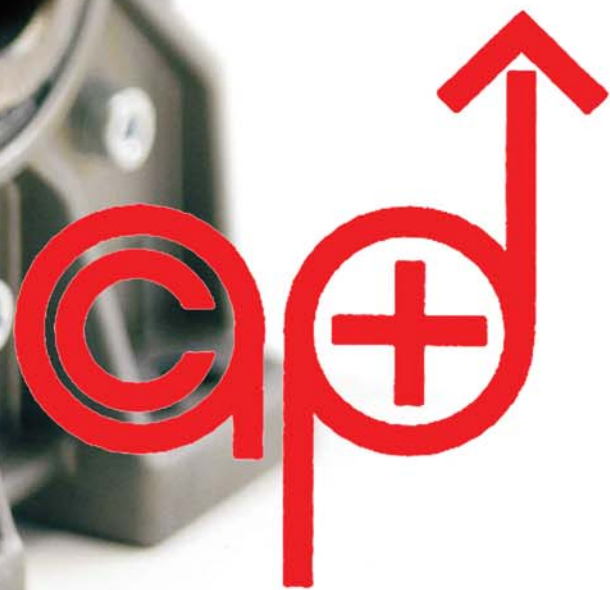


CMG

transmission

VARVEL
BOLOGNA-ITALY



ACP&D Limited

FRS-MAL geared motors

All aluminium motor & wormbox units





The FRS worm geared motor units are outstanding examples of the diverse range and product performance that has built the CMG name. The FRS series ranges up to 1500Nm, 0.09 to 15kW, and offers adaptability, reliability and flexibility.

CMG's world best practices and technologies, plus our national computerised sales, spare parts and service back-up mean we can offer a total commitment to every customer.

You can be sure every product supplied by CMG's Motors, Transmission or Drives divisions... be it an electric motor, geared motor, variable frequency drive, soft starter, or one of our many other associated products...will perform exactly to specification, and deliver reliable performance year after year with minimum maintenance and downtime.

CMG's Technology division is a recognised R & D leader offering professional engineering staff and facilities for design, testing, product development and quality control.

As depicted in our new corporate identity, when you think Motors, Transmission, Drives, or research and development Technology...think CMG.



FRS-MAL worm geared motors

0.09 to 2.2 kW, ratios 7 to 100:1, up to 215 Nm

This is a CMG short form catalogue for the CMG range of FRS-MAL geared motors.

For further detailed information please refer to the nearest CMG office for separate FRS gearbox or MAL motor catalogues.

This partnership of two proven products combines our die-cast aluminium FRS gearbox with our cast aluminium MAL motor, providing a rugged and reliably finished product. After assembly of the two components, all FRS-MAL geared motors are test run and the motor only is painted with a final coat of high quality green enamel.

FRS wormbox

The FRS worm gearboxes, sizes 28 to 70, are manufactured with housings and covers of die-cast aluminium alloy with the body and motor flange one piece. The modular design allows for alternative output covers on both sides.

Wormshafts and wormwheels have a right-hand gearing design with a ZK tooth profile, and are designed and verified for 15,000 running hours in accordance with BS 721.

Wormshafts are alloy steel, case hardened and profile ground. Wormwheels are of centrifrically cast bronze on a cast iron hub.

Standard output format is hollow bore. Alternatively, single or double solid output shafts are available (see page 9).

FRS wormboxes, sizes 28 to 70, are delivered filled with ISO VG320 grade synthetic long-life oil (no plugs).

This catalogue details all output cover designs for wormboxes supplied fitted to MAL motors. Dimensions of free input shaft arrangements are available on request.

MAL motor

The CMG low weight and compact profile MAL range of motors are recognized for their inherent suitability for all geared motor applications.

Standard motors are 3 phase, 415 volt, 50 Hz.

Motors are manufactured with 'F' class insulation, with windings designed to limit the temperature rise to 80K.

The MAL motor has an all cast aluminium construction, and provides a protection rating of IP54 for both motor and terminal box, with increased ratings available on request.

Models listed in this catalogue are standard B5 flange or B14A face mount, 4 pole (1500 rpm) with other motor speeds available upon request.

Also available in the CMG-MAL range of motors are 240 volt single phase motors, and motors built to customer specifications.

Product code specification

When placing an order the gearbox product code, mounting arrangement (see page 5), and motor kW rating should be specified. The product code of the gearbox is composed in accordance with the following example.

| | | | | | | | | | | | | |
|-----|-----|-----|-------|-------|---|---|---|---|---|---|---|---|
| V | R | S | 0 | 4 | 0 | 0 | 8 | 0 | 0 | 6 | 3 | S |
| 1-3 | 4-6 | 7-9 | 10-12 | 13-14 | | | | | | | | |

Positions 1 to 3

Series

VRS = CMG Varvel FRS wormbox

Positions 4 to 6

Gearbox size

(028, 040, 050, 060, and 070)

Positions 7 to 9

Gearbox ratio

Positions 10 to 12

Gearbox input size

(056, 063, 071, 080, 090 and 100)

Positions 13 and 14

Mounting type/side covers

S = Foot mount type S overdriven

I = Foot mount type S underdriven

D = Foot mount type S vertical

P = Face mount type PC RHS

P1 = Face mount type PC LHS

PP = Face mount type PC both sides

F = Flange mount type FL RHS

F1 = Flange mount type FL LHS

Note: For codes using alternative side covers contact CMG.

Service factors

Where the required service factor is not known it can be calculated using the following formula and tables.

$$\text{Service factor SF} = F_1 \times F_2 \times F_3$$

| F ₁ selection | | | | F ₂ selection | | F ₃ selection | |
|--------------------------|--------------|---------------|------------|--------------------------|----------------|--------------------------|----------------|
| Hours per day | Uniform load | Variable load | Shock load | Starts per hour | F ₂ | Expected lifetime | F ₃ |
| 3 to 4 | 0.8 | 1.0 | 1.5 | 6 | 1.0 | 10 000 | 0.8 |
| 8 to 10 | 1.0 | 1.2 | 1.8 | 60 | 1.2 | 15 000 | 1.0 |
| 10 to 24 | 1.4 | 1.6 | 2.0 | 120 | 1.4 | 20 000 | 1.4 |

Selection data

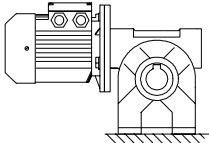
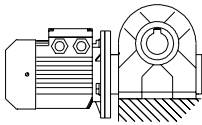
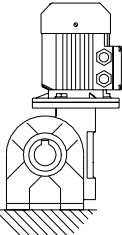
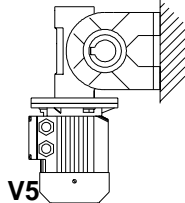
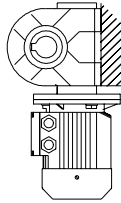
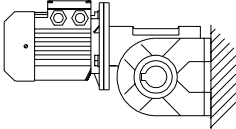
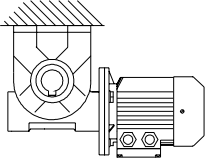
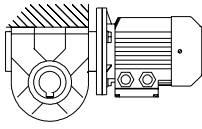
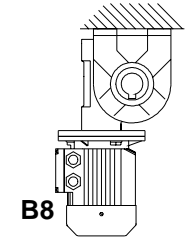
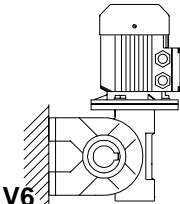
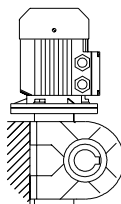
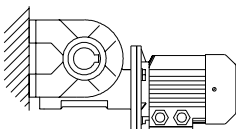
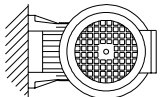
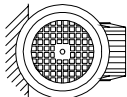
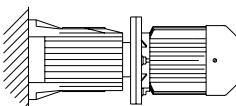
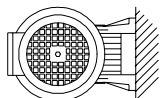
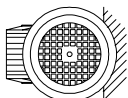
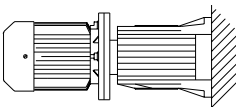
| Type | r/min | Nm | SF | ratio | Gearbox code |
|---------------|---|-----|-----|-------|---------------|
| 0.09kW | Motor MNT56B-4 B14A code M34000095MNT¹⁾ 1360 r/min 0.45 Amps | | | | |
| FRS 28-56 | 14 | 26 | 0.3 | 100 | VRS028100056• |
| | 18 | 22 | 0.5 | 80 | VRS028080056• |
| | 20 | 19 | 0.6 | 70 | VRS028070056• |
| | 25 | 18 | 0.9 | 56 | VRS028056056• |
| | 28 | 17 | 1.0 | 49 | VRS028049056• |
| | 35 | 15 | 1.1 | 40 | VRS028040056• |
| | 50 | 11 | 1.8 | 28 | VRS028028056• |
| | 70 | 9.1 | 1.8 | 20 | VRS028020056• |
| | 93 | 7.1 | 2.5 | 15 | VRS028015056• |
| | 140 | 5 | >3 | 10 | VRS028010056• |
| | 200 | 3.6 | >3 | 7 | VRS028007056• |
| 0.18kW | Motor MNT63B-4 B5 code M34000185MNT¹⁾ 1370 r/min 0.75 Amps | | | | |
| FRS 50-63 | 18 | 51 | 1.1 | 80 | VRS050080063• |
| | 20 | 46 | 1.4 | 70 | VRS050070063• |
| | 25 | 41 | 1.7 | 56 | VRS050056063• |
| FRS 40-63 | 25 | 39 | 1.0 | 56 | VRS040056063• |
| | 28 | 35 | 1.2 | 49 | VRS040049063• |
| | 35 | 30 | 1.4 | 40 | VRS040040063• |
| | 50 | 23 | 2.0 | 28 | VRS040028063• |
| | 70 | 18 | 2.1 | 20 | VRS040020063• |
| | 93 | 14 | 3.0 | 15 | VRS040015063• |
| | 140 | 10 | >3 | 10 | VRS040010063• |
| | 200 | 7.3 | >3 | 7 | VRS040007063• |
| | Motor MNT63B-4 B14A code M34000187MNT¹⁾ 1370 r/min 0.75 Amps | | | | |
| FRS 28-63 | 50 | 23 | 0.9 | 28 | VRS028028063• |
| | 70 | 18 | 0.9 | 20 | VRS028020063• |
| | 93 | 14 | 1.3 | 15 | VRS028015063• |
| | 140 | 9.9 | 1.8 | 10 | VRS028010063• |
| | 200 | 7.2 | 2.5 | 7 | VRS028007063• |
| 0.37kW | Motor MAL71B-4 B5 code M34000375MAL 1390 r/min 1.07 Amps | | | | |
| FRS 70-71 | 14 | 131 | 1.0 | 100 | VRS070100071• |
| | 18 | 113 | 1.4 | 80 | VRS070080071• |
| FRS 60-71 | 18 | 107 | 1.0 | 80 | VRS060080071• |
| | 20 | 97 | 1.3 | 70 | VRS060070071• |
| | 25 | 85 | 1.5 | 56 | VRS060056071• |
| | 28 | 77 | 1.7 | 49 | VRS060049071• |
| FRS 50-71 | 28 | 77 | 1.0 | 49 | VRS050049071• |
| | 35 | 65 | 1.1 | 40 | VRS050040071• |
| | 50 | 50 | 1.7 | 28 | VRS050028071• |
| | Motor MAL71B-4 B14A code M34000377MAL 1390 r/min 1.07 Amps | | | | |
| FRS 40-71 | 50 | 48 | 1.0 | 28 | VRS040028071• |
| | 70 | 38 | 1.0 | 20 | VRS040020071• |
| | 93 | 30 | 1.5 | 15 | VRS040015071• |
| | 140 | 21 | 2.2 | 10 | VRS040010071• |
| | 200 | 15 | 3.0 | 7 | VRS040007071• |

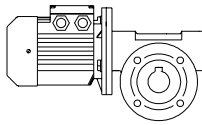
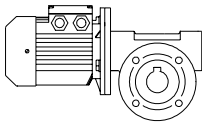
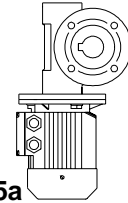
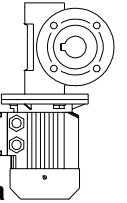
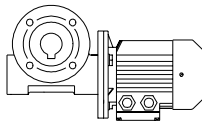
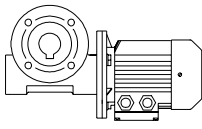
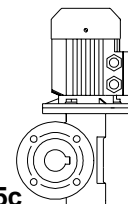
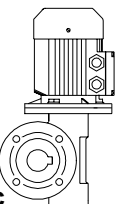
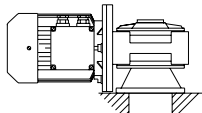
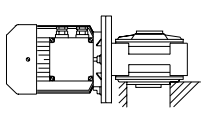
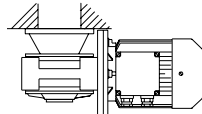
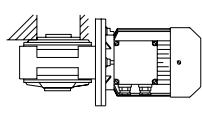
• = Mounting type/side covers: refer product code specification.

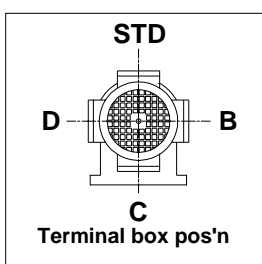
¹⁾ The CMG MNT series 0.09 kW and 0.18 kW motors are used in lieu of CMG MAL series motors.

| Type | r/min | Nm | SF | ratio | Gearbox code |
|---------------|---|-----|-----|-------|---------------|
| 0.55kW | Motor MAL80A-4 B5 code M34000555MAL 1340r/min 1.45Amps | | | | |
| FRS 70-80 | 18 | 168 | 0.9 | 80 | VRS070080080• |
| | 20 | 155 | 1.1 | 70 | VRS070070080• |
| | 25 | 135 | 1.3 | 56 | VRS070056080• |
| | 28 | 123 | 1.5 | 49 | VRS070049080• |
| FRS 60-80 | 28 | 114 | 1.1 | 49 | VRS060049080• |
| | 35 | 99 | 1.4 | 40 | VRS060040080• |
| | 50 | 75 | 1.9 | 28 | VRS060028080• |
| | Motor MAL80A-4 B14A code M34000557MAL 1340 r/min 1.45 Amps | | | | |
| FRS 50-80 | 50 | 75 | 1.1 | 28 | VRS050028080• |
| | 70 | 57 | 1.1 | 20 | VRS050020080• |
| | 93 | 44 | 1.7 | 15 | VRS050015080• |
| | 140 | 32 | 2.4 | 10 | VRS050010080• |
| | 200 | 23 | >3 | 7 | VRS050007080• |
| 0.75kW | Motor MAL80B-4 B5 code M34000755MAL 1380 r/min 1.95 Amps | | | | |
| FRS 70-80 | 25 | 183 | 1.0 | 56 | VRS070056080• |
| | 28 | 168 | 1.1 | 49 | VRS070049080• |
| | 35 | 145 | 1.6 | 40 | VRS070040080• |
| FRS 60-80 | 35 | 135 | 1.0 | 40 | VRS060040080• |
| | 50 | 102 | 1.4 | 28 | VRS060028080• |
| | 70 | 79 | 1.5 | 20 | VRS060020080• |
| | 93 | 62 | 2.1 | 15 | VRS060015080• |
| | Motor MAL80B-4 B14A code M34000757MAL 1380 r/min 1.95 Amps | | | | |
| FRS 50-80 | 93 | 60 | 1.2 | 15 | VRS050015080• |
| | 140 | 43 | 1.7 | 10 | VRS050010080• |
| | 200 | 31 | 2.4 | 7 | VRS050007080• |
| 1.1kW | Motor MAL90S-4 B5 code M34001105MAL 1405 r/min 2.5 Amps | | | | |
| FRS 70-90S | 35 | 213 | 1.1 | 40 | VRS070040090• |
| | 50 | 158 | 1.4 | 28 | VRS070028090• |
| | 70 | 122 | 1.6 | 20 | VRS070020090• |
| FRS 60-90S | 70 | 116 | 1.1 | 20 | VRS060020090• |
| | 93 | 91 | 1.4 | 15 | VRS060015090• |
| | 140 | 63 | 2.1 | 10 | VRS060010090• |
| | 200 | 45 | 2.5 | 7 | VRS060007090• |
| 1.5kW | Motor MAL90L-4 B5 code M34001505MAL 1415 r/min 3.5 Amps | | | | |
| FRS 70-90L | 50 | 215 | 1.0 | 28 | VRS070028090• |
| | 70 | 166 | 1.2 | 20 | VRS070020090• |
| | 93 | 127 | 1.5 | 15 | VRS070015090• |
| | 140 | 88 | 2.0 | 10 | VRS070010090• |
| FRS 60-90L | 93 | 124 | 1.0 | 15 | VRS060015090• |
| | 140 | 86 | 1.5 | 10 | VRS060010090• |
| | 200 | 62 | 1.8 | 7 | VRS060007090• |
| 2.2kW | Motor MAL100LA-4 B14A code M34002207MAL 1430 r/min 4.7 Amps | | | | |
| FRS 70-100L | 93 | 187 | 1.0 | 15 | VRS070015100• |
| | 140 | 129 | 1.4 | 10 | VRS070010100• |
| | 200 | 92 | 1.8 | 7 | VRS070007100• |

Mounting arrangements

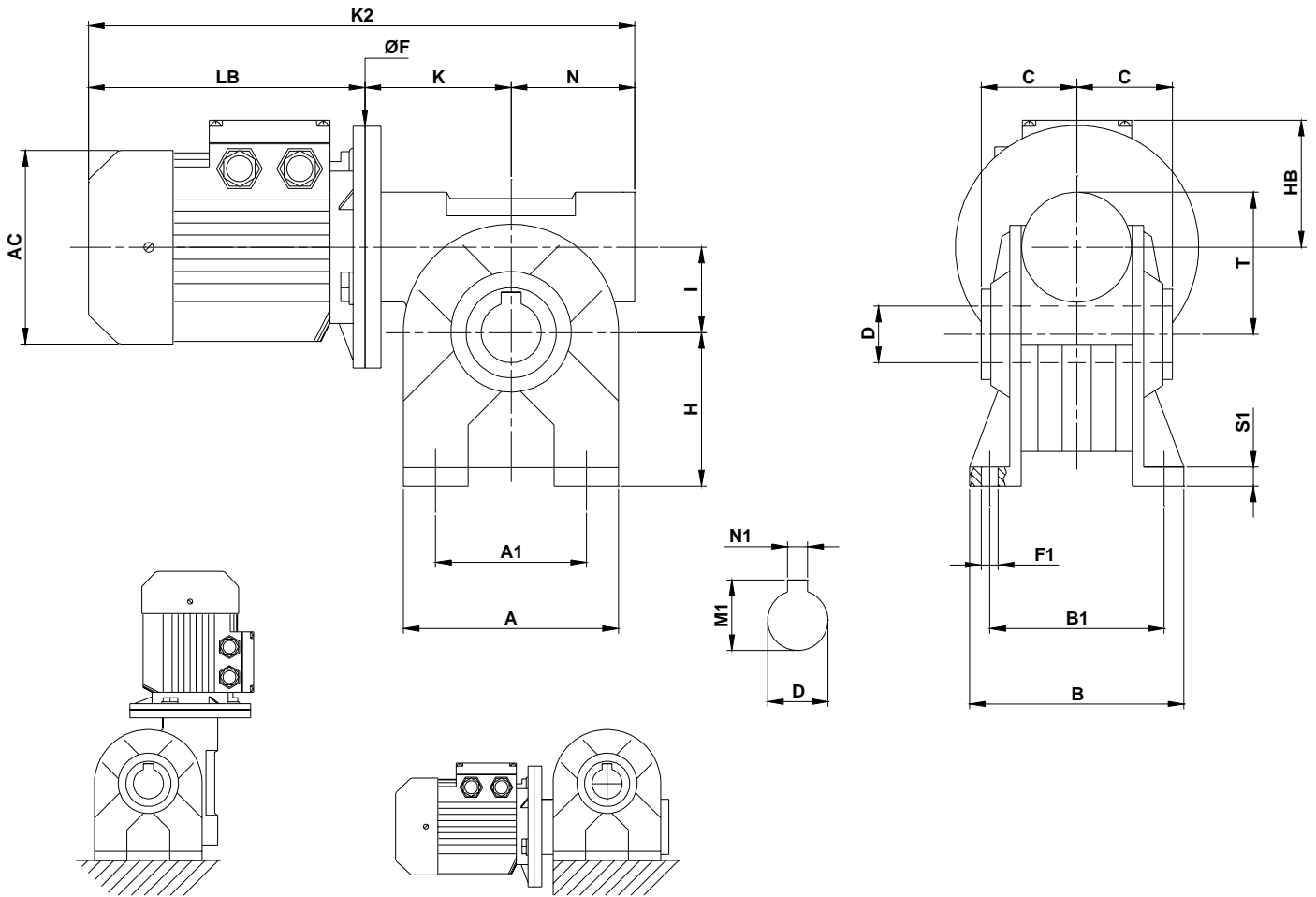
| S | I | D |
|--|--|--|
|  <p>B3</p> |  <p>B3</p> |  <p>B3</p> |
|  <p>V5</p> |  <p>V5</p> |  <p>V5</p> |
|  <p>B8</p> |  <p>B8</p> |  <p>B8</p> |
|  <p>V6</p> |  <p>V6</p> |  <p>V6</p> |
|  <p>B6</p> |  <p>B6</p> |  <p>B6</p> |
|  <p>B7</p> |  <p>B7</p> |  <p>B7</p> |

| FL | PC |
|---|---|
|  <p>B5</p> |  <p>B5</p> |
|  <p>B5a</p> |  <p>B5a</p> |
|  <p>B5b</p> |  <p>B5b</p> |
|  <p>B5c</p> |  <p>B5c</p> |
|  <p>V1</p> |  <p>V1</p> |
|  <p>V3</p> |  <p>V3</p> |



Dimensional drawings

Foot mount – type S



Mounting type D

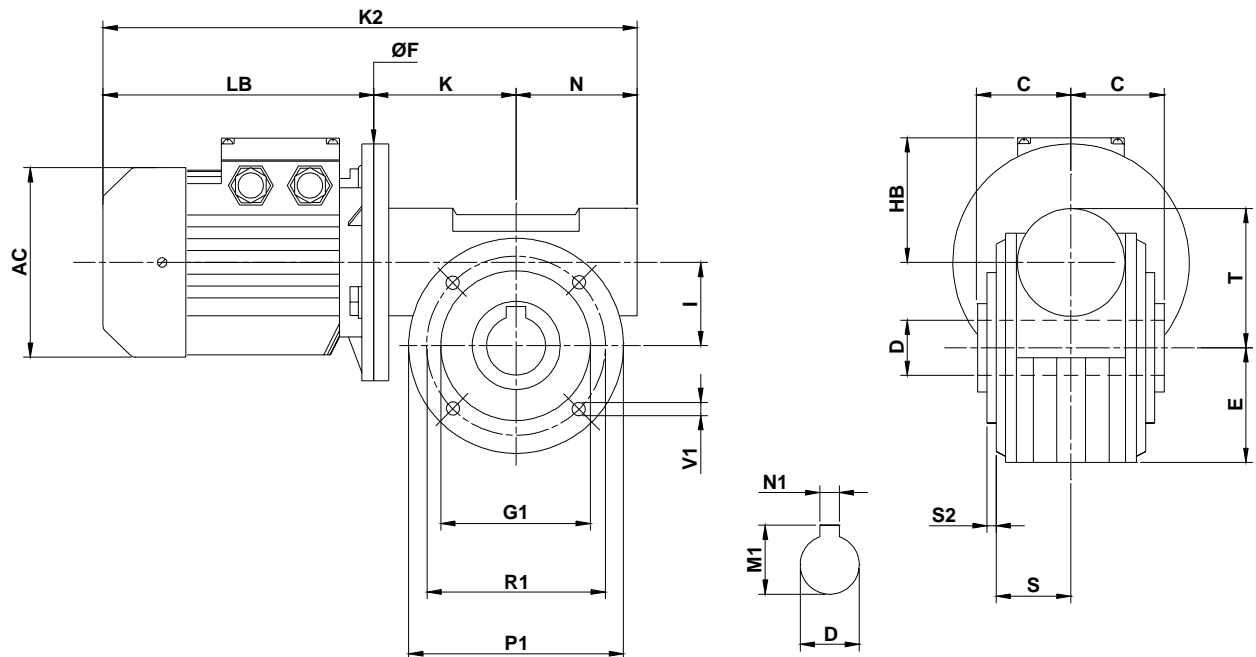
Mounting type I

| Type | Motor mount | Gearbox dimensions | | | | | | | | | | | | | | Motor dimensions | | | | | Weight ²⁾ [kg] | | |
|--------|-------------|--------------------|-----|-----|-----|-----|-----------------|----|-----|-----|----|-----|------|----|----|------------------|-----|-----|-----|-----|------------------------------|-----|------|
| | | A | A1 | B | B1 | C | D ¹⁾ | F1 | H | I | K | M1 | N | N1 | S1 | T | AC | ØF | HB | K2 | | LB | |
| FRS 28 | -56 | B14A | 67 | 52 | 78 | 66 | 30 | 14 | 5.5 | 52 | 28 | 47 | 16.3 | 40 | 5 | 6 | 49 | 110 | 80 | 108 | 255 | 168 | 3.7 |
| | -63 | B14A | | | | | | | | | | 50 | | 48 | | | | 123 | 90 | 110 | 283 | 185 | 5.1 |
| FRS 40 | -63 | B5 | 100 | 70 | 102 | 84 | 41 | 18 | 7 | 71 | 40 | 67 | 20.8 | 60 | 6 | 9 | 67 | 123 | 140 | 110 | 312 | 185 | 6.7 |
| | -71 | B14A | | | | | | | | | | 70 | | | | | | 134 | 105 | 92 | 335 | 205 | 9.0 |
| FRS 50 | -63 | B5 | 120 | 85 | 119 | 99 | 49 | 25 | 9 | 85 | 50 | 78 | 28.3 | 70 | 8 | 12 | 82 | 123 | 140 | 110 | 333 | 185 | 8.1 |
| | -71 | B5 | | | | | | | | | | | | | | | | 134 | 160 | 92 | 353 | 205 | 10.4 |
| | -80 | B14A | | | | | | | | | | | | | | | | 164 | 120 | 107 | 380 | 232 | 13.6 |
| FRS 60 | -71 | B5 | 138 | 95 | 136 | 111 | 60 | 25 | 11 | 100 | 60 | 88 | 28.3 | 78 | 8 | 12 | 97 | 134 | 160 | 92 | 371 | 205 | 12.8 |
| | -80 | B5 | | | | | | | | | | | | | | | | 164 | 200 | 107 | 398 | 232 | 16.0 |
| | -90S | B5 | | | | | | | | | | | | | | | | 177 | 200 | 115 | 416 | 250 | 18.6 |
| | -90L | B5 | | | | | | | | | | | | | | | | 177 | 200 | 115 | 436 | 270 | 20.1 |
| FRS 70 | -71 | B5 | 158 | 120 | 140 | 116 | 60 | 25 | 11 | 115 | 70 | 101 | 28.3 | 90 | 8 | 14 | 107 | 134 | 160 | 92 | 396 | 205 | 14.4 |
| | -80 | B5 | | | | | | | | | | | | | | | | 164 | 200 | 107 | 423 | 232 | 17.6 |
| | -90S | B5 | | | | | | | | | | | | | | | | 177 | 200 | 115 | 441 | 250 | 20.2 |
| | -90L | B5 | | | | | | | | | | | | | | | | 177 | 200 | 115 | 461 | 270 | 21.7 |
| | -100L | B14A | | | | | | | | | | | | | | | | 223 | 160 | 138 | 493 | 302 | 33.1 |

¹⁾ See page 9 for alternative shaft sizes

²⁾ Includes oil

Face mount – type PC



| Type | Motor Mount | Gearbox dimensions | | | | | | | | | | | | | | Motor dimensions | | | | | Weight ²⁾ [kg] | | |
|--------|-------------|--------------------|-----------------|----|----|----|----|-----|------|----|----|-----|-----|------|------------------|------------------|------------------|-----|-----|-----|------------------------------|-----|------|
| | | C | D ¹⁾ | E | G1 | I | K | M1 | N | N1 | P1 | R1 | S | S2 | T | V1 | AC | ØF | HB | K2 | | LB | |
| FRS 28 | -56 | B14A | 30 | 14 | 34 | 42 | 28 | 47 | 16.3 | 40 | 5 | 67 | 56 | 32 | -4 ³⁾ | 49 | M6 ⁴⁾ | 110 | 80 | 108 | 255 | 168 | 3.7 |
| | -63 | B14A | | | | | | | | | | | | | | | | 123 | 90 | 110 | 283 | 185 | 5.1 |
| FRS 40 | -63 | B5 | 41 | 18 | 50 | 60 | 40 | 67 | 20.8 | 60 | 6 | 95 | 83 | 38 | 2 | 67 | M6 | 123 | 140 | 110 | 312 | 185 | 6.7 |
| | -71 | B14A | | | | | | | | | | | | | | | | 134 | 105 | 92 | 335 | 205 | 9.0 |
| FRS 50 | -63 | B5 | 49 | 25 | 60 | 70 | 50 | 78 | 28.3 | 70 | 8 | 100 | 85 | 49 | 2.5 | 82 | M8 | 123 | 140 | 110 | 333 | 185 | 8.1 |
| | -71 | B5 | | | | | | | | | | | | | | | | 134 | 160 | 92 | 353 | 205 | 10.4 |
| | -80 | B14A | | | | | | | | | | | | | | | | 164 | 120 | 107 | 380 | 232 | 13.6 |
| FRS 60 | -71 | B5 | 60 | 25 | 70 | 70 | 60 | 88 | 28.3 | 78 | 8 | 102 | 85 | 57.5 | 2.5 | 97 | M8 | 134 | 160 | 92 | 371 | 205 | 12.8 |
| | -80 | B5 | | | | | | | | | | | | | | | | 164 | 200 | 107 | 398 | 232 | 16.0 |
| | -90S | B5 | | | | | | | | | | | | | | | | 177 | 200 | 115 | 416 | 250 | 18.6 |
| | -90L | B5 | | | | | | | | | | | | | | | | 177 | 200 | 115 | 436 | 270 | 20.1 |
| | -100L | B14A | | | | | | | | | | | | | | | | 223 | 160 | 138 | 493 | 302 | 33.1 |
| FRS 70 | -71 | B5 | 60 | 25 | 80 | 80 | 70 | 101 | 28.3 | 90 | 8 | 116 | 100 | 57 | 3 | 107 | M8 | 134 | 160 | 92 | 396 | 205 | 14.4 |
| | -80 | B5 | | | | | | | | | | | | | | | | 164 | 200 | 107 | 423 | 232 | 17.6 |
| | -90S | B5 | | | | | | | | | | | | | | | | 177 | 200 | 115 | 441 | 250 | 20.2 |
| | -90L | B5 | | | | | | | | | | | | | | | | 177 | 200 | 115 | 461 | 270 | 21.7 |
| | -100L | B14A | | | | | | | | | | | | | | | | 223 | 160 | 138 | 493 | 302 | 33.1 |

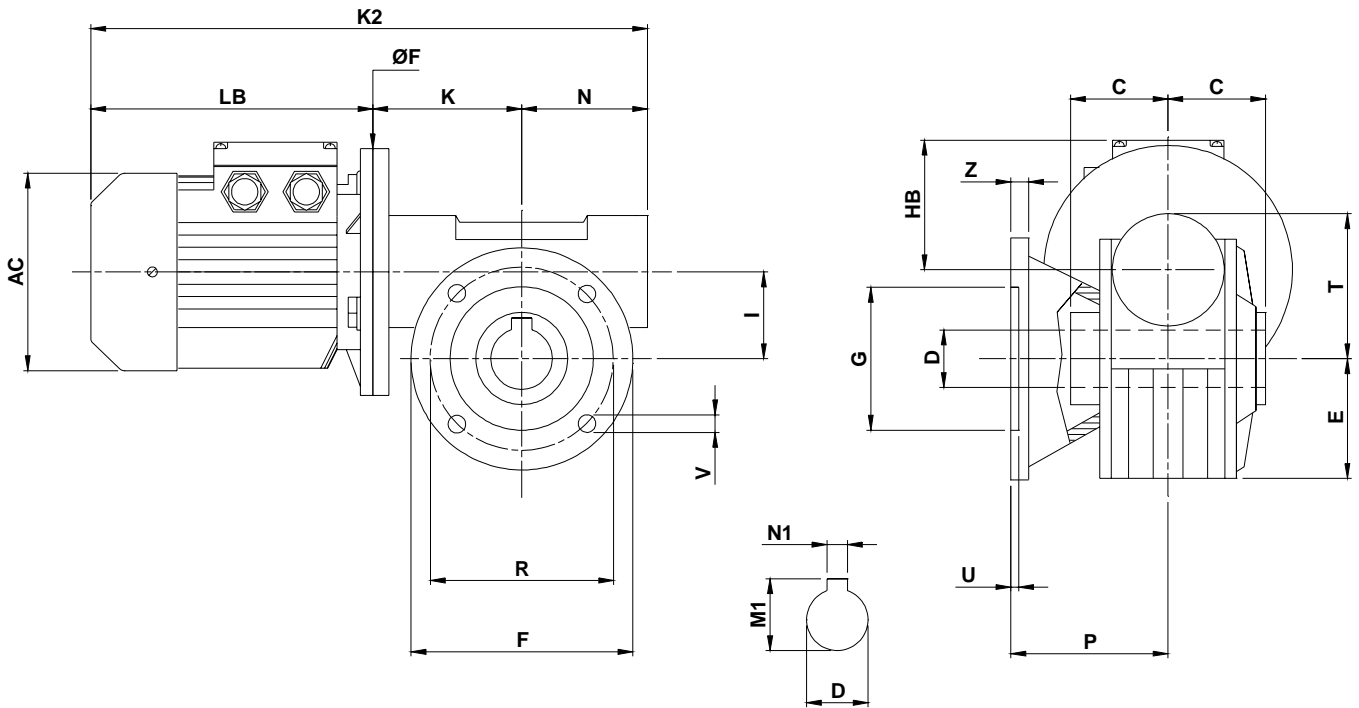
¹⁾ See page 9 for alternative shaft sizes

²⁾ Includes oil

³⁾ Spigot is recessed on FRS 28

⁴⁾ 4 mounting holes are rotated by 45°

Flange mount – type FL

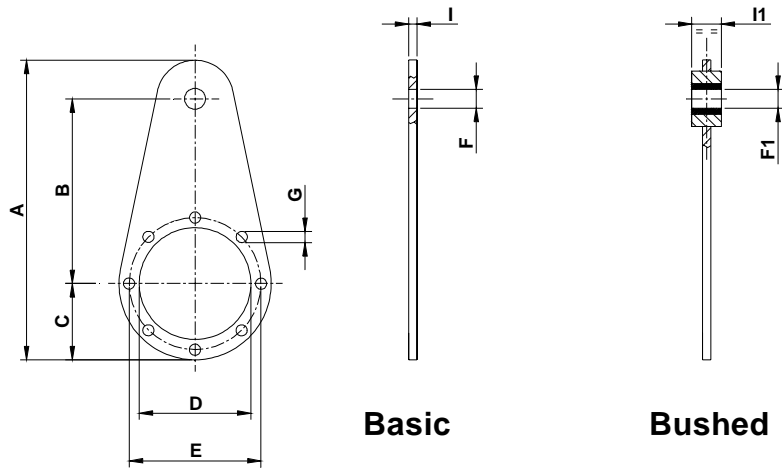


| Type | Motor mount | Gearbox dimensions | | | | | | | | | | | | | | Motor dimensions | | | | | Weight ²⁾ [kg] | | | |
|--------|-------------|--------------------|-----------------|----|----|-----|-----|----|-----|------|----|---|------|-----|-----|------------------|------|----|-----|-----|------------------------------|-----|-----|------|
| | | C | D ¹⁾ | E | F | G | I | K | M1 | N | N1 | P | R | T | U | V | Z | AC | ØF | HB | | K2 | LB | |
| FRS 28 | -56 | B14A | 30 | 14 | 34 | 70 | 40 | 28 | 47 | 16.3 | 40 | 5 | 49 | 56 | 49 | 4 | 6 | 5 | 110 | 80 | 108 | 255 | 168 | 3.7 |
| | -63 | B14A | | | | | | | | | | | 50 | | | | | | 123 | 90 | 110 | 283 | 185 | 5.1 |
| FRS 40 | -63 | B5 | 41 | 18 | 50 | 140 | 95 | 40 | 67 | 20.8 | 60 | 6 | 82 | 115 | 67 | 4 | 8.5 | 10 | 123 | 140 | 110 | 312 | 185 | 6.7 |
| | -71 | B14A | | | | | | | | | | | 70 | | | | | | 134 | 105 | 92 | 335 | 205 | 9.0 |
| FRS 50 | -63 | B5 | 49 | 25 | 60 | 160 | 110 | 50 | 78 | 28.3 | 70 | 8 | 91.5 | 130 | 82 | 4 | 10.5 | 10 | 123 | 140 | 110 | 333 | 185 | 8.1 |
| | -71 | B5 | | | | | | | | | | | | | | | | | 134 | 160 | 92 | 353 | 205 | 10.4 |
| | -80 | B14A | | | | | | | | | | | | | | | | | 164 | 120 | 107 | 380 | 232 | 13.6 |
| FRS 60 | -71 | B5 | 60 | 25 | 70 | 180 | 115 | 60 | 88 | 28.3 | 78 | 8 | 116 | 150 | 97 | 5 | 10.5 | 11 | 134 | 160 | 92 | 371 | 205 | 12.8 |
| | -80 | B5 | | | | | | | | | | | | | | | | | 164 | 200 | 107 | 398 | 232 | 16.0 |
| | -90S | B5 | | | | | | | | | | | | | | | | | 177 | 200 | 115 | 416 | 250 | 18.6 |
| | -90L | B5 | | | | | | | | | | | | | | | | | 177 | 200 | 115 | 436 | 270 | 20.1 |
| FRS 70 | -71 | B5 | 60 | 25 | 80 | 200 | 130 | 70 | 101 | 28.3 | 90 | 8 | 111 | 165 | 107 | 5 | 13 | 11 | 134 | 160 | 92 | 396 | 205 | 14.4 |
| | -80 | B5 | | | | | | | | | | | | | | | | | 164 | 200 | 107 | 423 | 232 | 17.6 |
| | -90S | B5 | | | | | | | | | | | | | | | | | 177 | 200 | 115 | 441 | 250 | 20.2 |
| | -90L | B5 | | | | | | | | | | | | | | | | | 177 | 200 | 115 | 461 | 270 | 21.7 |
| | -100L | B14A | | | | | | | | | | | | | | | | | 223 | 160 | 138 | 493 | 302 | 33.1 |

¹⁾ See page 9 for alternative shaft sizes

²⁾ Includes oil

Torque arms



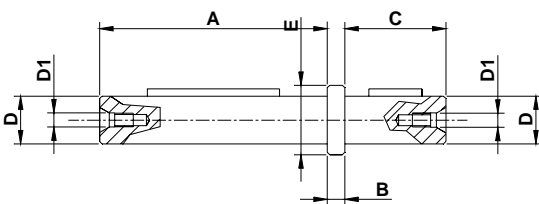
| FRS | Part Number | | Dimensions | | | | | | | | | |
|-----|--------------|--------------|------------|-----|------|----|-----|------|----|---|---|----|
| | Basic | Bushed | A | B | C | D | E | F | F1 | G | I | I1 |
| 28 | V470-202-004 | V470-202-002 | 133.5 | 80 | 33.5 | 42 | 56 | 10.5 | 10 | 6 | 4 | 15 |
| 40 | V471-202-004 | V471-202-002 | 165 | 90 | 50 | 60 | 83 | 10.5 | 10 | 7 | 4 | 15 |
| 50 | V472-202-004 | V472-202-002 | 185 | 100 | 60 | 70 | 85 | 10.5 | 10 | 9 | 4 | 15 |
| 60 | V479-202-004 | V479-202-002 | 230 | 150 | 50 | 70 | 85 | 10.5 | 10 | 9 | 6 | 20 |
| 70 | V473-202-004 | V473-202-002 | 240 | 150 | 60 | 80 | 100 | 10.5 | 10 | 9 | 6 | 20 |

Alternative shaft sizes

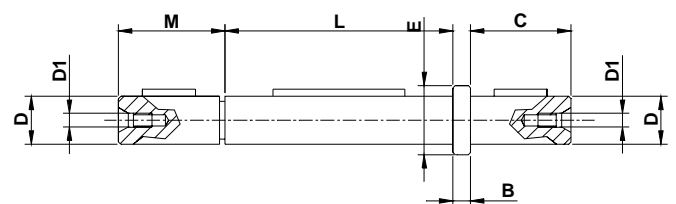
CMG standard hollow shaft diameter is chosen to meet the Australian market preference. Also available is the European alternative.

| Type | Bore diameter | |
|-------|-------------------|----------------------|
| | Australian market | European alternative |
| FRS40 | 18mm | 19mm |
| FRS50 | 25mm | 24mm |
| FRS70 | 25mm | 28mm |

Output shafts



Single ended



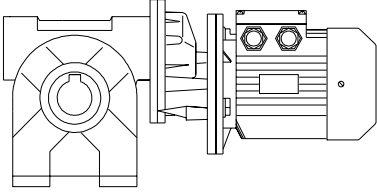
Double ended

| FRS | Part number | | Dimensions | | | | | | | | |
|---------|--------------|--------------|------------|----|----|----|----|----|-----|----|--|
| | Single ended | Double ended | A | B | C | D | D1 | E | L | M | |
| 28 | V470-901-014 | V470-902-014 | 58 | 1 | 30 | 14 | M5 | - | 60 | 31 | |
| 40 | V471-901-018 | V471-902-018 | 80 | 10 | 40 | 18 | M8 | 22 | 82 | 50 | |
| 40(alt) | V471-901-019 | V471-902-019 | 80 | 10 | 40 | 19 | M8 | 22 | 82 | 50 | |
| 50 | V472-901-025 | V472-902-025 | 95 | 10 | 45 | 25 | M8 | 28 | 98 | 55 | |
| 50(alt) | V472-901-024 | V472-902-024 | 95 | 10 | 45 | 24 | M8 | 28 | 98 | 55 | |
| 60 | V479-901-025 | V479-902-025 | 117 | 10 | 50 | 25 | M8 | 30 | 120 | 60 | |
| 70 | V473-901-025 | V473-902-025 | 117 | 10 | 60 | 25 | M8 | 34 | 120 | 70 | |
| 70(alt) | V473-901-028 | V473-902-028 | 117 | 10 | 60 | 28 | M8 | 34 | 120 | 70 | |

Options and extras

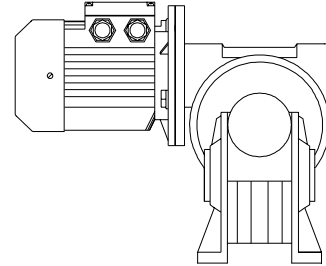
Helical/wormbox – FRA

The gearbox type FRA is a type FRS with a helical inline gear set on the input of the FRS wormbox. This gives a wider range of reduction ratios with greater output torque and higher efficiency than the corresponding standard FRS wormbox.



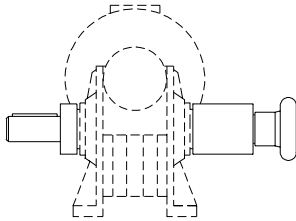
Double wormbox – FRS/FRS

Fitting two FRS type gearboxes together makes possible a selection of high reduction ratios to achieve low output speeds and a change of configuration.



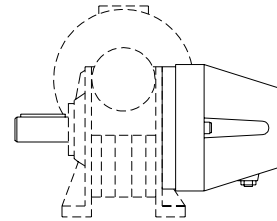
Torque limiting device – TL

The Varvel torque limiter 'TL' is a plug-in device to the FRS gearbox range which offers full gearbox protection against unexpected operational overloads. Simple hand release, and manual operation in the case of power failure are available with this device. Slipping torque can be adjusted through a locking knob control and is factory set to maximum torque of the gearbox or can be set to a demand torque.

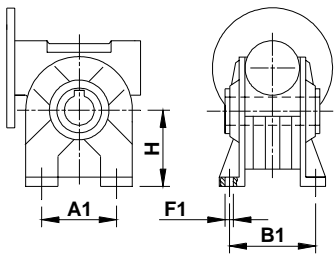


Travel limiting device – SL

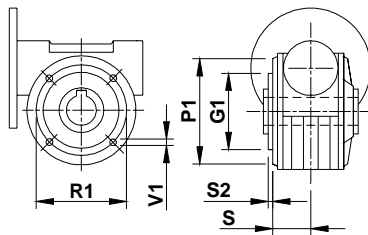
The Varvel Travel limiter 'SL' is used in all applications where a drive must be stopped by means of limit switches after a given operational time. The unit is designed to be fitted to the worm gearboxes type FRS with easy wiring and adjustment on site without special tooling.



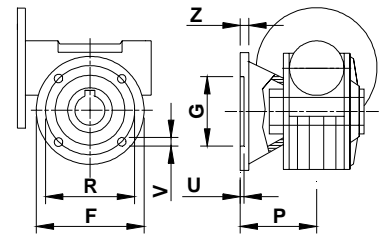
Alternative side covers (for interchangeability with other brands)



SA



PA-PB



FA-FB

| SA | | | | | PA-PB | | | | | | | FA-FB | | | | | | | |
|---------|------------|------|-----|----|------------|------------|-----|-----|------|-----|----|------------|------------|-----|-------|-----|-----|------|----|
| SA Type | Dimensions | | | | PA-PB Type | Dimensions | | | | | | FA-FB Type | Dimensions | | | | | | |
| | A1 | B1 | F1 | H | | G1 | P1 | R1 | S | S2 | V1 | | F | G | P | R | U | V | Z |
| 28 SA | - | - | - | - | 28 PA | - | - | - | - | - | - | - | - | - | - | - | - | - | |
| 40 SA | 52 | 81.0 | 8.5 | 72 | 40 PA | 50 | 95 | 65 | 38.0 | 2.0 | M6 | 40 FA | 105 | 60 | 69.0 | 87 | 5.0 | 9.0 | 8 |
| 50 SA | 63 | 98.5 | 9.0 | 82 | 40 PB | - | - | - | - | - | - | 40 FB | 120 | 80 | 62.0 | 100 | 4.0 | 9.0 | 9 |
| 60 SA | - | - | - | - | 50 PA | 68 | 110 | 94 | 49.0 | 2.5 | M6 | 50 FA | 125 | 70 | 93.0 | 90 | 5.0 | 11.0 | 10 |
| 70 SA | - | - | - | - | 50 PB | 60 | 110 | 75 | 49.0 | 2.5 | M6 | 50 FB | - | - | - | - | - | - | - |
| | | | | | 60 PA | 75 | 104 | 90 | 47.5 | 5.5 | M8 | 60 FA | 165 | 110 | 90.0 | 130 | 5.0 | 10.5 | 15 |
| | | | | | 60 PB | - | - | - | - | - | - | 60 FB | 180 | 115 | 86.0 | 150 | 3.5 | 10.5 | 12 |
| | | | | | 70 PA | 90 | 125 | 110 | 55.0 | 3.0 | M8 | 70 FA | 165 | 115 | 116.0 | 150 | 4.0 | 11.0 | 10 |
| | | | | | 70 PB | 70 | 116 | 85 | 57.0 | 4.0 | M8 | 70 FB | 160 | 110 | 84.5 | 130 | 4.5 | 11.0 | 14 |

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