60 [15.85]			
Pressure Range*, bar [PSI]	30 ÷ 100; 50 ÷ 210; 80 ÷ 300 [435÷1450]; [725÷3050]; [1160÷4350]			
Weight, kg [lb]	1,55 [3.42]		1,50 [3.31]	

*Pressure Settings are at flow rate of 5 lpm [1.32 GPM] and viscosity 32 mm²/s [150 SUS] (50°C [122°F]).

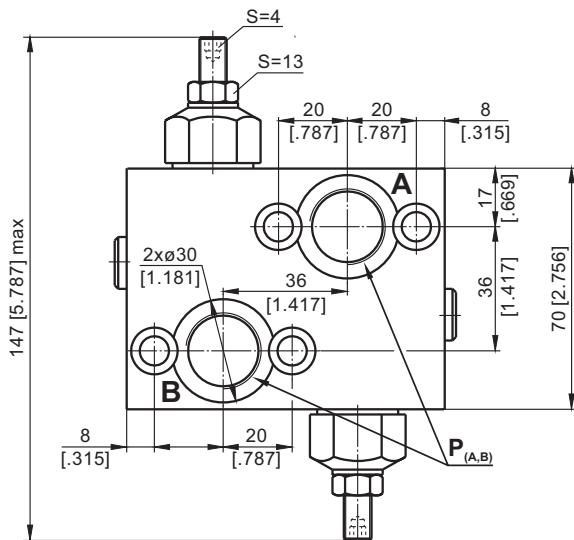
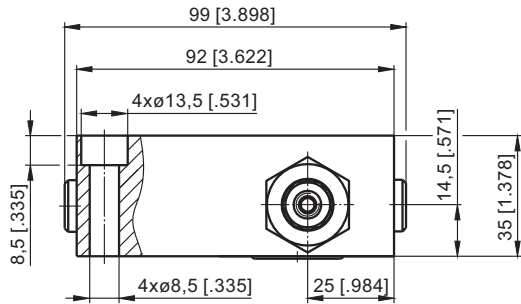
Rated Pressure

- A → 100 bar [1450 PSI]
- B → 210 bar [3050 PSI]
- C → 250 bar [3625 PSI]



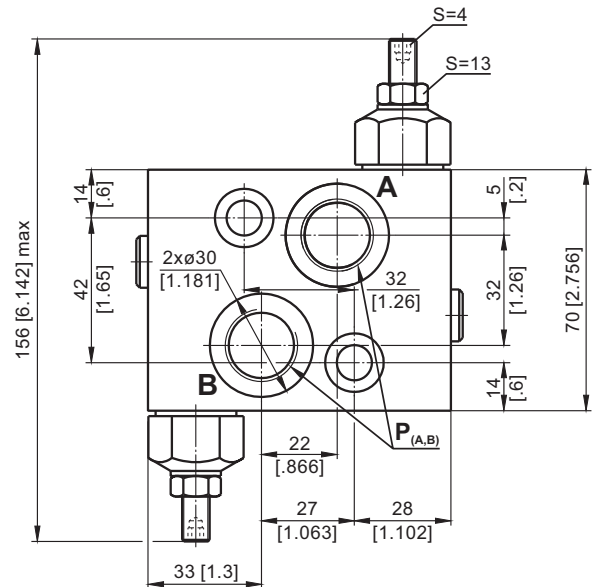
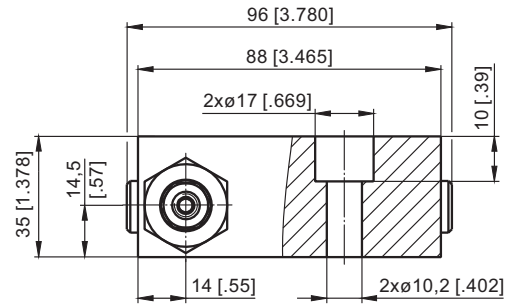
**VALVES for MP, MR and MH
HYDRAULIC MOTORS**

DUAL VALVE KPDR

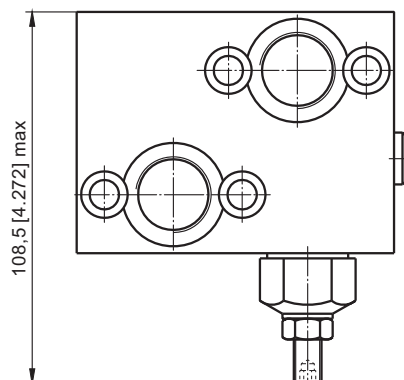


**VALVES for MS
HYDRAULIC MOTORS**

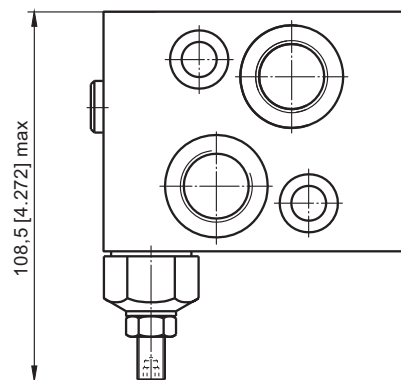
DUAL VALVE KPDS



SINGLE VALVE KPER



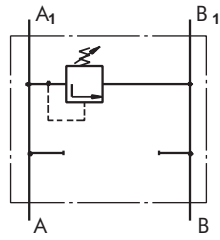
SINGLE VALVE KPES



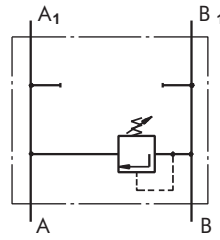
	Thread Ports - P _(A,B)
-	G1/2 20 [0.79] depth
M	M22x1,5 20 [0.79] depth
A	7/8 - 14 UNF O-ring 20 [0.79] depth

Note: **KPDR** and **KPER** Blocks are installed directly on MP, MR and MH Motors with four screws M8x35 - 8.8 DIN 912 or 5/16-18 UNC, 1.5 long ANSI B 18.3 . Tightening torque 2,0^{+0.5} daNm [177⁺⁴⁴ lb-in].
KPDS and **KPES** Blocks are installed directly on MS Motors with two screws M10x35 - 8.8 DIN 912 or 3/8-16 UNC, 1.5 long ANSI B 18.3 . Tightening torque 3,5 daNm [310 lb-in].

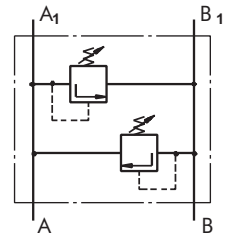
VALVES for MT HYDRAULIC MOTORS



Single Crossover
Relief Valve
type KPEAT ...



Single Crossover
Relief Valve
type KPEBT ...



Dual Crossover
Relief Valve
type KPDT ...

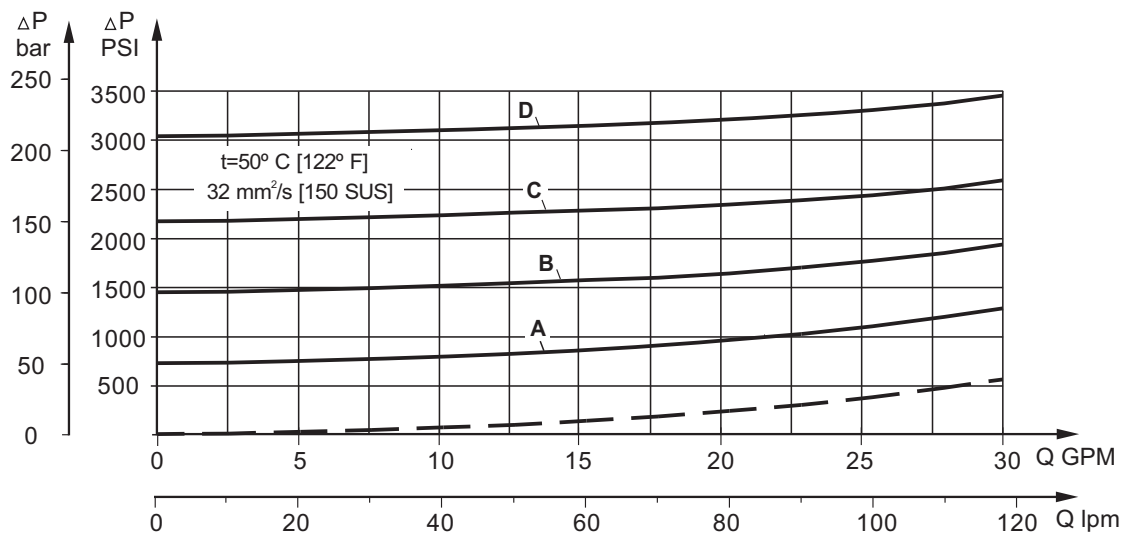
SPECIFICATION DATA

Parameters		Type	
		KPE...T	KPDT
Flow Rate,	lpm [GPM]	120 [32]	
Pressure Range*,	bar [PSI]	80÷210 [1160÷3050]	
Weight,	kg	5,10	5,54
	[lb]	[11.24]	[12.21]

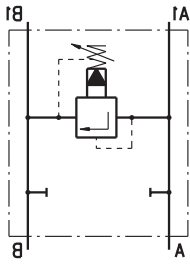
*Pressure Settings are at flow rate of 5 lpm [1.32 GPM] and viscosity 32 mm²/s [150 SUS] (50°C [122°F]).

Rated Pressure

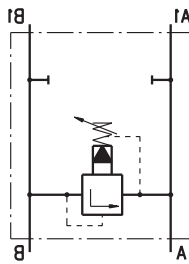
- A → 50 bar [725 PSI]
- B → 100 bar [1450 PSI]
- C → 150 bar [2175 PSI]
- D → 210 bar [3045 PSI]



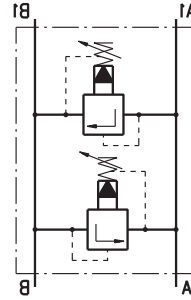
VALVES for MV HYDRAULIC MOTORS



Single Crossover
Relief Valve
type KPEAV ...



Single Crossover
Relief Valve
type KPEBV ...



Dual Crossover
Relief Valve
type KP DV ...

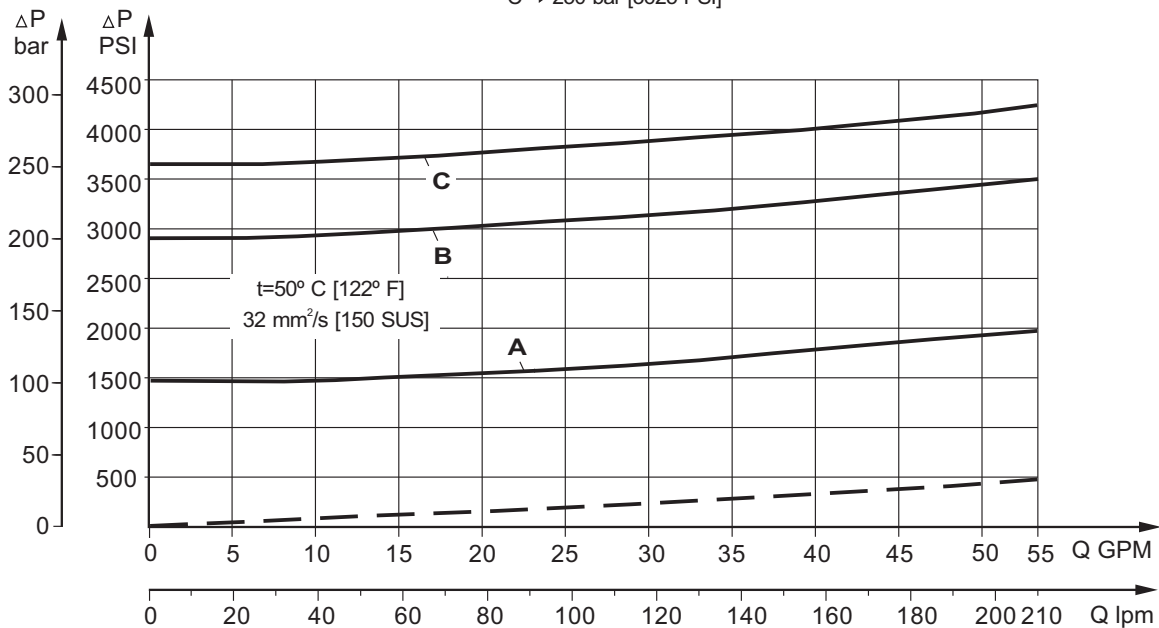
SPECIFICATION DATA

Parameters	Type		
	KPEAV	KPEBV	KPDV
Flow Rate, lpm [GPM]	200 [53]		
Pressure Range*, bar [PSI]	10÷100 [145÷1450]	20÷250 [290÷3625]	
Weight, kg [lb]	4,90 [10.8]	7,10 [15.65]	8,00 [17.64]

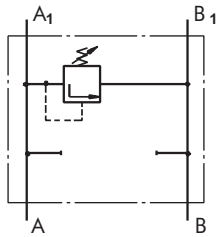
*Pressure Settings are at flow rate of 5 lpm [1.32 GPM] and viscosity 32 mm²/s [150 SUS] (50°C [122°F]).

Rated Pressure

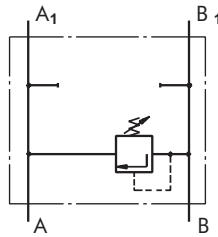
- A → 100 bar [1450 PSI]
- B → 200 bar [2900 PSI]
- C → 250 bar [3625 PSI]



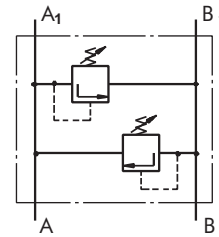
VALVES for RW and HW HYDRAULIC MOTORS



Single Crossover
Relief Valve
type KPEAW ...



Single Crossover
Relief Valve
type KPEBW ...



Dual Crossover
Relief Valve
type KPDW ...

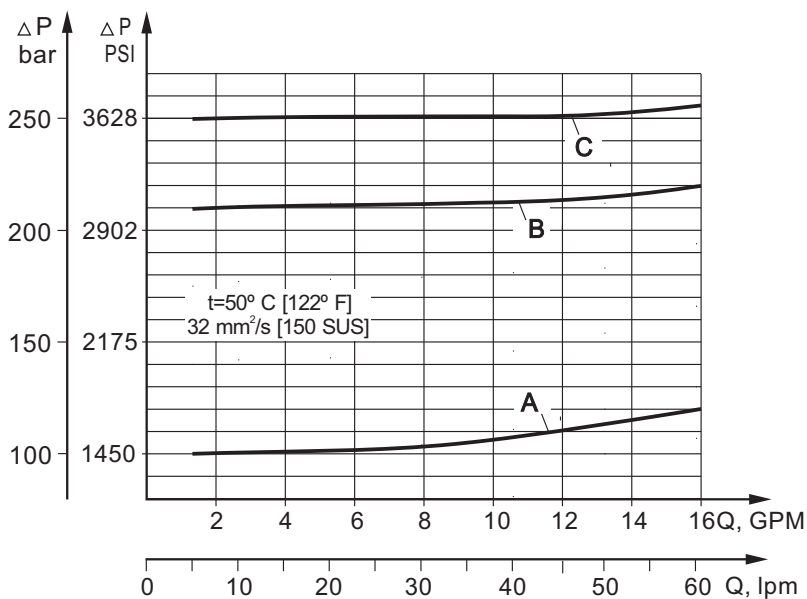
SPECIFICATION DATA

Parameters		Type		
		KPE...W		KPDW
Flow Rate,	lpm [GPM]	60 [15.85]		
Pressure Range*,	bar	5÷40	30÷100	80÷250
	[PSI]	[75÷580]	[435÷1450]	[1160÷3625]
Weight,	kg	2,700		2,800
	[lb]	[5.95]		[6.17]

*Pressure Settings are at flow rate of 5 lpm [1.32 GPM]
and viscosity 32 mm²/s [150 SUS] (50°C [122°F]).

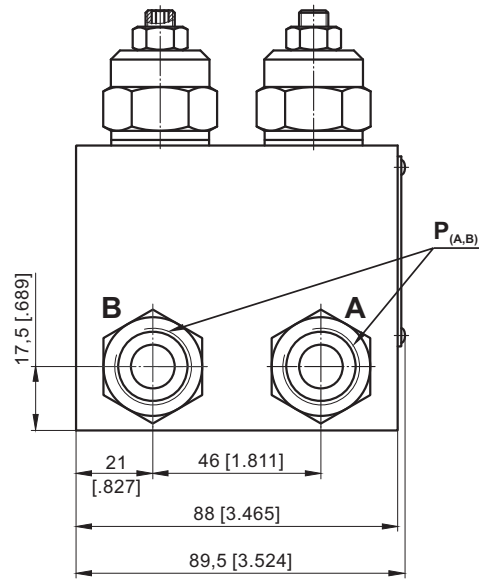
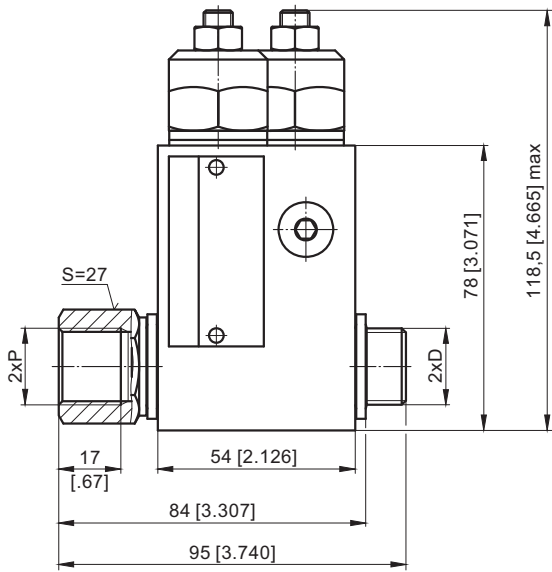
Rated Pressure

- A → 100 bar [1450 PSI]
- B → 210 bar [3050 PSI]
- C → 250 bar [3625 PSI]

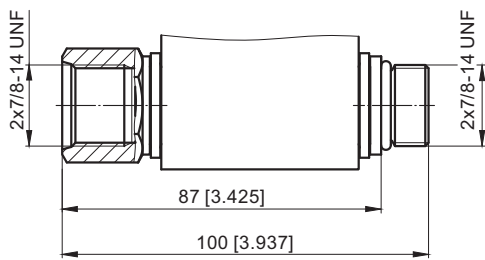


VALVES for RW and HW HYDRAULIC MOTORS

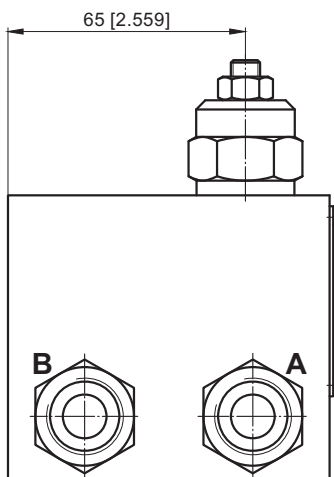
DUAL VALVE KPDW...



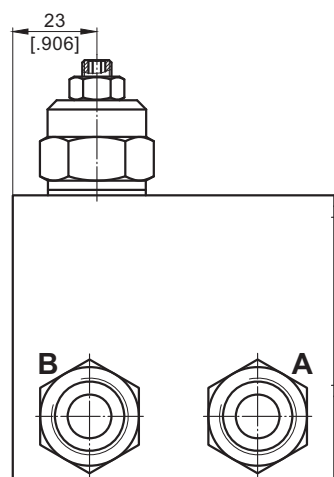
KPDW...A



SINGLE VALVE KPEAW...



SINGLE VALVE KPEBW...



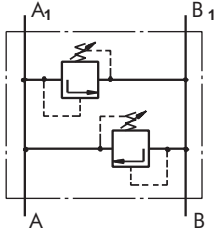
	Thread Ports - P _(A,B)	Thread Ports - D
-	G1/2 16 [.63] depth	G1/2 12 [.47] depth
M	M22x1,5 16 [.63] depth	M22x1,5 12 [.47] depth
A	7/8 - 14 UNF O-ring 16 [.63] depth	7/8 - 14 UNF O-ring 13 [.51] depth



Note: KPDW and KPE..W Blocks assembly to RW or HW motors is done with two screws (thread D) included in the valve set. Tightening torque 8 daNm [710 lb-in].

CROSSOVER RELIEF VALVES

SPECIFICATION DATA



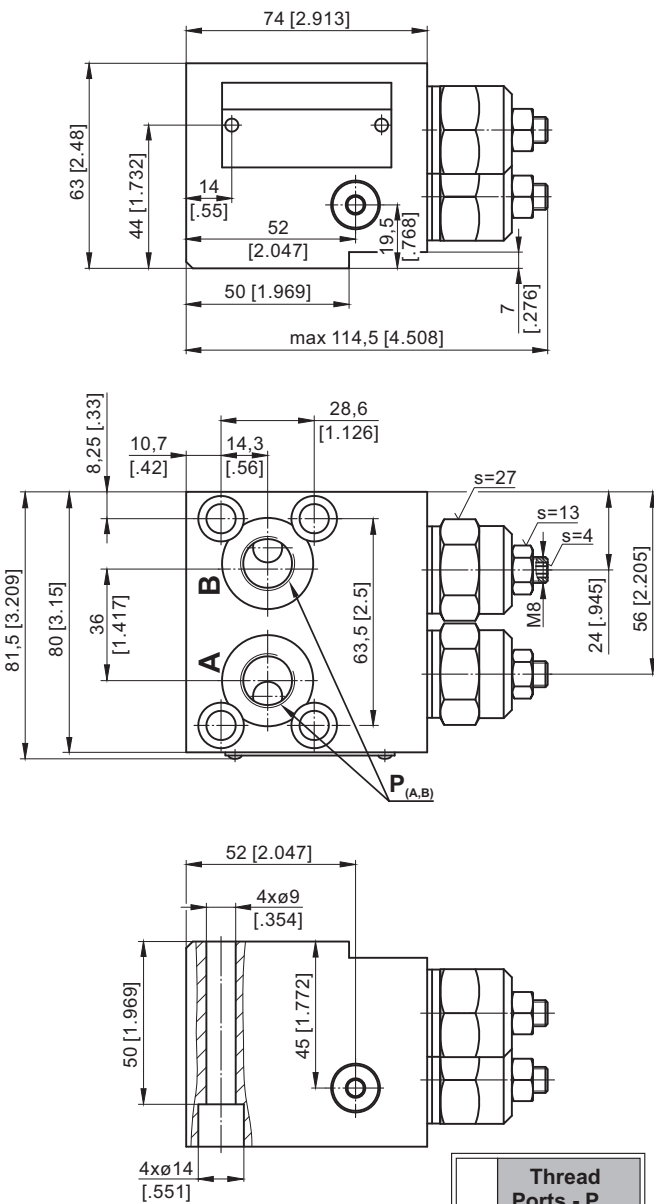
Dual Crossover Relief Valves type KPDHR... and KPDRK...

Parameters	Type					
	KPDHR			KPDRK		
Flow Rate, lpm [GPM]	60 [15.85]					
Pressure bar	5÷40	30÷100	80÷250	10÷40	30÷100	80÷250
Range*, [PSI]	[70÷580]	[435÷1450]	[1160÷3625]	[145÷580]	[435÷1450]	[1160÷3625]
Weight, kg [lb]	2,420 [5.34]			1,600 [3.53]		

*Pressure Settings are at flow rate of 5 lpm [1.32 GPM] and viscosity 32 mm²/s [150 SUS] (50°C [122°F]).

VALVES for HP and HR HYDRAULIC MOTORS

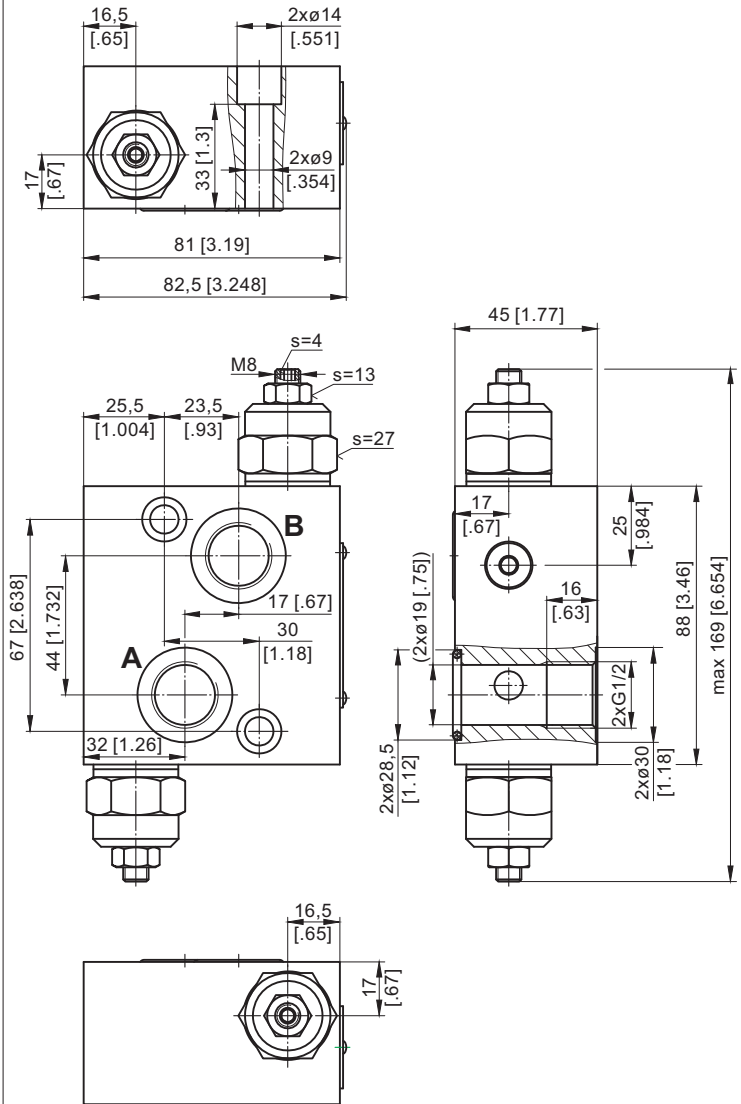
DUAL VALVE KPDHR



Thread Ports - P _(A,B)	
-	G3/8
M	M18x1,5
A	3/4 - 16 UNF

VALVES for RK HYDRAULIC MOTORS

DUAL VALVE KPDRK



Thread Ports - P _(A,B)	
-	G1/2

ORDER CODE - OVERCENTER VALVES with BRAKE CONTROL

	1	2	3	4	5	6	7
K P B		-	/	/			

Pos.1 - Mounting Flange*

- R** - Valve block for MP, MR and MH Motors
- S** - Valve block for MS Motors
- W** - Valve block for RW and HW Motors
- T** - Valve block for MT Motors
- V** - Valve block for MV Motors
- HR** - Valve block for HP and HR Motors

Pos.2 - Pressure Range, bar [PSI]

- 250** - 70÷250 [1015÷3625], Std Setting 250bar@5 lpm

Pos.3 - Pilot Ratio

- 1** - 4,25:1

Pos.4 - Number of Valves

- D** - Two Valves - Dual
- E** - One Valve - Single (for R and S only)
- AE** - One Valve on line A - Single (for T,V,W,HP and HR)
- BE** - One Valve on line B - Single (for T,V,W,HP and HR)

Pos.5 - Threaded Ports

- omit - BSPP thread - ISO 228
- M** - Metric thread - ISO 262
- A** - Unified inch screw threads ANSI B 1.1 - 1982

Pos.6 - Option [Paint]**

- omit - no Paint
- P** - Painted
- PC** - Corrosio Protected Paint

Pos.7 - Design Series

- omit - Factory specified

Notes:

- * For detailed information on mounting the valve on the various body types, refer to the corresponding "M+S"-catalog of hydraulic motors.
- ** Color at customer's request.

ORDER CODE - SWITCH VALVES

	1	2	3	4
K P W				

Pos.1 - Housing Type

- R** - Valve block for MP, MR and MH Motors
- S** - Valve block for MS Motors
- T** - Valve block for MT Motors
- V** - Valve block for MV Motors

Pos.2 - Threaded Ports

- omit - BSPP thread - ISO 228
- M** - Metric thread - ISO 262
- A** - Unified inch screw threads ANSI B 1.1 - 1982

Pos.3 - Option [Paint]*

- omit - no Paint
- P** - Painted
- PC** - Corrosio Protected Paint

Pos.4 - Design Series

- omit - Factory specified

Notes: * Color at customer's request.

The Valve Blocks are mangano phosphatized as standard.

ORDER CODE - CROSSOVER RELIEF VALVE

	1	2	3	4	5	6
K P			/			

Pos. 1 - Number of Valves

- D** - Two Valves - Dual
- E** - One Valve - Single (for R and S only)
- AE** - One Valve on line A - Single (for T,V and W only)
- BE** - One Valve on line B - Single (for T,V and W only)

Pos. 2 - Housing Type

- R** - Valve block for MP, MR and MH Motors
- S** - Valve block for MS Motors
- W** - Valve block for RW and HW Motors
- T** - Valve block for MT Motors
- V** - Valve block for MV Motors

Pos. 3 - Presssure Range, bar [PSI]

- 100*** - 30÷100 [435÷1450], Std Setting 100 bar@5 lpm
- 210*** - 50÷210 [725÷3050], Std Setting 210 bar@5 lpm
- 300*** - 80÷300 [1160÷4350], Std Setting 250 bar@5 lpm
- 210**** - 80÷210 [1160÷3050], Std Setting 210 bar@5 lpm
- 100***** - 10÷100 [145÷1450], Std Setting 100 bar@5 lpm
- 250***** - 20÷250 [290÷3625], Std Setting 250 bar@5 lpm

Pos. 4 - Threaded Ports

- omit - BSPP thread - ISO 228
- M** - Metric thread - ISO 262
- A** - Unified inch screw threads ANSI B 1.1 - 1982

Pos. 5 - Option [Paint]****

- omit - no Paint
- P** - Painted
- PC** - Corrosion Protected Paint

Pos. 6 - Design Series

- omit - Factory specified

- Notes:**
- * Useful for types **R** and **S** only.
 - ** Useful for types **T** only.
 - *** Useful for types **V** only.
 - **** Color at customer's request.

ORDER CODE - CROSSOVER RELIEF VALVE

	1	2	3	4	5	6
K P			/			

Pos. 1 - Number of Valves

- D** - Two Valves - Dual

Pos. 2 - Housing Type

- HR** - Valve block for HR Motors
- RK** - Valve block for RK and GHM Motors

Pos. 3 - Presssure Range, bar [PSI]

- 40** - 10÷ 40 [145÷ 580], Std Setting 100 bar@5 lpm
- 100** - 30÷100 [435÷1450], Std Setting 100 bar@5 lpm
- 250** - 80÷250 [1160÷3625], Std Setting 250 bar@5 lpm

Pos. 4 - Threaded Ports

- omit - BSPP thread - ISO 228
- M** - Metric thread - ISO 262
- A** - Unified inch screw threads ANSI B 1.1 - 1982

Pos. 5 - Option [Paint]****

- omit - no Paint
- P** - Painted
- PC** - Corrosion Protected Paint

Pos. 6 - Design Series

- omit - Factory specified

- Notes:** * Color at customer's request.

The Valve Blocks are mangano phosphatized as standard.

MOTOR-BRAKE ADDITIONAL OPTIONS

Additional Options Description	Order Code	Motor type						
		B/MR	BD/MR	MT/B	MT/BX	MTM/B	SW	TW
Low Leakage	LL	O	O	-	O	O	-	-
Low Speed Valving	LSV	O	O	-	O	O	-	-
Free Running	FR	-	O	-	-	O		-
Reinforced unit	HD	-	-	O	-	O	-	-
Reverse Rotation	R	O	O	O	O	O	-	-
Paint*	P	O	O	O	O	O	O	O
Corrosion Protected Paint*	PC	O	O	O	O	O	O	O
Special Paint**	PS	O	O	O	O	O	O	O
	PCS							
Check Valves		S	-	S***	S	-	S	S

O	Optional
-	Not applicable
S	Standard

* Colour at customer's request.

** Non painted feeding surfaces, colour at customer's request.

*** Without check valves for "HD" option.

⚠ For more information about HD option please contact with "M+S Hydraulic".

APPLICATION CALCULATION

VEHICLE DRIVE CALCULATIONS

1. Motor speed: n [RPM]

$$n = \frac{2.65 \times V_{km} \times i}{R_m} \quad n = \frac{168 \times V_{mi} \times i}{R_{in}}$$

V_{km} - vehicle speed, km/h;

V_{mi} - vehicle speed, mil/h;

R_m - wheel rolling radius, m;

R_{in} - wheel rolling radius, in;

i - gear ratio between motor and wheels.

If no gearbox, use $i=1$.

2. Rolling resistance: RR, daN [lbs]

The resistance force resulted in wheels contact with different surfaces:

$$RR = G \times \rho$$

G - total weight loaded on vehicle, daN [lbs];

ρ - rolling resistance coefficient (Table 1).

Table 1

Rolling resistance coefficient In case of rubber tire rolling on different surfaces	
Surface	ρ
Concrete- faultless	0.010
Concrete- good	0.015
Concrete- bad	0.020
Asphalt- faultless	0.012
Asphalt- good	0.017
Asphalt- bad	0.022
Macadam- faultless	0.015
Macadam- good	0.022
Macadam- bad	0.037
Snow- 5 cm	0.025
Snow- 10 cm	0.037
Polluted covering- smooth	0.025
Polluted covering- sandy	0.040
Mud	0.037÷0.150
Sand- Gravel	0.060÷0.150
Sand- loose	0.160÷0.300

3. Grade resistance: GR, daN [lbs]

$$GR = G \times (\sin\alpha + \rho \times \cos\alpha)$$

α - gradient negotiation angle (Table 2).

Table 2

Grade %	α Degrees	Grade %	α Degrees
1%	0° 35'	12%	6° 5'
2%	1° 9'	15%	8° 31'
5%	2° 51'	20%	11° 19'
6%	3° 26'	25%	14° 3'
8%	4° 35'	32%	18°
10%	5° 43'	60%	31°

4. Acceleration force: FA, daN [lbs]

Force FA necessary for acceleration from 0 to maximum speed v and time t can be calculated with a formula:

$$FA = \frac{V_{km} \times G}{36 \times t}, [\text{daN}] \quad FA = \frac{V_{mi} \times G}{22 \times t}, [\text{lbs}]$$

FA - acceleration force, daN [lbs];

t - time, [s]

5. Tractive effort: DP, daN [lbs]

Tractive effort DP is the additional force of trailer. This value will be established as follows:

- acc. to constructor's assessment;

- as calculating forces in items 2, 3 and 4 of trailer;

the calculated sum corresponds to the tractive effort requested.

6. Total tractive effort: TE, daN [lbs]

Total tractive effort TE is total effort necessary for vehicle motion; that the sum of forces calculated in items from 2 to 5 and increased with 10% because of air resistance.

$$TE = 1,1 \times (RR + GR + FA + DP)$$

RR - force acquired to overcome the rolling resistance;

GR - force acquired to slope upwards;

FA - force acquired to accelerate (acceleration force);

DP - additional tractive effort (trailer).

7. Motor Torque moment: M, daNm [lb-in]

Necessary torque moment for every hydraulic motor:

$$M = \frac{TE \times R_m [R_{in}]}{N \times i \times \eta_M}$$

N - motor numbers;

η_M - mechanical gear efficiency (if it is available).

8. Cohesion between tire and road covering:

M_w , daNm [lb-in]

Necessary torque moment for every hydraulic motor:

$$M_w = \frac{G_w \times f \times R_m [R_{in}]}{i \times \eta_M}$$

To avoid wheel slipping, the following condition should be observed $M_w > M$

f - frictional factor;

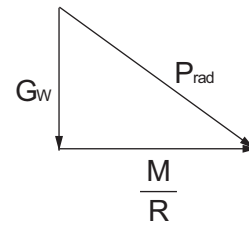
G_w - total weight over the wheels, daN [lbs].

Table 3

Surface	Frictional factor f
Steel on steel	0.15 ÷ 0.20
Rubber tire on polluted surface	0.5 ÷ 0.7
Rubber tire on asphalt	0.8 ÷ 1.0
Rubber tire on concrete	0.8 ÷ 1.0
Rubber tire on grass	0.4

9. Radial motor loading: P_{rad} , daN [lbs]

When motor is used for vehicle motion with wheels mounted directly on motor shaft, the total radial loading of motor shaft P_{rad} is a sum of motion force and weight force acting on one wheel.



G_w - weight held by wheel;

P_{rad} - total radial loading of motor shaft;

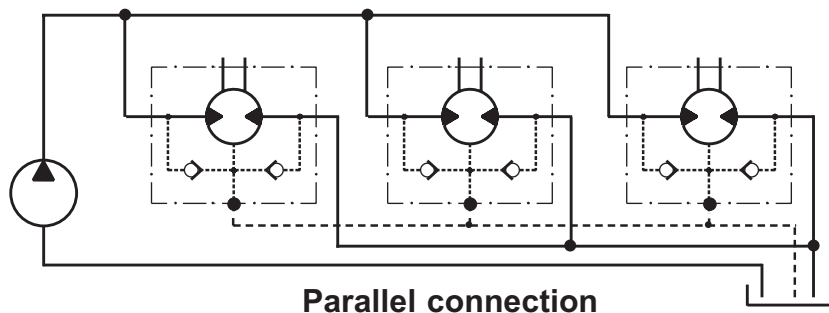
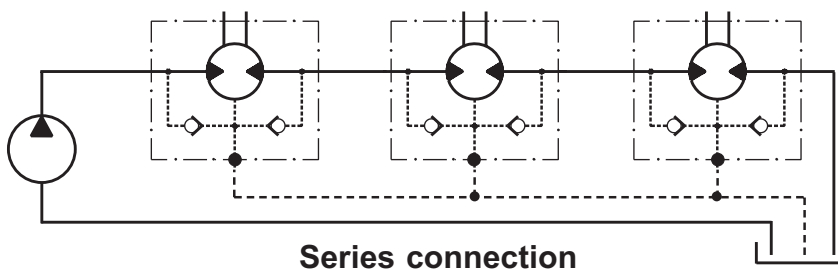
M/R - motion force.

$$P_{rad} = \sqrt{G_w^2 + \left(\frac{M}{R}\right)^2}$$

In accordance with calculated loadings the suitable motor from the catalogue is selected.

DRAINAGE SPACE AND DRAINAGE PRESSURE

Advantages in oil drainage from drain space: Cleaning; Cooling and Seal lifetime prolonging.



WARRANTY

M+S Hydraulic warrants, that its products, supplied directly to original equipment manufacturer, authorized distributor or other customer, will be free of defects in material or workmanship at the time of shipment from M+S Hydraulic and will conform to the products technical documentation (drawings and specifications) under sale agreement with Buyer.

This warranty will apply only to defects appearing within applicable Warranty period, mentioned below. If Buyer notifies M+S Hydraulic within the Warranty period about any such defects, M+S, at its sole option will replace or repair the defective products or their parts found by M+S Hydraulic to be defective in material or workmanship.

THE FOREGOING LIMITED WARRANTY IS AVAILABLE ONLY IF "M+S HYDRAULIC" IS PROMPTLY NOTIFIED IN WRITTEN OF THE ALLEGED DEFECT AND DOES NOT COVER FAILURE TO FUNCTION CAUSED BY DAMAGE TO THE PRODUCT, IMPROPER INSTALLATION, UNREASONABLE USE OR ABUSE OF THE PRODUCT, FAILURE TO PROVIDE OR USE OF IMPROPER MAINTENANCE OR USUAL, DEGRADATION OF THE PRODUCT DUE TO PHYSICAL ENVIRONMENTS OF AN USUAL NATURE. THE FOREGOING REMEDIES ARE THE SOLE AND EXCLUSIVE REMEDIES AVAILABLE TO CUSTOMER. To facilitate the inspection, M+S Hydraulic may require return of the product/part, which Buyer claims to be defective.

M+S Hydraulic shall not be liable for labor costs or any other expenses incurred during the disassembling or reinstalling of the product/part.

In case the claimed products are returned to M+S Hydraulic in bad condition: dirty, disassembled, with damaged or missing parts during transportation, the warranty will be considered as not applicable and the products will not be liable to repair.

Warranty periods

New products: The Warranty period is limited to 24 consecutive months (2 years) from the date of production of the product.

Repaired products: If the product is repaired in M+S Hydraulic during its warranty period, the warranty period of the repaired item shall continue for the balance of original Warranty period or for a period equal to 50% of the original new product Warranty period, whichever is later.

Spare parts: The Warranty period for Spare parts is 12 consecutive months (1 year) from the dispatch date of such parts from M+S Hydraulic.

LIMITATION OF LIABILITY M+S Hydraulic's liability for claim of any kind, for loss or damage arising out of, connected with or resulting from an order, or from the performance or branch thereof, or from the design, manufacture, sale delivery, operation or use of any of its products shall be limited to, at M+S 's sole option, replacement, repair of any defective product or the issuance of a credit to Customer against any future purchases. Cash refunds will not be made under any circumstances and Customer will not be entitled to recover any damages of any kind against M+S Hydraulic, including but not limited to incidental or consequential damages, whether direct or indirect, known or unknown, foreseen or unforeseen.



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