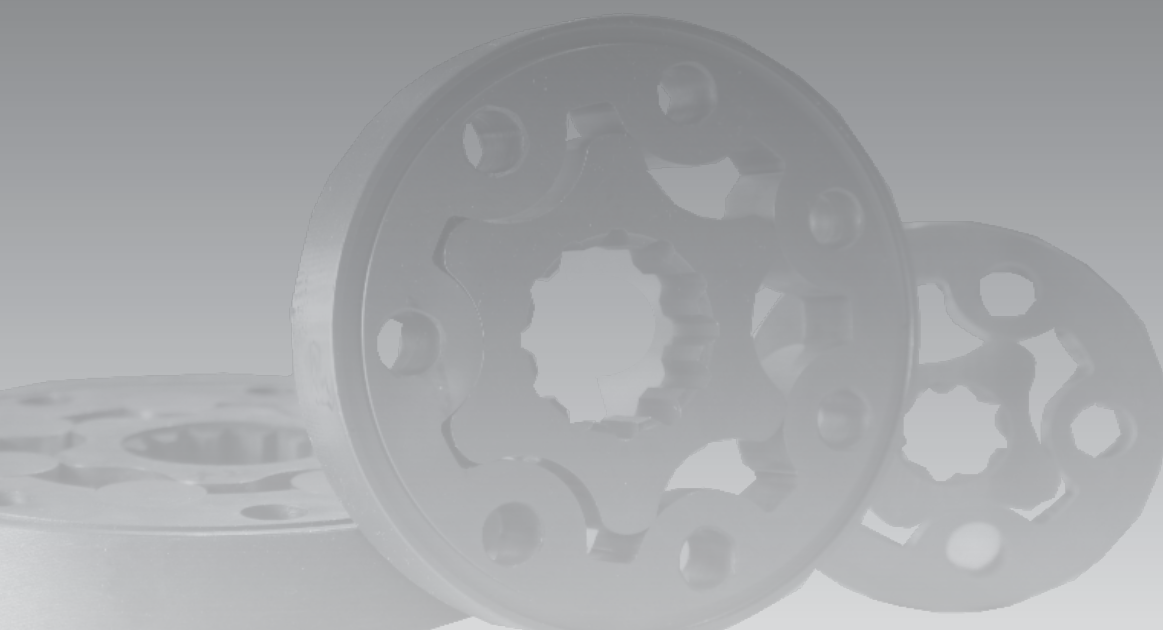


CPMSS HYDRAULIC MOTOR



CPMSS HYDRAULIKMOTOR

HYDROMOT
Hydraulic solutions.

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CPMSS Short-Motor

Der Kurzmotor CPMSS hat keine Abtriebswelle bzw. Lagerung und ist zur direkten Montage an ein Getriebe bzw. an eine Bremse konzipiert worden. Die Kardanwelle führt eine taumelnde Bewegung durch, daher ist die Montage eines Wellendichtringes nicht möglich. Das Getriebe muss eine entsprechende Abdichtung besitzen. Außerdem muss es so konstruiert werden, dass das Lecköl des Motors die Schmierung der Kardanwelle übernimmt.

CPMSS Short-Motor

The short motor CPMSS has no output shafts or bearings and is designed for a direct mounting into a gearbox or brake. The cardan shaft of the motor describes a tumbling motion. For this reason the motor itself can't be fitted with a shaft seal. The gear box must be fitted with a sealing. It is also necessary that the leakage of the motor lubricates the cardan shaft.



Technische Daten CPMSS | Technical Data CPMSS

| Typ Type | | CPMSS 80 | CPMSS 100 | CPMSS 125 | CPMSS 160 | CPMSS 200 | CPMSS 250 | CPMSS 315 | CPMSS 400 |
|--|-----------------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Schluckvolumen Displacement [cm³/REV] | | 80.6 | 100.8 | 125 | 157.2 | 200 | 252 | 314.5 | 370 |
| Max. Drehzahl Max. Speed [RPM] | Dauerbetrieb Cont. | 800 | 748 | 600 | 470 | 375 | 300 | 240 | 200 |
| | Int.(1) | 988 | 900 | 720 | 560 | 450 | 360 | 280 | 240 |
| Max. Drehmoment Max. Torque [daNm] | Dauerbetrieb Cont. | 19 | 24 | 31 | 31.6 | 40 | 45 | 56 | 53.6 |
| | Int.(1) | 24 | 30 | 37 | 43 | 46.6 | 54 | 65.8 | 64.5 |
| | Spitze (2) Peak | 26 | 32 | 40 | 47.2 | 65 | 69 | 74 | 75.1 |
| Max. Leistungsabgabe Max. Output Power [kW] | Dauerbetrieb Cont. | 15.9 | 18.8 | 19.5 | 15.6 | 15.7 | 14.1 | 14.1 | 11.8 |
| | Int.(1) | 20.1 | 23.5 | 23.2 | 21.2 | 18.3 | 17 | 18.9 | 17 |
| Max. Druckgefälle Max. Pressure Drop [bar] | Dauerbetrieb Cont. | 175 | 175 | 175 | 150 | 140 | 125 | 120 | 100 |
| | Int.(1) | 210 | 210 | 210 | 210 | 160 | 160 | 140 | 120 |
| | Spitze (2) Peak | 225 | 225 | 225 | 225 | 225 | 200 | 185 | 140 |
| Max. Ölstrom Max. Oil flow [l/min] | Dauerbetrieb Cont. | 65 | 75 | 75 | 75 | 75 | 75 | 75 | 75 |
| | Int.(1) | 80 | 90 | 90 | 90 | 90 | 90 | 90 | 90 |
| Max. Eingangsdruck Max. Input Pressure [bar] | Dauerbet. Cont. | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| | Int.(1) | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |

(1) Intermittierender Betrieb max. 6 Sekunden / Minute

(2) Spitzenbetrieb max. 0,6 Sekunden / Minute

(1) Intermittend operation rating applies to 6 sec. of every minute

(2) Peak load rating applies to 0,6 sec of every minute

Leistungsdaten CPMSS | Performance Data CPMSS

CPMSS 80 (80.6 cm³/U)

| | | Druck [bar] pressure | | | | Max. cont. | Max. int. | | |
|-------------------------------------|----|-------------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | 35 | 70 | 105 | 140 | 175 | 210 | 225 | |
| Durchflussmenge [l/min] Oil flow | 15 | 3.5 180 | 8 174 | 12 168 | 15.8 164 | 19.5 158 | 23.5 151 | 24.9 143 | daNm RPM |
| | 30 | 3.5 362 | 8 352 | 12 346 | 15.8 338 | 19.5 330 | 24 322 | 26 310 | |
| | 40 | 3.5 482 | 7.9 473 | 11.9 464 | 15.5 453 | 19.3 444 | 23.4 434 | 25 415 | |
| | 50 | 3 602 | 7.7 594 | 11.7 587 | 15.3 569 | 19.2 560 | 23.2 551 | 24.8 522 | |
| Max. cont. | 60 | 2.8 724 | 7.7 713 | 11.7 707 | 15.3 683 | 19.2 673 | 23.2 664 | 24.7 629 | |
| | 65 | 2.5 790 | 7.5 785 | 11.4 770 | 15.2 760 | 19 742 | 23 720 | 24.5 704 | |
| Max. int. | 80 | 2.2 980 | 7 965 | 11 950 | 14 920 | 17 891 | 20 860 | 22 830 | |

CPMSS 100 (100.8 cm³/U)

| | | Druck [bar] pressure | | | | Max. cont. | Max. int. | | |
|-------------------------------------|----|-------------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | 35 | 70 | 105 | 140 | 175 | 210 | 225 | |
| Durchflussmenge [l/min] Oil flow | 15 | 4.8 146 | 9.5 144 | 15 139 | 20 135 | 25 130 | 28.9 120 | 31 105 | daNm RPM |
| | 30 | 4.5 291 | 9.4 289 | 14.6 278 | 19.8 274 | 25 269 | 29.5 258 | 31.7 242 | |
| | 40 | 4.3 387 | 8.9 384 | 14.2 374 | 19.6 359 | 24.8 350 | 29.3 335 | 31.6 320 | |
| | 50 | 4 486 | 8.8 483 | 13.5 473 | 19.4 462 | 24.7 450 | 29.2 430 | 31.5 420 | |
| | 60 | 3.7 588 | 8.8 584 | 13.2 574 | 18.5 562 | 24.4 550 | 28.9 538 | 31.2 520 | |
| Max. cont. | 75 | 3.5 740 | 8 735 | 13 720 | 18 705 | 24 696 | 28.6 676 | 31 653 | |
| Max. int. | 90 | 3 850 | 7.5 840 | 12.4 810 | 17 787 | 23.6 770 | 27.7 750 | 30.3 747 | |

Leistungsdaten CPMSS | Performance Data CPMSS

CPMSS 125 (125 cm³/U)

| | | Druck [bar] pressure | | | | Max. cont. | Max. int. | | |
|-------------------------------------|----|-------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | 35 | 70 | 105 | 140 | 175 | 210 | 225 | |
| Durchflussmenge [l/min] Oil flow | 15 | 5.5 112 | 12 110 | 17.6 103 | 24.5 96 | 30.9 93 | 34.9 90 | 37.5 84 | daNm RPM |
| | 30 | 5.5 222 | 12 220 | 17.5 217 | 25 208 | 32.4 200 | 37.5 199 | 40.8 190 | |
| | 40 | 5.5 302 | 12 298 | 17.5 292 | 25 284 | 32.4 276 | 37 268 | 40.8 260 | |
| | 50 | 5 379 | 11.5 373 | 17.6 368 | 24.8 363 | 32 350 | 37 339 | 40.6 328 | |
| | 60 | 4.5 456 | 11.3 448 | 17.1 443 | 24.5 439 | 32.4 425 | 36.8 406 | 40.6 393 | |
| | 75 | 4.5 570 | 11 563 | 16.7 555 | 24 546 | 31.4 533 | 37 515 | 40.1 503 | |
| Max. cont. | 90 | 4 685 | 10.5 676 | 16.2 670 | 23.7 659 | 30.9 644 | 36.5 625 | 39.8 610 | |
| Max. int. | | | | | | | | | |

CPMSS 160 (157.2 cm³/U)

| | | Druck [bar] pressure | | | | Max. cont. | Max. int. | | |
|-------------------------------------|----|-------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | 35 | 70 | 105 | 140 | 175 | 210 | 225 | |
| Durchflussmenge [l/min] Oil flow | 15 | 7 91 | 14 88 | 20.5 84 | 30.5 78 | 37.1 76 | 43 74 | 47.3 58 | daNm RPM |
| | 30 | 7.5 185 | 15 182 | 21.4 176 | 32.1 168 | 38 164 | 42.7 162 | 49 152 | |
| | 40 | 7 248 | 15 244 | 21.5 239 | 32 229 | 37.8 224 | 42.5 217 | 48.8 204 | |
| | 50 | 6.5 312 | 14.5 308 | 21.5 304 | 31.6 294 | 37.8 288 | 42.5 280 | 48.2 270 | |
| | 60 | 6.5 375 | 14.5 371 | 21.4 365 | 31.5 357 | 37.5 346 | 42.4 336 | 48.2 323 | |
| Max. cont. | 75 | 6 470 | 13.8 465 | 20.8 458 | 31.1 447 | 37.5 436 | 42 426 | | |
| Max. int. | 90 | 5.6 564 | 13 559 | 20 551 | 30.8 541 | 37 526 | 41.4 517 | | |

Leistungsdaten CPMSS | Performance Data CPMSS

CPMSS 200 (200 cm³/U)

| | | Druck [bar] pressure | | | Max. cont. | | Max. int. | | | |
|-------------------------------------|----|-------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--|--|
| | | 35 | 70 | 105 | 140 | 175 | 225 | | | |
| Durchflussmenge [l/min] Oil flow | 15 | 8.9 73 | 19.0 71 | 29.5 68 | 40.0 64 | 48.4 60 | 60.8 52 | daNm RPM | | |
| | 30 | 8.7 148 | 19.0 146 | 29.4 143 | 39.9 140 | 48.5 135 | 60.0 127 | | | |
| | 40 | 8.6 193 | 18.8 191 | 29.2 189 | 39.7 186 | 48.3 181 | 59.4 172 | | | |
| | 50 | 8.0 247 | 18.4 245 | 29.0 243 | 39.5 240 | 48.0 235 | 59.0 226 | | | |
| | 60 | 7.4 298 | 17.8 295 | 28.6 293 | 39.0 290 | 47.5 284 | 58.2 273 | | | |
| Max. cont. | 75 | 5.8 372 | 16.0 369 | 27.5 365 | 37.5 362 | 46.0 358 | 57.0 346 | | | |
| Max. int. | 90 | 4.9 440 | 14.8 435 | 26.0 430 | 35.5 422 | 44.5 411 | 55.5 401 | | | |

CPMSS 250 (252 cm³/U)

| | | Druck [bar] pressure | | | Max. cont. | Max. int. | | |
|-------------------------------------|----|-------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | 35 | 70 | 105 | 140 | 175 | 225 | |
| Durchflussmenge [l/min] Oil flow | 15 | 11.7 58 | 23.0 55 | 35.5 52 | 45.0 51 | 55.4 47 | 65.2 46 | daNm RPM |
| | 30 | 11.7 118 | 22.5 117 | 35.0 112 | 44.6 109 | 56.0 107 | 65.7 106 | |
| | 40 | 11.5 160 | 22.5 156 | 34.8 152 | 44.2 150 | 55.2 146 | 65.0 142 | |
| | 50 | 11.0 202 | 22.0 200 | 34.5 198 | 43.8 196 | 54.6 195 | 64.5 192 | |
| | 60 | 10.5 242 | 22.0 239 | 34.0 237 | 43.5 234 | 54.2 231 | 64.2 229 | |
| Max. cont. | 75 | 9.5 300 | 21.5 296 | 33.8 293 | 43.0 286 | 53.7 282 | 63.8 278 | |
| Max. int. | 90 | 9.0 360 | 20.5 354 | 33.2 348 | 42.0 340 | 53.0 332 | 63.2 326 | |

Leistungsdaten CPMSS | Performance Data CPMSS

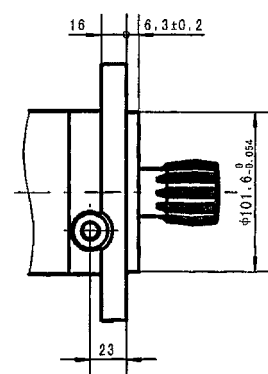
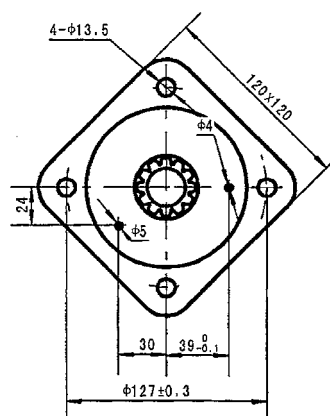
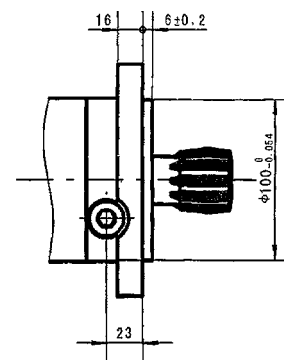
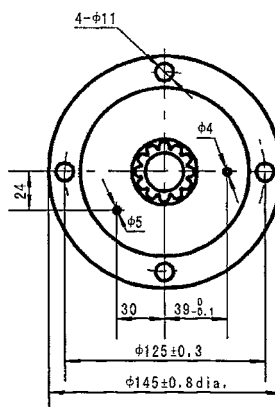
CPMSS 315 (314.5 cm³/U)

| | | Druck [bar] pressure | | | Max. cont. | Max. int. | | |
|-------------------------------------|----|-------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | 35 | 70 | 105 | 120 | 140 | 185 | |
| Durchflussmenge [l/min] Oil flow | 15 | 16.0 48 | 32.0 47 | 46.5 45 | 55.5 43 | 65.0 40 | 74.8 38 | daNm RPM |
| | 30 | 16.5 94 | 32.2 92 | 46.8 90 | 56.0 89 | 65.8 86 | 75.2 85 | |
| | 40 | 16.0 125 | 31.0 123 | 45.7 120 | 54.6 118 | 64.2 116 | 74.1 115 | |
| | 50 | 15.5 158 | 30.5 156 | 45.0 153 | 53.8 150 | 63.7 147 | 73.6 145 | |
| | 60 | 15.2 175 | 30.2 174 | 44.2 170 | 53.2 164 | 63.2 162 | 73.2 159 | |
| | 75 | 14.5 236 | 29.5 234 | 43.6 230 | 52.5 227 | 62.8 225 | 72.6 222 | |
| Max. cont. | | | | | | | | |
| Max. int. | 90 | 13.2 285 | 28.0 282 | 43.0 280 | 52.0 276 | 62.2 273 | 72.3 270 | |

CPMSS 400 (370 cm³/U)

| | | Druck [bar] pressure | | | Max. cont. | Max. int. | | |
|-------------------------------------|----|-------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | | 35 | 70 | 90 | 100 | 120 | 140 | |
| Durchflussmenge [l/min] Oil flow | 15 | 18.5 40 | 36.2 39 | 47.4 38 | 51.2 37 | 58.8 35 | 66.0 33 | daNm RPM |
| | 30 | 18.4 80 | 36.4 78 | 47.5 77 | 51.4 76 | 59.0 74 | 66.1 72 | |
| | 40 | 18.0 106 | 36.2 104 | 47.3 103 | 51.3 102 | 58.8 100 | 65.9 97 | |
| | 50 | 16.0 133 | 36.0 131 | 47.2 130 | 51.1 129 | 58.6 128 | 65.8 125 | |
| | 60 | 15.0 157 | 35.9 156 | 47.1 155 | 51.0 154 | 58.5 152 | 65.7 150 | |
| | 75 | 13.0 200 | 35.3 198 | 46.5 196 | 50.4 195 | 58.4 194 | 65.1 193 | |
| Max. cont. | | | | | | | | |
| Max. int. | 90 | 10.5 238 | 35.0 235 | 46.2 234 | 50.0 232 | 58.0 230 | 64.7 227 | |

Standard Flansch
Standard Flange

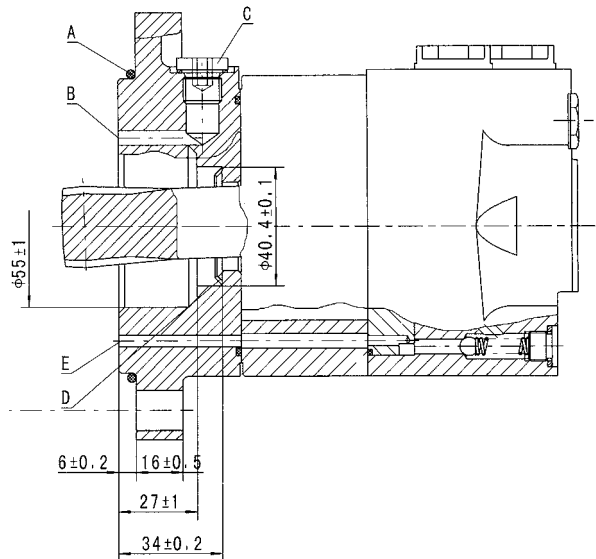
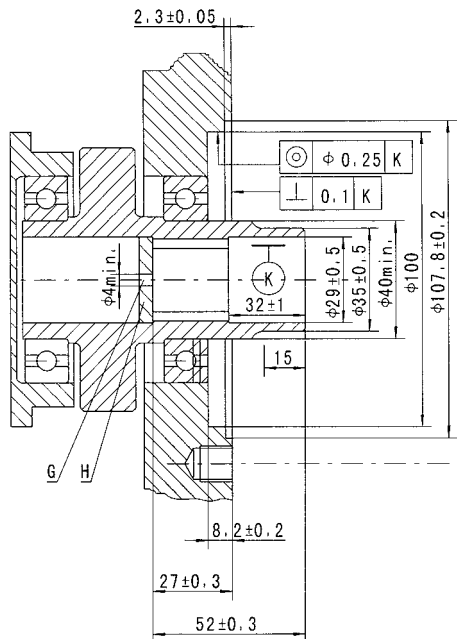


S1 - Quadratflansch
S1 - Square flange

| Typ Type | L | L1 | L2 |
|-------------|-------|------|-------|
| CPMSS 80 | 130 | 13 | 86 |
| CPMSS 100 | 134 | 17 | 90 |
| CPMSS 125 | 139 | 22 | 95 |
| CPMSS 160 | 144.5 | 27.5 | 100.5 |
| CPMSS 200 | 152 | 35.1 | 108 |
| CPMSS 250 | 164 | 47 | 120 |
| CPMSS 315 | 176 | 59 | 132 |
| CPMSS 400 | 188 | 71 | 144 |

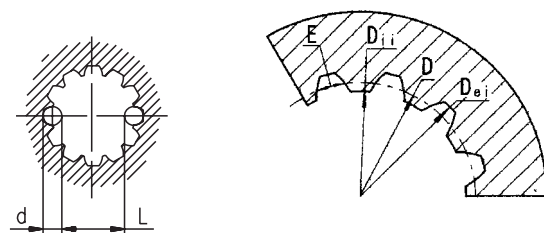
Abmessungen CPMSS | Dimensions CPMSS

Anschlüsse und Anbaumaße | Porting and Mounting



- A: O-ring 100x3
- A: O-ring 100x3
- B: Äußerer Leckölanschluss
- B: External drain channel
- C: Leckölanschluss G 1/4", 12mm tief
- C: Drain connection G 1/4", 12mm deep
- D: Konischer Dichtring
- D: Conical seal ring

- E: Interner Leckölanschluss
- E: Internal Drain channel
- F: M10; min. 15mm tief
- F: M10; min. 15mm deep
- G: Ölzirkulationsloch
- G: Oil circulation hole
- H: Gehärtete Anschlagssplatte
- H: Hardened stop plate



Härtenspezifikation: HRC 62±2
Hardening Specification: HRC 60±2

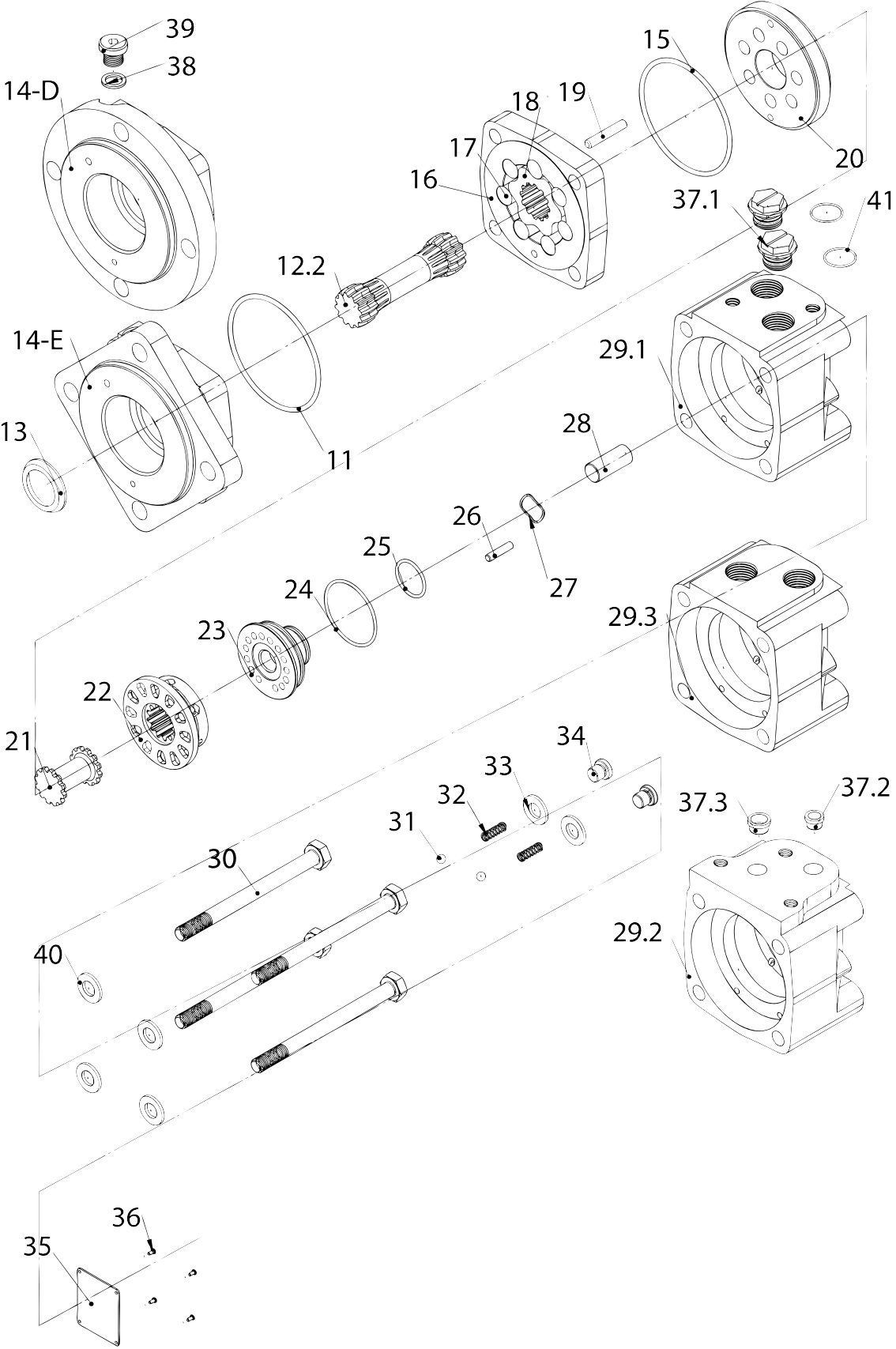
Effektive Härtetiefe: 0,7±0,2mm
Effective case depth (HRC 52): 0,7±0,2mm

| Verzahnungsgeometrie Fillet Root Side Fit | | mm |
|--|------------|------------------------|
| Zähnezahl Number of Teeth | z | 12 |
| Steigung Diametral Pitch | DP | 12/24 |
| Anpresswinkel Pressure Angle | α_d | 30° |
| Nenndurchmesser Pitch Diameter | D | 25.4 |
| Hauptdurchmesser Major Diameter | D_{ri} | 28.0 ^{+0.1} |
| Zahngrund Minor Diameter | D_i | 23.0 ^{+0.033} |
| Abstand Zahngrund Space Width (Circular) | L_0 | 4.308±0.020 |

Bestellinformation | Order Information

| CPMSS | 1 | 2 | 3 | 4 | 5 |
|---------------|---|---|---|---|---|
| Pos. 1 | Montageflansch Mounting flange | | | | |
| Leer Omit | Kurzversion Short mount | | | | |
| S1 | Kurzversion Quadratflansch Short mount Square flange | | | | |
| Pos. 1 | Schluckvolumen Displacement | | | | |
| 80 | 80.6 cm ³ /U 80.6 ccm/REV | | | | |
| 100 | 100.8 cm ³ /U 100.8 ccm/REV | | | | |
| 125 | 125 cm ³ /U 125 ccm/REV | | | | |
| 160 | 157.2 cm ³ /U 157.2 ccm/REV | | | | |
| 200 | 200 cm ³ /U 200 ccm/REV | | | | |
| 250 | 252 cm ³ /U 252 ccm/REV | | | | |
| 315 | 314.5 cm ³ /U 314.5 ccm/REV | | | | |
| 400 | 370 cm ³ /U 370 ccm/REV | | | | |
| Pos. 2 | Anschlüsse Porting | | | | |
| Leer Omit | G 1/2" G 1/2" | | | | |
| M | M22 x 1.5 M22 x 1.5 | | | | |
| S | 7/8 -14 UNF, O-Ring 7/8 -UNF, O-ring | | | | |
| P | 1/2 -14 NPTF 1/2 -14 NPTF | | | | |
| Pos. 3 | Farbe Painting | | | | |
| Leer Omit | Grau Grey | | | | |
| RAL... | + Ralfarbe (z.B. 7021) + Ral colour (e.g. 7021) | | | | |
| Pos. 4 | Drehrichtung Rotation direction | | | | |
| Leer Omit | Standarddrehrichtung Standard Rotation | | | | |
| R | Umgekehrte Drehrichtung Reverse Rotation | | | | |

Explosionszeichnung CPMSS | Assembly Drawing CPMSS



Anwendungsberechnung von Motoren | Application calculation of motors

Berechnung des Antriebes von Fahrzeugen | Vehicle drive calculations

1. Geschwindigkeit des Motors: n [min^{-1}]

$$n = \frac{2,65 \times v_{km} \times i}{R_m} \quad n = \frac{168 \times v_{mi} \times i}{R_{in}}$$

v_{km} : Fahrzeug Geschwindigkeit [km/h]
 v_{mi} : Fahrzeug Geschwindigkeit [mi/h]
 R_m : Rollradius des Rads [m]
 R_{in} : Rollradius des Rads [in]
 i : Übersetzung zwischen Motor und Rad
 Wenn kein Getriebe verwendet wird $\Rightarrow i = 1$

2. Rollwiderstand: RR [daN]; [lbs]

Widerstandskraft entstanden durch Berührung der Räder mit diversen Oberflächen:

$$RR = G \times p$$

G : Fahrzeug Gesamtgewicht (beladen) [daN]; [lbs]
 p : Widerstandsbeiwert beim Rollen

| Widerstandsbeiwert beim Rollen von Gummireifen auf diversen Oberflächen | |
|---|---------------|
| Oberfläche | p |
| Beton (einwandfrei) | 0,010 |
| Beton (gut) | 0,015 |
| Beton (schlecht) | 0,020 |
| Asphalt (einwandfrei) | 0,012 |
| Asphalt (gut) | 0,017 |
| Asphalt (schlecht) | 0,022 |
| Schotterdecke (einwandfrei) | 0,015 |
| Schotterdecke (gut) | 0,022 |
| Schotterdecke (schlecht) | 0,037 |
| Schnee (5 cm) | 0,025 |
| Schnee (10 cm) | 0,037 |
| Verschmutzte Decke (glatt) | 0,025 |
| Verschmutzte Decke (sandig) | 0,040 |
| Schlamm | 0,037 - 0,150 |
| Kies | 0,060 - 0,150 |
| Sand | 0,160 - 0,300 |

3. Neigungswiderstand: GR [daN]; [lbs]

$$GR = G \times (\sin \alpha \times p \times \cos \alpha)$$

α : Neigungswinkel (Straßengefälle)

| Neigung | α Grad |
|---------|---------------|
| 1% | 0°35' |
| 2% | 1°9' |
| 5% | 2°51' |
| 6% | 3°26' |
| 8% | 4°35' |
| 10% | 5°43' |

| Neigung | α Grad |
|---------|---------------|
| 12% | 6°5' |
| 15% | 8°31' |
| 20% | 11°19' |
| 25% | 14°3' |
| 32% | 18° |
| 60% | 31° |

1. Motor speed: n [min^{-1}]

$$n = \frac{2,65 \times v_{km} \times i}{R_m} \quad n = \frac{168 \times v_{mi} \times i}{R_{in}}$$

v_{km} : Vehicle speed [km/h]
 v_{mi} : Vehicle speed [mi/h]
 R_m : Wheel rolling radius [m]
 R_{in} : Wheel rolling radius [in]
 i : Gear ratio between motor and wheels
 If no gearbox use $\Rightarrow i = 1$

2. Rolling resistance: RR [daN]; [lbs]

The resistance force resulted in wheels contact with different surfaces:

$$RR = G \times p$$

G : Total weight loaded on vehicle [daN]; [lbs]
 p : Rolling resistance coefficient

| Grade resistance coefficient in case of rubber tire rolling on different surfaces | |
|---|---------------|
| Surface | p |
| 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 |
| Gravel | 0,060 - 0,150 |
| Sand | 0,160 - 0,300 |

3. Grade resistance: GR [daN]; [lbs]

$$GR = G \times (\sin \alpha \times p \times \cos \alpha)$$

α : gradient negotiation angle

| Grade | α Degrees |
|-------|------------------|
| 1% | 0°35' |
| 2% | 1°9' |
| 5% | 2°51' |
| 6% | 3°26' |
| 8% | 4°35' |
| 10% | 5°43' |

| Grade | α Degrees |
|-------|------------------|
| 12% | 6°5' |
| 15% | 8°31' |
| 20% | 11°19' |
| 25% | 14°3' |
| 32% | 18° |
| 60% | 31° |

4. Trägheitskraft: FA [daN]; [lbs]

Die Kraft **FA**, erforderlich für die Beschleunigung von 0 bis zur max. Geschwindigkeit **v** und Zeit **t**, wird nach folgender Formel berechnet:

$$FA = \frac{v_{km} \times G}{3,6 \times t} \quad FA = \frac{v_{ml} \times G}{22 \times t}$$

FA: Trägheitskraft [daN]; [lbs]
t: Zeit [s]

5. Zugkraft: DP [daN]; [lbs]

Die Zugkraft DP ist die zusätzliche Kraft des Anhängers. Diese Größe wird wie folgt ermittelt:
- nach Bewertung des Konstrukteurs
- durch Berechnung der Kräfte gemäß Punkte 2, 3 und 4 für den Anhänger.
Die berechnete Summe entspricht der gesuchten Zugkraft.

6. Gesamtzugkraft: TE [daN]; [lbs]

Die Gesamtzugkraft TE entspricht der benötigten Kraft zur Fahrzeugbewegung. Das ist die Summe der Punkte 2 bis 5 erhöht um 10% wegen des Luftwiderstandes.

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

RR: Erforderliche Kraft zur Überwindung des Rollwiderstandes
GR: Erforderliche Kraft zur Überwindung von Steigungen
FA: Erforderliche Kraft zum Beschleunigen (Trägheitskraft)
DP: Zusätzliche Zugkraft (Anhänger)

7. Drehmoment des Motors: M [daNm]; [in-lb]

Erforderliches Drehmoment für jeden hydraulischen Motor:

$$M = \frac{TE \times R_m}{N \times i \times \eta_m} \quad M = \frac{TE \times R_{in}}{N \times i \times \eta_m}$$

N: Anzahl der Motoren
 η_m : Mechanischer Wirkungsgrad des Getriebes (wenn vorhanden)

8. Radhaftung: MW [daNm]; [in-lb]

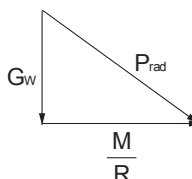
$$M_W = \frac{G_W \times f \times R_m}{i \times \eta_m} \quad M_W = \frac{G_W \times f \times R_m}{i \times \eta_m}$$

Um Radschlupf zu vermeiden sollte **MW** größer als **M** sein
f: Reibungskoeffizient
GW: Gesamtgewicht über Räder [daN]; [lbs]

| Oberfläche | f |
|------------------------------------|-------------|
| Stahl an Stahl | 0,15 - 0,20 |
| Reifen an verschmutzter Oberfläche | 0,5 - 0,7 |
| Reifen an Asphalt | 0,8 - 1,0 |
| Reifen an Beton | 0,8 - 1,0 |
| Reifen an Gras | 0,4 |

9. Radiale Belastung des Motors: Prad [daN]; [lbs]

Falls der Motor für den Antrieb von Fahrzeugen mit direkt auf der Motorwelle montierten Rädern eingesetzt wird, entspricht die radiale Gesamtbelastung der Motorwelle **Prad** der Summe von Antriebs- und Lastkraft, die auf einem Rad wirken.



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

GW: Gewicht, getragen vom Rad
Prad: Radiale Gesamtbelastung der Motorwelle
M/R: Antriebskraft

Gemäß den berechneten Belastungen kann der passende Motor aus diesem Katalog ausgewählt werden.

4. Accelerate force: FA [daN]; [lbs]

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

$$FA = \frac{v_{km} \times G}{3,6 \times t} \quad FA = \frac{v_{ml} \times G}{22 \times t}$$

FA: Accelerate 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:
- according to constructor's assessment
- As calculated 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 is the sum of forces calculated in items from 2 to 5 and increased 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: M [daNm]; [in-lb]

Necessary torque for every hydraulic motor:

$$M = \frac{TE \times R_m}{N \times i \times \eta_m} \quad M = \frac{TE \times R_{in}}{N \times i \times \eta_m}$$

N: Number of motors
 η_m : Mechanical gear efficiency (if it's available)

8. Cohesion between tire and road covering: MW [daNm]; [in-lb]

$$M_W = \frac{G_W \times f \times R_m}{i \times \eta_m} \quad M_W = \frac{G_W \times f \times R_m}{i \times \eta_m}$$

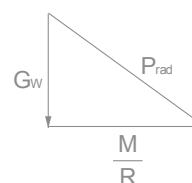
To avoid wheel slipping, it should be observed that **MW** is higher than **M**

f: Frictional factor
GW: Total weight over the wheels [daN]; [lbs]

| Surface | 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: Prad [daN]; [lbs]

When motor is used for vehicle motion with wheels mounted directly on motor shaft, the total radial loading of motoshaft **Prad** is the sum of motion force and weight force acting on one wheel.



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

GW: Weight held by wheel
Prad: Total radial loading of motor shaft
M/R: Motion force

In accordance with calculated loadings the suitable motor from this catalogue could be selected.

Leckageraum und Lecköldruck | Drainage space and drainage pressure

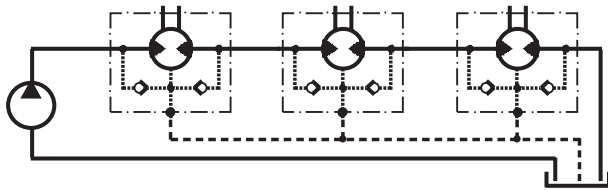
Vorteile der Leckölabfuhr aus dem Leckageraum:

- Reinigung
- Kühlung
- Verlängerung der Dichtungshaltbarkeit

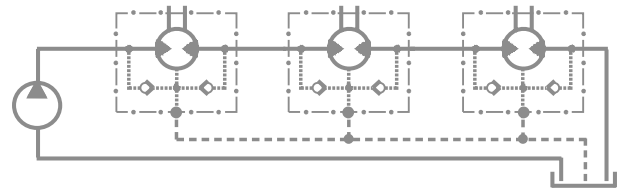
Advantages of oil drainage from drain space:

- Cleaning
- Cooling
- Seal lifetime prolonging

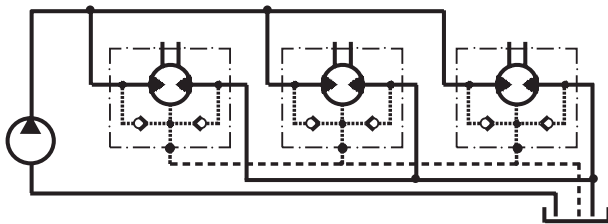
Reihenschaltung



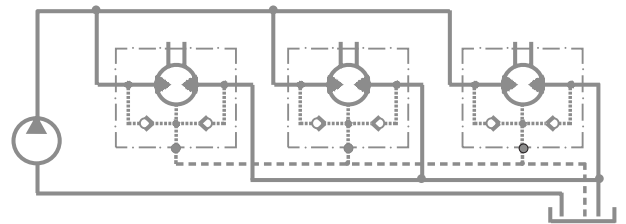
Series connection



Parallelschaltung



Parallel connection



Notizen | Notes