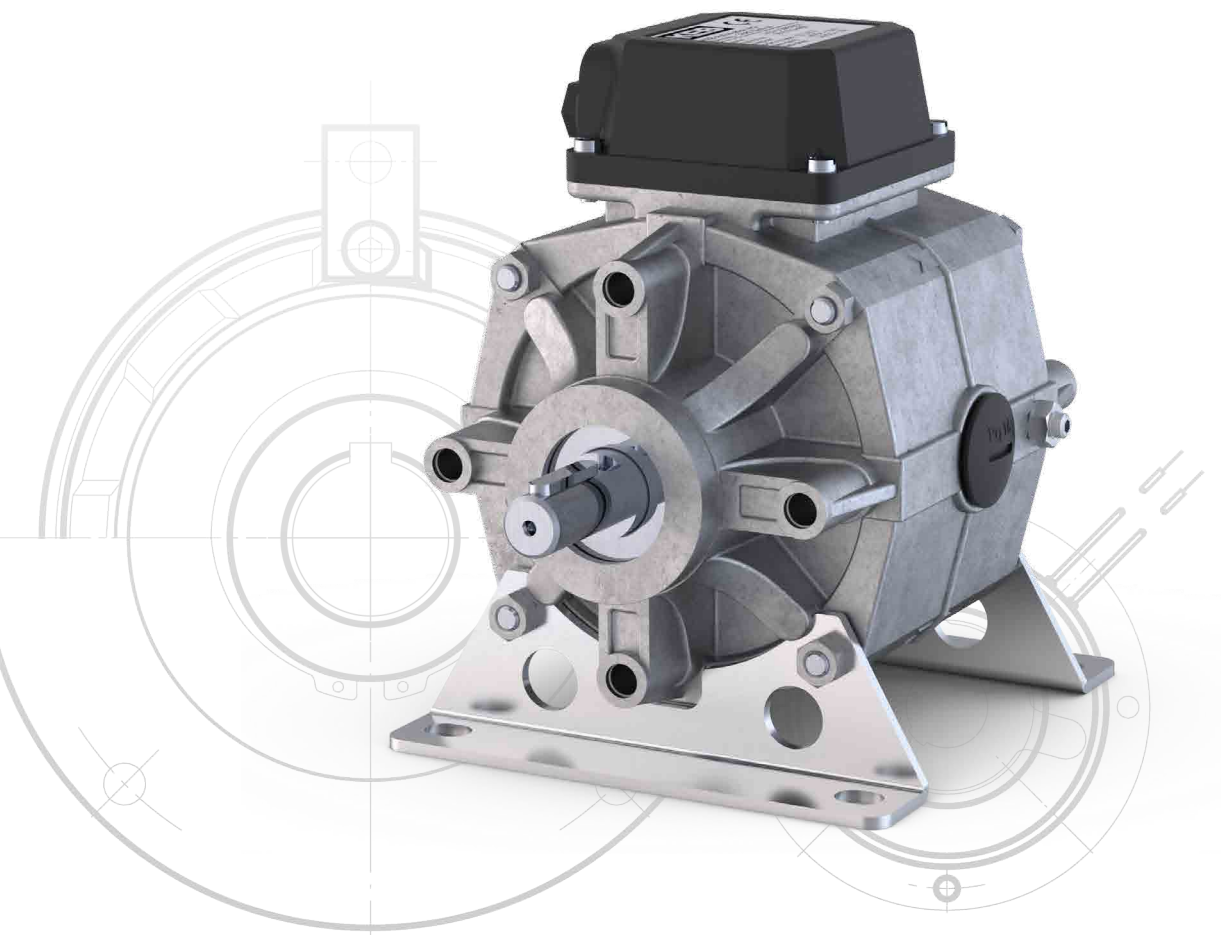




# **BRAKES & CLUTCHES**

COMBIBOX  
EN



## KEB AUTOMATION KG

All our efforts are directed towards the development, production and application of electromagnetic technology throughout our extensive range of brakes and clutches.

The functions, **starting, stopping, positioning and safe holding** of moving axes in machines and plant call for reliably designed and safely functioning components.

With our advanced manufacturing techniques we are able to produce high quality, high-grade products, and through our continued investment we now have manufacturing plants worldwide. We have the ability to produce high volume stock parts or ones that are tailored specifically to your requirements.

# PROGRAM SCHEDULE

## COMBIBOX CLUTCH-BRAKE-COMBINATION TYPE 10 / 09 / 06

|                                                                                                                  |             |
|------------------------------------------------------------------------------------------------------------------|-------------|
| with an energised to engage single sided clutch / brake                                                          | COMBIBOX 10 |
| with an energised to engage single sided clutch without brake                                                    | COMBIBOX 09 |
| with an energised to engage single sides clutch / and energised to disengage single sided permanent magnet brake | COMBIBOX 06 |

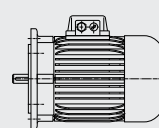
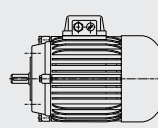
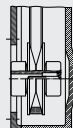
### TECHNICAL DATA

|                                                    |        |
|----------------------------------------------------|--------|
| COMBIBOX shaft in / shaft out                      | page 5 |
| COMBIBOX bore in / bore out                        | page 6 |
| COMBIBOX bore in / shaft out                       | page 7 |
| COMBIBOX shaft in / bore out                       | page 8 |
| Moments of inertia, friction work and calculations | page 9 |

On request we adapt the COMBIBOX to your constructional and electrical requirements.

## DESIGN ATTACHMENTS

Input



Output

360 / 370

380 / 390

460 / 470

440

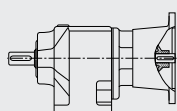


570 / 580

410 / 430

450 / 480

670

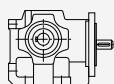


490

500

510

520

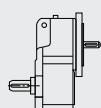


530 / 540

550 / 560

590 / 600

610



620 / 630

640 / 660

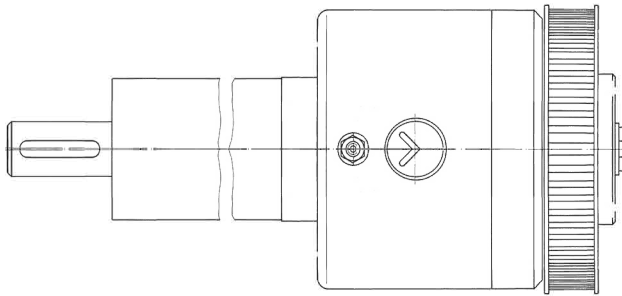
680 / 690

700

800

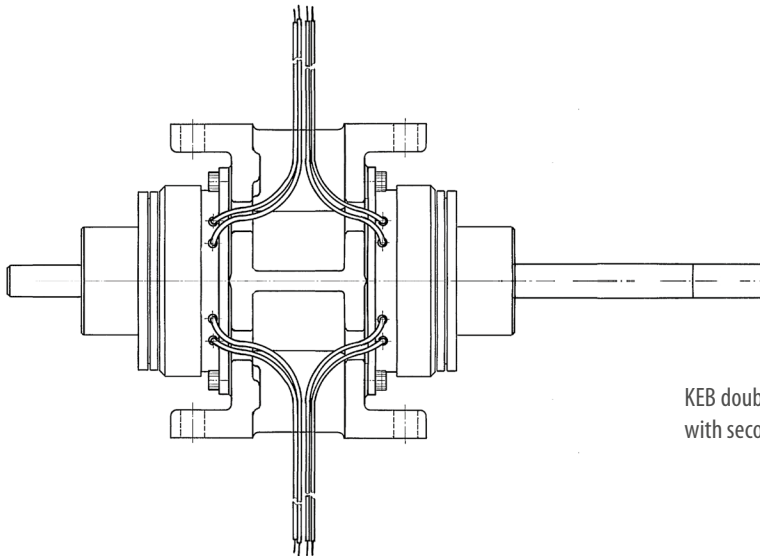


## COMBIBOX PROJECT SOLUTIONS

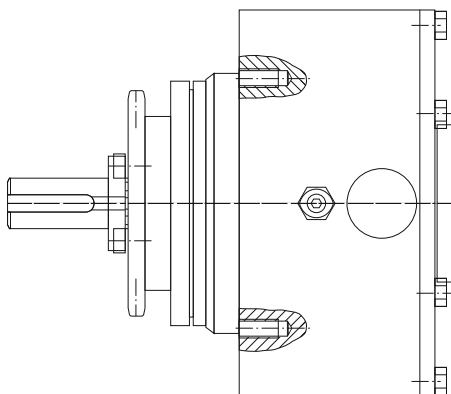


### READY FOR INSTALLATION

Compact COMBIBOX with customized housing and sprockets for cycled machine processes.



KEB double clutch for engaging and disengaging the motor together with secondary attachments.



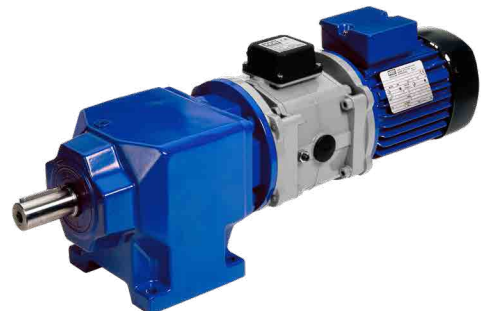
Ready installed KEB COMBIBOX for clutching and breaking a pulley.

The COMBIBOX is a ready to install electromagnetic actuated clutch-brake module in a single housing.

The modular system is designed for a multitude of variants; these covering most of the applications in the field.

The patented adjustment procedure permits an air gap readjustment in it's installed condition. Thus giving a greater lifetime of the wear affected components.

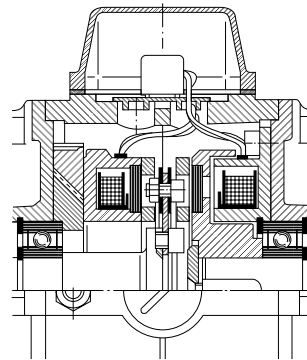
The units designed for Start-Stop-operation considerably reduce the energy consumption due to a continuously running drive.



## TYPE 10

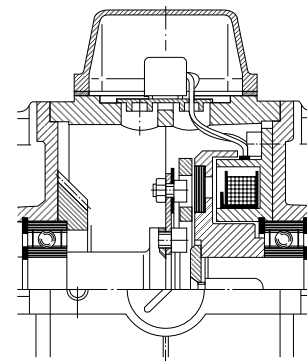
has an energise to engage single sided brake, this is the most commonly used, permitting high switching frequency and good positioning accuracy. The COMBITRON rapid switch can be used with this variant to achieve exceptionally high switching frequencies.

The rated torque of both clutch and brake are identical.



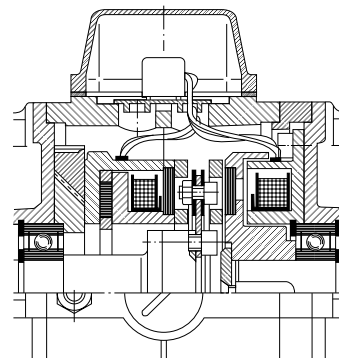
## TYPE 09

is the COMBIBOX version without brake, i.e. an electrical clutch in a housing for the use between e.g. motor and gear unit.



## TYPE 06

has an energise to disengage permanent magnet single-side brake. The characteristic of this variant is that the position of the output shaft is kept safe and backlash-free in currentless condition. The rated torque of the brake is slightly lower than that of the clutch.



# COMBIBOX SHAFT IN / SHAFT OUT

| SIZE | a <sub>3</sub> | a <sub>4</sub> | a <sub>7</sub> | b       | c | e   | f <sub>2</sub> | f <sub>5</sub> | g   | h   | h <sub>1</sub> | i    | k       | k <sub>1</sub> | n  | s  | s <sub>2</sub> | u  | Shaft          |       | Weight<br>[kg] |
|------|----------------|----------------|----------------|---------|---|-----|----------------|----------------|-----|-----|----------------|------|---------|----------------|----|----|----------------|----|----------------|-------|----------------|
|      |                |                |                |         |   |     |                |                |     |     |                |      |         |                |    |    |                |    | d <sub>1</sub> | l     |                |
| 06   | 80             | 100/109        | 85             | 115/124 | 3 | 72  | 100            | 10             | 103 | 63  | 87             | 18.4 | 137/146 | 117/126        | 18 | 7  | M6             | 44 | 11 14          | 23 30 | 2.8/2.9        |
| 07   | 105            | 115/125        | 110            | 138/148 | 3 | 90  | 130            | 10             | 125 | 71  | 94             | 22.7 | 160/170 | 140/150        | 25 | 9  | M8             | 50 | 14 19          | 30 40 | 3.9/4.1        |
| 08   | 130            | 135/147        | 140            | 160/172 | 4 | 112 | 160            | 12             | 158 | 90  | 108            | 30.6 | 196/208 | 172/184        | 28 | 9  | M8             | 62 | 19 24          | 40 50 | 7.7/8.7        |
| 09   | 150            | 155/169        | 160            | 180/194 | 5 | 137 | 180            | 14             | 185 | 100 | 129            | 34.4 | 224/238 | 196/210        | 30 | 11 | M10            | 74 | 24 28          | 50 60 | 12.5/15.0      |
| 10   | 185            | 185/202        | 195            | 215/232 | 6 | 175 | 223            | 18             | 236 | 132 | 154            | 50.6 | 286/303 | 250/267        | 38 | 13 | M12            | 95 | 28             | 60    | 22.5/28.0      |
| 11   | upon request   |                |                |         |   |     |                |                |     |     |                |      |         |                |    |    |                |    |                |       |                |

Alle dimensions in mm keyways according to DIN 6885/1 centerings D according DIN 332/2 standard voltage 24 V DC VDE 0580, ISO-class „B“

## Rated torques type 10 / 09 / 06

| SIZE                               |        | 06      | 07      | 08      | 09      | 10        | 11      |
|------------------------------------|--------|---------|---------|---------|---------|-----------|---------|
| T <sub>2N</sub> <sup>1)</sup> [Nm] | clutch | 7       | 15      | 30      | 65      | 130       | 250 / - |
|                                    | brake  | 7 / 6   | 15 / 12 | 30 / 24 | 65 / 50 | 130 / 120 | 250 / - |
| P <sub>20</sub> [W]                | clutch | 15      | 20      | 28      | 35      | 50        | 68 / -  |
|                                    | brake  | 12 / 13 | 16 / 21 | 21 / 20 | 28 / 30 | 38 / 50   | 50 / -  |

<sup>1)</sup> rated torque after running in process

variations type 06 (marked in red)

## PART NO.

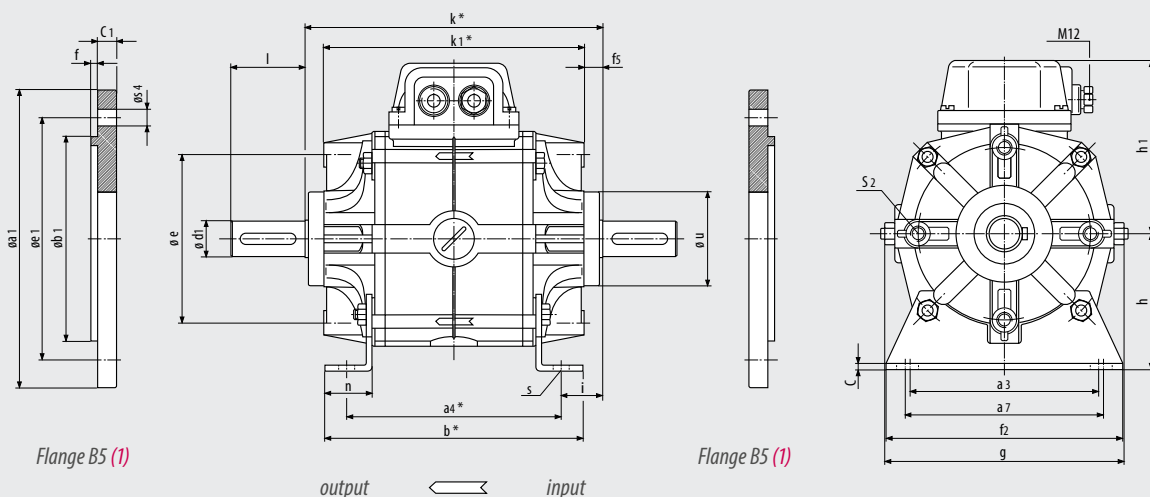
|          | feet | input<br>flange<br>B5 (1) | output<br>flange<br>B5 (1) |
|----------|------|---------------------------|----------------------------|
| -----360 |      |                           |                            |
| -----370 | X    |                           |                            |
| -----380 |      | X                         |                            |
| -----390 | X    | X                         |                            |
| -----410 |      | X                         | X                          |
| -----430 | X    | X                         | X                          |
| -----570 |      |                           | X                          |
| -----580 | X    |                           | X                          |
| Design   |      |                           |                            |
| Type     |      |                           |                            |
| Size     |      |                           |                            |

## ORDERING EXAMPLE:

Size 06 10 430 Design  
Type  
V DC, Ø a<sub>r</sub>, Ø d<sub>1</sub> ?

## Ordering specification:

- part number
- diameter of input-side flange
- diameter of input-side shaft
- diameter of output-side shaft
- diameter of output-side flange
- operating voltage of COMBIBOX
- flange dimensions on page 11



Flange dimensions page 11

| SIZE | a <sub>3</sub> | a <sub>4</sub> | a <sub>5</sub> | a <sub>7</sub> | b       | b <sub>4</sub><br>h8 | c | d <sub>2</sub><br>G7 <sub>max</sub> | d <sub>3</sub><br>G7 <sub>max</sub> | e <sub>3</sub> | f <sub>2</sub> | f <sub>6</sub> |  |  |  | Preferred bores<br>d <sub>2</sub> and d <sub>3</sub> |
|------|----------------|----------------|----------------|----------------|---------|----------------------|---|-------------------------------------|-------------------------------------|----------------|----------------|----------------|--|--|--|------------------------------------------------------|
| 06   | 80             | 100/109        | 104            | 85             | 115/124 | 60                   | 3 | 15                                  | 15                                  | 108            | 100            | 4              |  |  |  | 11 or 14                                             |
| 07   | 105            | 115/125        | 123            | 110            | 138/148 | 70                   | 3 | 24                                  | 24                                  | 128            | 130            | 4              |  |  |  | 14 or 19                                             |
| 08   | 130            | 135/147        | 155            | 140            | 160/172 | 80                   | 4 | 28                                  | 28                                  | 165            | 160            | 4              |  |  |  | 19 or 24                                             |
| 09   | 150            | 155/169        | 178            | 160            | 180/194 | 95                   | 5 | 35                                  | 35                                  | 190            | 180            | 5              |  |  |  | 24 or 28                                             |
| 10   | 185            | 185/202        | 229            | 195            | 215/232 | 110                  | 6 | 42                                  | 42                                  | 242            | 223            | 5              |  |  |  | 28                                                   |
| 11   | on request     |                |                |                |         |                      |   |                                     |                                     |                |                |                |  |  |  |                                                      |

Alle dimensions in mm keyways according to DIN 6885/1 centerings D according DIN 332/2 standard voltage 24 V DC VDE 0580, ISO-class „B“

| SIZE | g          | h   | h <sub>1</sub> | k <sub>4</sub> | l <sub>1</sub> | l <sub>2</sub> | l <sub>3</sub> | n  | s  | s <sub>6</sub> | v  | a  |  |  |  | Weight<br>[kg] |
|------|------------|-----|----------------|----------------|----------------|----------------|----------------|----|----|----------------|----|----|--|--|--|----------------|
| 06   | 103        | 63  | 87             | 101/110        | 50             | 57             | 9              | 18 | 7  | 5.5            | 30 | 60 |  |  |  | 2.7 / 3.1      |
| 07   | 125        | 71  | 94             | 108/118        | 52             | 61             | 9              | 25 | 9  | 6.5            | 35 | 60 |  |  |  | 3.7 / 4.5      |
| 08   | 158        | 90  | 108            | 132/144        | 63,5           | 75             | 11             | 28 | 9  | 8.5            | 45 | 64 |  |  |  | 7.5 / 8.9      |
| 09   | 185        | 100 | 129            | 153/167        | 74             | 86             | 13             | 30 | 11 | 8.5            | 50 | 62 |  |  |  | 12.0 / 14.5    |
| 10   | 236        | 132 | 154            | 175/192        | 86             | 102            | 17             | 38 | 13 | 10.5           | 70 | 60 |  |  |  | 20 / 25.5      |
| 11   | on request |     |                |                |                |                |                |    |    |                |    |    |  |  |  |                |

variations type 06 (marked in red) <sup>1)</sup> Nominal torque after running-in

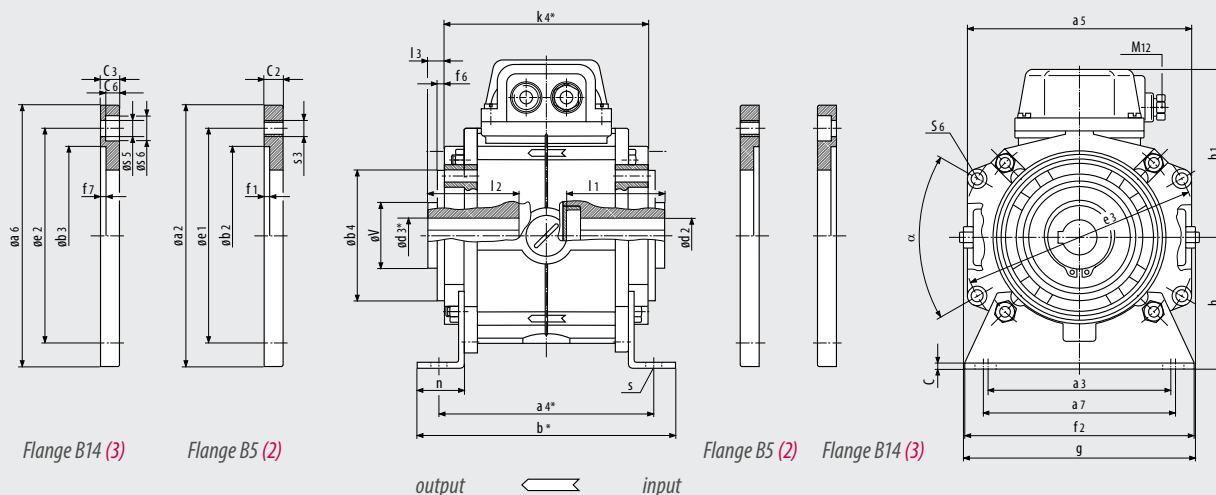
| PART NO. | feet | input flange |         | output flange |         |
|----------|------|--------------|---------|---------------|---------|
|          |      | B5 (2)       | B14 (3) | B5 (2)        | B14 (3) |
| -----510 |      |              | X       | X             |         |
| -----520 |      | X            |         | X             |         |
| -----590 |      |              | X       |               | X       |
| -----600 | X    |              | X       |               | X       |
| -----610 |      | X            |         |               | X       |
| -----680 |      |              |         |               |         |
| -----690 | X    |              |         |               |         |
| Design   |      |              |         |               |         |
| Type     |      |              |         |               |         |
| Size     |      |              |         |               |         |

## ORDERING EXAMPLE:

Size 06 10 600 Design  
Type  
V DC, Ø a<sub>r</sub>, Ø d<sub>1</sub> ?

## Ordering specification:

- part number
- diameter of input-side flange
- diameter of input-side shaft
- diameter of output-side shaft
- diameter of output-side flange
- operating voltage of COMBIBOX
- flange dimensions on page 11



Flange dimensions page 11

# COMBIBOX BORE IN / SHAFT OUT

## SIZE

|    | a <sub>3</sub> | a <sub>4</sub> | a <sub>5</sub> | a <sub>7</sub> | b       | b <sub>4</sub><br>h8 | c | d <sub>2+3</sub><br>G7 <sub>max</sub> | e   | e <sub>3</sub> | f <sub>2</sub> | f <sub>5</sub> | f <sub>6</sub> | g   | h   |
|----|----------------|----------------|----------------|----------------|---------|----------------------|---|---------------------------------------|-----|----------------|----------------|----------------|----------------|-----|-----|
| 06 | 80             | 100/109        | 104            | 85             | 115/124 | 60                   | 3 | 15                                    | 72  | 108            | 100            | 10             | 4              | 103 | 63  |
| 07 | 105            | 115/125        | 123            | 110            | 138/148 | 70                   | 3 | 24                                    | 90  | 128            | 130            | 10             | 4              | 125 | 71  |
| 08 | 130            | 135/147        | 155            | 140            | 160/172 | 80                   | 4 | 28                                    | 112 | 165            | 160            | 12             | 4              | 158 | 90  |
| 09 | 150            | 155/169        | 178            | 160            | 180/194 | 95                   | 5 | 35                                    | 137 | 190            | 180            | 14             | 5              | 185 | 100 |
| 10 | 185            | 185/202        | 229            | 195            | 215/232 | 110                  | 6 | 42                                    | 175 | 242            | 223            | 18             | 5              | 236 | 132 |
| 11 | upon request   |                |                |                |         |                      |   |                                       |     |                |                |                |                |     |     |

Alle dimensions in mm keyways according to DIN 6885/1 centerings D according DIN 332/2 standard voltage 24 V DC VDE 0580, ISO-class „B“ variations type 06 (marked in red) <sup>1)</sup> rated torque after running in process

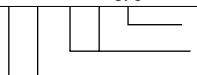
## Rated torques type 10 / 09 / 06

| SIZE                               |        | 06      | 07      | 08      | 09      | 10        | 11      |
|------------------------------------|--------|---------|---------|---------|---------|-----------|---------|
| M <sub>2N</sub> <sup>1)</sup> [Nm] | Clutch | 7       | 15      | 30      | 65      | 130       | 250 / - |
|                                    | Brake  | 7 / 6   | 15 / 12 | 30 / 24 | 65 / 50 | 130 / 120 | 250 / - |
| P <sub>20</sub> [W]                | Clutch | 15      | 20      | 28      | 35      | 50        | 68 / -  |
|                                    | Brake  | 12 / 13 | 16 / 21 | 21 / 20 | 28 / 30 | 38 / 50   | 50 / -  |

variations type 06 (marked in red) <sup>1)</sup> rated torque after running in process

## PART NO.

| feet | input<br>flange<br>B5 (2) B14 (3) | outout<br>flange<br>B5 (1) |
|------|-----------------------------------|----------------------------|
| 440  | X                                 | X                          |
| 450  |                                   | X                          |
| 460  |                                   | X                          |
| 470  | X                                 | X                          |
| 480  | X                                 | X                          |
| 640  |                                   |                            |
| 660  | X                                 |                            |
| 670  | X                                 | X                          |



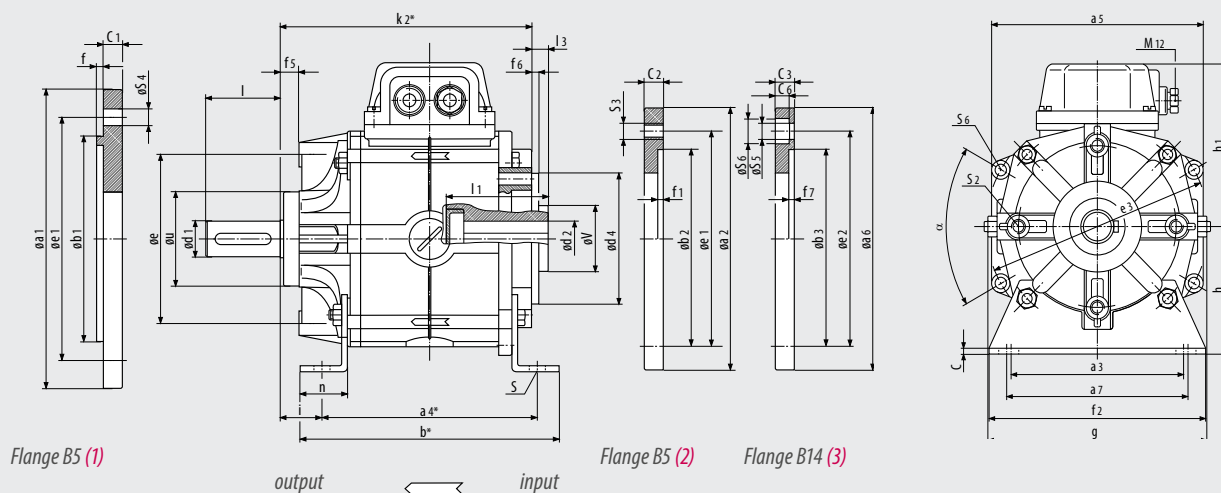
Design  
Type  
Size

## ORDERING EXAMPLE:

Size **06** **10** **450** Design  
Type  
V DC, Ø a<sub>6</sub>, Ø a<sub>7</sub>, Ø d<sub>1</sub> ?

## Ordering specification:

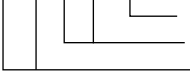
- part number
- diameter of input-side flange
- diameter of input-side bore
- diameter of output-side bore
- diameter of output-side flange
- operating voltage of COMBIBOX
- flange dimensions on page 11



Flange dimensions page 11

|                |      |                |                |                |    |    |                |                |         |    |    | Preferential-bore                 | Shaft                |          | Weight    |
|----------------|------|----------------|----------------|----------------|----|----|----------------|----------------|---------|----|----|-----------------------------------|----------------------|----------|-----------|
| h <sub>1</sub> | i    | k <sub>2</sub> | l <sub>1</sub> | l <sub>3</sub> | n  | s  | s <sub>2</sub> | s <sub>6</sub> | u<br>h8 | v  | α  | d <sub>2</sub> und d <sub>3</sub> | d <sub>1</sub><br>k6 | l        | [kg]      |
| 87             | 18.4 | 119/128        | 50             | 9              | 18 | 7  | M6             | 5.5            | 44      | 30 | 60 | 11 oder 14                        | 11<br>14             | 23<br>30 | 2.8/3.1   |
| 94             | 22.7 | 134/144        | 52             | 9              | 25 | 9  | M8             | 6.5            | 50      | 35 | 60 | 14 oder 19                        | 14<br>19             | 30<br>40 | 3.9/4.5   |
| 108            | 30.6 | 164/176        | 63,5           | 11             | 28 | 9  | M8             | 8.5            | 62      | 45 | 64 | 19 oder 24                        | 19<br>24             | 40<br>50 | 7.7/8.9   |
| 129            | 34.4 | 189/203        | 74             | 13             | 30 | 11 | M10            | 8.5            | 74      | 50 | 62 | 24 oder 28                        | 24<br>28             | 50<br>60 | 12.5/14.5 |
| 154            | 50.6 | 231/248        | 86             | 17             | 38 | 13 | M12            | 10.5           | 95      | 70 | 60 | 28                                | 28                   | 60       | 22.5/26.0 |

Nominal torque after running-in

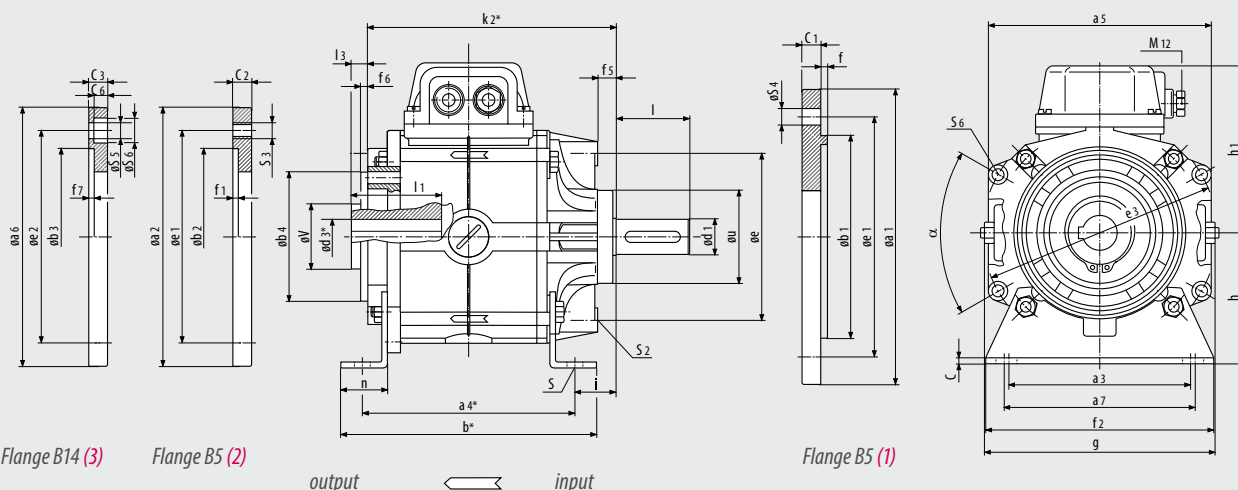
| PART NO.                                                                            |     | feet   | input<br>flange<br>B5 (1) | output<br>flange |         |
|-------------------------------------------------------------------------------------|-----|--------|---------------------------|------------------|---------|
|                                                                                     |     |        |                           | B5 (2)           | B14 (3) |
| -----                                                                               | 490 |        |                           | X                |         |
| -----                                                                               | 500 |        | X                         | X                |         |
| -----                                                                               | 530 |        |                           |                  | X       |
| -----                                                                               | 540 | X      |                           |                  | X       |
| -----                                                                               | 550 |        | X                         |                  | X       |
| -----                                                                               | 560 | X      | X                         |                  | X       |
| -----                                                                               | 620 |        |                           |                  |         |
| -----                                                                               | 630 | X      |                           |                  |         |
|  |     | Design |                           |                  |         |
|                                                                                     |     | Type   |                           |                  |         |
|                                                                                     |     | Size   |                           |                  |         |

**ORDERING EXAMPLE:**

| Size                         | 06 | 10 | 500 | Design |
|------------------------------|----|----|-----|--------|
| Typ                          |    |    |     |        |
| V DC, Ø a1, Ø d1, Ø a2, Ø d3 |    |    |     | ?      |

**Ordering specification:**

- part number
- diameter of input-side flange
- diameter of input-side bore
- diameter of output-side shaft
- diameter of output-side flange
- operating voltage of COMBIBOX
- flange dimensions on page 11



Flange dimensions page 11

# COMBIBOX TECHNICAL DATA

## COMBIBOX 06 / 09 / 10

| Size          | Type     |          |                          | 06    | 07    | 08    | 09    | 10    | 11    |
|---------------|----------|----------|--------------------------|-------|-------|-------|-------|-------|-------|
| $T_{2N}^{2)}$ | Clutch   | 06/09/10 | [Nm]                     | 7     | 15    | 30    | 65    | 130   | 250   |
|               | Brake    | 10       |                          | 7     | 15    | 30    | 65    | 130   | 250   |
|               |          | 06       |                          | 6     | 12    | 24    | 50    | 120   |       |
| $P_{20}$      | Clutch   | 06/09/10 | [W]                      | 15    | 20    | 28    | 35    | 50    | 68    |
|               | Brake    | 10       |                          | 12    | 16    | 21    | 28    | 38    | 50    |
|               |          | 06       |                          | 13    | 21    | 20    | 30    | 50    |       |
| $J^{1)}$      | Rotor    | 06/09/10 | $[10^{-4} \text{kgm}^2]$ | 1.07  | 2.98  | 7.78  | 23.29 | 67.4  | 220   |
|               | Armature | 06/10    |                          | 0.84  | 2.62  | 8.59  | 23.08 | 91.07 | 330   |
|               | Armature | 09       |                          | 0.80  | 1.2   | 4.8   | 12.61 | 54.3  | 190   |
| $W_{Rmax}$    |          | 06/09/10 | $[10^3 \text{J}]$        | 1.9   | 3.1   | 4.8   | 7.5   | 12.5  | 20.0  |
| $W_{R0.1mm}$  | Clutch   | 06/09/10 | $[10^6 \text{J}]$        | 9.5   | 16.3  | 25.3  | 40.9  | 66.6  | 104   |
|               | Brake    | 06/10    |                          | 9.5   | 16.3  | 25.3  | 40.9  | 66.6  | 104   |
| $P_{Rmax.}$   | Clutch   | 06/09/10 | [J/s]                    | 81    | 114   | 161   | 228   | 323   | 458   |
|               | Brake    | 06/10    |                          | 59    | 80    | 114   | 164   | 236   | 339   |
| $X$           |          | 06/09/10 | [mm]                     | 0.2   | 0.3   | 0.35  | 0.35  | 0.4   | 0.5   |
| $X_n$         |          | 06/09/10 | [mm]                     | 0.4   | 0.6   | 0.7   | 0.7   | 0.8   | 1.0   |
| $n_{max}$     |          | 06/09/10 | [rpm]                    | 3,000 | 3,000 | 3,000 | 3,000 | 3,000 | 3,000 |

## SWITCHING TIMES

|        |    | Type 09/10 rated voltage [ms] |       |          |       | Type 06 rated voltage [ms] |       |       |       |
|--------|----|-------------------------------|-------|----------|-------|----------------------------|-------|-------|-------|
| Clutch |    | $t_{11}$                      | $t_1$ | $t_2$    | $t_1$ | $t_{11}$                   | $t_1$ | $t_2$ | $t_1$ |
| Brake  |    | $t_2$                         |       | $t_{11}$ | $t_1$ | $t_{11}$                   |       | $t_2$ | $t_1$ |
| Size   | 06 | 18                            | 55    | 15       | 45    | 20                         | 50    | 10    | 45    |
|        | 07 | 25                            | 95    | 20       | 60    | 25                         | 85    | 14    | 50    |
|        | 08 | 40                            | 125   | 30       | 110   | 40                         | 100   | 22    | 68    |
|        | 09 | 50                            | 200   | 40       | 160   | 50                         | 200   | 30    | 150   |
|        | 10 | 60                            | 250   | 45       | 220   | 85                         | 250   | 40    | 180   |
|        | 11 | 100                           | 300   | 80       | 260   |                            |       |       |       |

|               |                                                        |                     |          |                                            |      |  |
|---------------|--------------------------------------------------------|---------------------|----------|--------------------------------------------|------|--|
| $J^{1)}$      | = moment of inertia                                    | [kgm <sup>2</sup> ] | $t_1$    | = Engaging time,                           |      |  |
| $T_{2N}^{2)}$ | = rated torque after running in process                | [Nm]                |          | time until 0.9 $T_{2N}$ is reached         | [ms] |  |
| $P_R$         | = permissible friction per second                      | [J/s]               |          |                                            |      |  |
| $P_{20}$      | = power input at 20 °C                                 | [W]                 | $t_{11}$ | = Engaging delay time,                     |      |  |
| $W_R$         | = friction                                             | [J]                 |          | time until the armature is attracted       | [ms] |  |
| $W_{R0.1}$    | = friction work until an abrasion of 0,1 mm is reached | [J]                 |          |                                            |      |  |
| $X$           | = rated air gap                                        | [mm]                | $t_2$    | = Release time, time until the armature is |      |  |
| $X_n$         | = clearance at which a readjustment is recommended     | [mm]                |          | attracted to the opposing side.            | [ms] |  |

<sup>1)</sup> Sum of the moment of inertia reduced to the speed of the COMBIBOX plus the moment of inertia of the COMBIBOX parts to be accelerated or decelerated (J).

<sup>2)</sup> The rated torques listed are safely attained after a run-in phase at 100 rpm. In new condition and for substantially higher speeds the torques are possibly lower.

## POWER SUPPLY

COMBIBOX requires d.c. voltage for actuation. The rated voltage of the magnets is 24 V DC standard. For operation with rectifiers the magnets are available in other voltages on specification. The permanent-magnet brake installed in type 06 requires a smoothed supply voltage. To ensure a safe function in case of large temperature fluctuations, we recommend the supply of the coil with constant current.

# COMBIBOX FLANGE DIMENSIONS

| SIZE | IEC Ø <sup>1)</sup> | a1 (1)   | a2 (2) | a6 (3) | b1 (1)<br>h8 | b2 (2)<br>+0.3 +0.2 | b3 (3)<br>H8 | c1 (1) | c2 (2) | c3 (3) | c6 (3)                 |
|------|---------------------|----------|--------|--------|--------------|---------------------|--------------|--------|--------|--------|------------------------|
| 06   | 90                  | 90       | 120    | 120    | 60           | 60                  | 60           | 10     | 10     | 10     | 5.5                    |
|      | 105                 | 105      | 120    | 120    | 70           | 70                  | 70           | 10     | 10     | 10     | 6.5                    |
|      | 120                 | 120      | 120    | 120    | 80           | 80                  | 80           | 10     | 10     | 10     | 6.5                    |
|      | 140                 | 140      | 140    | 140    | 95           | 95                  | 95           | 10     | 10     | 12     | 8.0                    |
|      | 160                 | 160      | 160    | 160    | 110          | 110                 | 110          | 10     | 12     | 12     | 8.0                    |
| 07   | 105                 | 110      | 120    | 120    | 70           | 70                  | 70           | 10     | 10     | 10     | 6.5                    |
|      | 120                 | 120      | 120    | 120    | 80           | 80                  | 80           | 10     | 10     | 10     | 6.5                    |
|      | 140                 | 140      | 140    | 140    | 95           | 95                  | 95           | 10     | 10     | 10     | 6.0                    |
|      | 160                 | 160      | 160    |        | 110          | 110                 |              | 10     | 12     |        | 6.0                    |
|      | 200                 | 200      | 200    |        | 130          | 130                 |              | 10     | 14     |        | 8.0                    |
| 08   | 120                 | 130      | -      | 160    | 80           |                     | 80           | 12     |        | 12     | 6.5                    |
|      | 140                 | 140      | 160    | 160    | 95           | 95                  | 95           | 12     | 12     | 12     | 6.0                    |
|      | 160                 | 160      | 160    | 160    | 110          | 110                 | 110          | 12     | 12     | 12     | 6.0                    |
|      | 200                 | 200      | 200    | 200    | 130          | 130                 | 130          | 12     | 14     | 14     | 7.0                    |
|      | 250                 | 250      | 250    | -      | 180          | 180                 |              | 12     | 14     |        |                        |
| 09   | 140                 | 160      | 160    | 160    | 95           | 95                  | 95           | 14     | 14     | 14     | 9.0                    |
|      | 160                 | 160      | 160    | 160    | 110          | 110                 | 110          | 14     | 14     | 14     | 9.0                    |
|      | 200                 | 200      | 200    | 200    | 130          | 130                 | 130          | 14     | 14     | 14     |                        |
|      | 250                 | 250      | 250    | 250    | 180          | 180                 | 180          | 14     | 14     | 14     |                        |
| 10   | 160                 | -        | 200    | 200    |              | 110                 | 110          |        | 18     | 18     | 9.0                    |
|      | 200                 | 210      | 200    | 200    | 130          | 130                 | 130          | 18     | 18     | 18     | 8.0                    |
|      | 250                 | 250      | 250    |        | 180          | 180                 |              | 18     | 18     |        |                        |
|      | 300                 | 300      | 300    |        | 230          | 230                 |              | 18     | 18     |        |                        |
|      | 350                 | 350      |        |        | 250          |                     |              | 20     |        |        |                        |
| 11   | 250                 | 250      | 268    |        | 180          | 180                 |              | 20     | 25     |        |                        |
|      | 300                 | 300      | 300    |        | 230          | 230                 |              | 20     | 25     |        |                        |
|      | 350                 | 350      | 350    |        | 250          | 250                 |              | 20     | 25     |        |                        |
| SIZE | IEC Ø <sup>1)</sup> | e1 (1+2) | e2 (3) | f (1)  | f1 (2)       | f7 (3)              | s3 (2)       | s4 (1) | s5(3)  | s6 (3) | Weight (1/2/3)<br>[kg] |
| 06   | 90                  | 75       | 75     | 2.5    | 3            | 3                   | M5           | 5.5    | 5.5    | 10     | 0.16                   |
|      | 105                 | 85       | 85     | 2.5    | 3.5          | 3                   | M6           | 7.0    | 6.5    | 11     | 0.17                   |
|      | 120                 | 100      | 100    | 3      | 3.5          | 3.5                 | M6           | 6.5    | 6.5    | 11     | 0.2                    |
|      | 140                 | 115      | 115    | 3      | 3.5          | 3.5                 | M8           | 9      | 8.5    | 14     | 0.28                   |
|      | 160                 | 130      | 130    | 3.5    | 4            | 4                   | M8           | 9      | 8.5    | 14     | 0.45                   |
| 07   | 105                 | 85       | 85     | 2.5    | 3.5          | 3                   | M6           | M6     | 6.5    | 11     | 0.21                   |
|      | 120                 | 100      | 100    | 3      | 3.5          | 3.5                 | M6           | 6.5    | 6.5    | 11     | 0.22                   |
|      | 140                 | 115      | 115    | 3      | 3.5          | 3.5                 | M8           | 9      | 9      | 14     | 0.3                    |
|      | 160                 | 130      |        | 3.5    | 4            |                     | M8           | 9      |        | 14     | 0.33                   |
|      | 200                 | 165      |        | 3.5    | 4            |                     | M10          | 11     |        | 18     | 0.55                   |
| 08   | 120                 | 100      | 100    | 3      |              | 3.5                 |              | 7      | 6.5    | 11     | 0.45                   |
|      | 140                 | 115      | 115    | 3      | 3.5          | 3.5                 | M8           | 9      | 9      | 14     | 0.48                   |
|      | 160                 | 130      | 130    | 3.5    | 4            | 4                   | M8           | 9      | 9      | 14     | 0.5                    |
|      | 200                 | 165      | 165    | 3.5    | 4            | 4.5                 | M10          | 11     | 14     | 18     | 0.8                    |
|      | 250                 | 215      | 215    | 4      | 4.5          |                     | M12          | 14     |        |        | 1.4                    |
| 09   | 140                 | 115      | 115    | 3      |              | 3.5                 |              | 9      | 9      | 15     | 0.5                    |
|      | 160                 | 130      | 130    | 3.5    | 4            | 4                   | M8           | 9      | 9      | 15     | 0.55                   |
|      | 200                 | 165      | 165    | 3.5    | 4            | 4                   | M10          | 11     | 11     |        | 0.63                   |
|      | 250                 | 215      | 215    | 4      | 4.5          | 4.5                 | M12          | 14     | 14     |        | 0.95                   |
| 10   | 200                 | 165      | 165    | 4      | 4.5          | 4                   | M10          | 11     | 11     | 18     | 1.1                    |
|      | 250                 | 215      |        | 4      | 4.5          |                     | M12          | 14     |        |        | 1.2                    |
|      | 300                 | 265      |        | 4      | 5            |                     | M12          | 14     |        |        | 1.25                   |
|      | 350                 | 300      |        | 5      |              |                     |              | 18     |        |        | 6.5                    |
| 11   | 250                 | 215      |        | 4      | 4.5          |                     | M12          | 14     |        |        |                        |
|      | 300                 | 265      |        | 4      | 4.5          |                     | M12          | 14     |        |        |                        |
|      | 350                 | 300      |        | 5      | 5.5          |                     | M16          | 18     |        |        |                        |

<sup>1)</sup> according DIN IEC 34  standard flange



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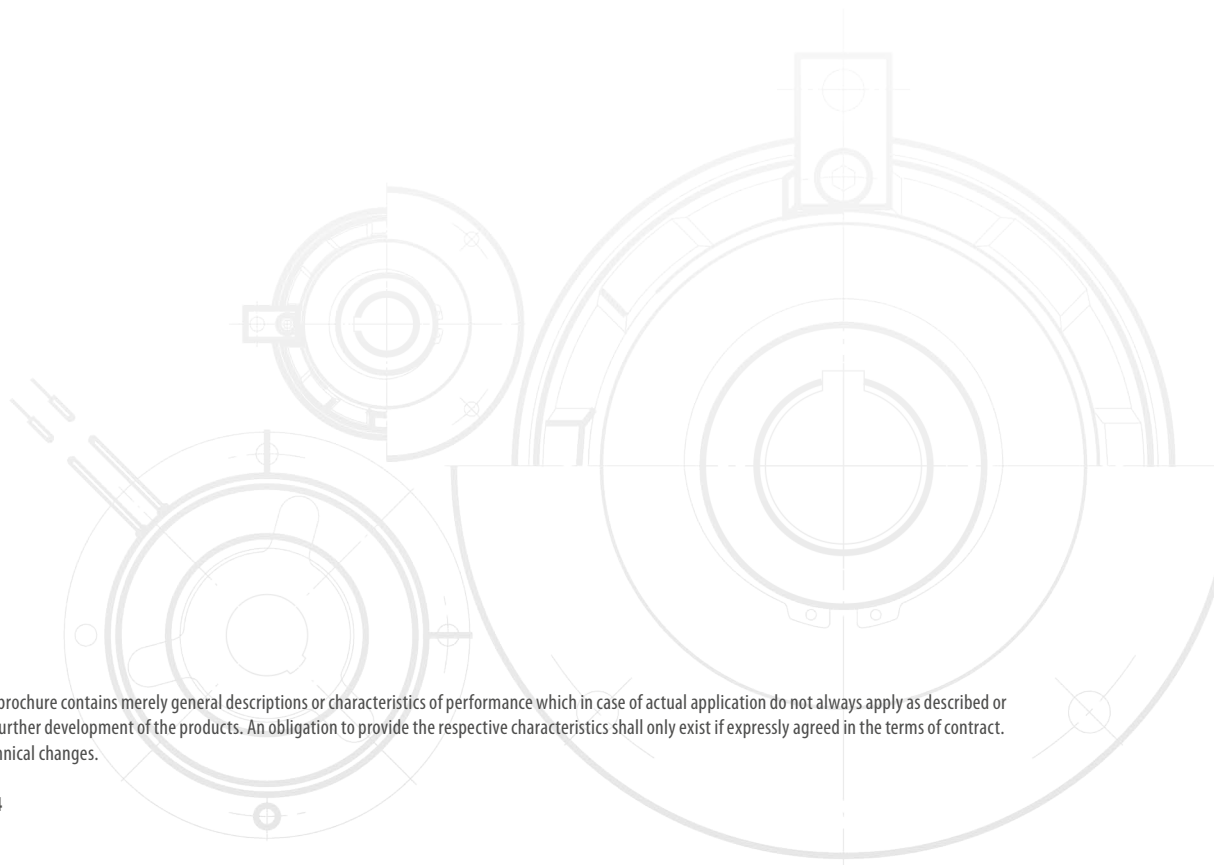
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