

# [MODEL CODING SYSTEM]



## GEARHEAD

|          |          |          |            |          |          |
|----------|----------|----------|------------|----------|----------|
| <b>K</b> | <b>8</b> | <b>G</b> | <b>100</b> | <b>B</b> | <b>F</b> |
|----------|----------|----------|------------|----------|----------|

| <b>INITIAL</b><br>K-SERIES | <table border="1"> <tr> <th colspan="2">FLANGE SIZE</th> </tr> <tr> <td>6</td> <td>60 X 60</td> </tr> <tr> <td>7</td> <td>70 X 70</td> </tr> <tr> <td>8</td> <td>80 X 80</td> </tr> <tr> <td>9</td> <td>90 X 90</td> </tr> </table> | FLANGE SIZE |  | 6 | 60 X 60 | 7 | 70 X 70 | 8 | 80 X 80 | 9 | 90 X 90 | <table border="1"> <tr> <th colspan="2">GEAR TYPE</th> </tr> <tr> <td>G</td> <td>GENERAL</td> </tr> <tr> <td>P</td> <td>POWERFUL</td> </tr> <tr> <td>H</td> <td>HIGH STRENGTH</td> </tr> </table> | GEAR TYPE |  | G | GENERAL | P | POWERFUL | H | HIGH STRENGTH | <table border="1"> <tr> <th colspan="2">RATIO</th> </tr> <tr> <td>3</td> <td>1/3</td> </tr> <tr> <td>5</td> <td>1/5</td> </tr> <tr> <td>:</td> <td>:</td> </tr> <tr> <td>250</td> <td>1/250</td> </tr> </table> | RATIO |  | 3 | 1/3 | 5 | 1/5 | : | : | 250 | 1/250 | <table border="1"> <tr> <th colspan="2">BEARING</th> </tr> <tr> <td>B</td> <td>BALL BEARING</td> </tr> <tr> <td>M</td> <td>METAL</td> </tr> <tr> <td>C</td> <td>COMPOUND</td> </tr> </table> | BEARING |  | B | BALL BEARING | M | METAL | C | COMPOUND | <table border="1"> <tr> <th colspan="2">SHAFT TYPE</th> </tr> <tr> <td>NON</td> <td>BOX TYPE</td> </tr> <tr> <td>F</td> <td>FLANGE</td> </tr> <tr> <td>U</td> <td>ULTRA BOX</td> </tr> <tr> <td>UF</td> <td>ULTRA FLANGE</td> </tr> <tr> <td>RH</td> <td>RIGHT ANGLE ( HOLLOW SHAFT )</td> </tr> <tr> <td>RS</td> <td>RIGHT ANGLE ( SOLID SHAFT )</td> </tr> </table> | SHAFT TYPE |  | NON | BOX TYPE | F | FLANGE | U | ULTRA BOX | UF | ULTRA FLANGE | RH | RIGHT ANGLE ( HOLLOW SHAFT ) | RS | RIGHT ANGLE ( SOLID SHAFT ) |
|----------------------------|---|-------------|--|---|---------|---|---------|---|---------|---|---------|---|-----------|--|---|---------|---|----------|---|---------------|---|-------|--|---|-----|---|-----|---|---|-----|-------|--|---------|--|---|--------------|---|-------|---|----------|---|------------|--|-----|----------|---|--------|---|-----------|----|--------------|----|------------------------------|----|-----------------------------|
| FLANGE SIZE                |   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| 6                          | 60 X 60   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| 7                          | 70 X 70   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| 8                          | 80 X 80   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| 9                          | 90 X 90   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| GEAR TYPE                  |   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| G                          | GENERAL   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| P                          | POWERFUL  |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| H                          | HIGH STRENGTH   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| RATIO                      |   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| 3                          | 1/3   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| 5                          | 1/5   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| :                          | :   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| 250                        | 1/250   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| BEARING                    |   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| B                          | BALL BEARING  |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| M                          | METAL   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| C                          | COMPOUND  |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| SHAFT TYPE                 |   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| NON                        | BOX TYPE  |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| F                          | FLANGE  |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| U                          | ULTRA BOX   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| UF                         | ULTRA FLANGE  |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| RH                         | RIGHT ANGLE ( HOLLOW SHAFT )  |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |
| RS                         | RIGHT ANGLE ( SOLID SHAFT )   |             |  |   |         |   |         |   |         |   |         |   |           |  |   |         |   |          |   |               |   |       |  |   |     |   |     |   |   |     |       |  |         |  |   |              |   |       |   |          |   |            |  |     |          |   |        |   |           |    |              |    |                              |    |                             |

## DECIMAL GEARHEAD

|          |          |          |           |          |          |
|----------|----------|----------|-----------|----------|----------|
| <b>K</b> | <b>8</b> | <b>G</b> | <b>10</b> | <b>B</b> | <b>X</b> |
|----------|----------|----------|-----------|----------|----------|

| <b>INITIAL</b><br>K-SERIES | <table border="1"> <tr> <th colspan="2">FLANGE SIZE</th> </tr> <tr> <td>6</td> <td>60 X 60</td> </tr> <tr> <td>7</td> <td>70 X 70</td> </tr> <tr> <td>8</td> <td>80 X 80</td> </tr> <tr> <td>9</td> <td>90 X 90</td> </tr> </table> | FLANGE SIZE |  | 6 | 60 X 60 | 7 | 70 X 70 | 8 | 80 X 80 | 9 | 90 X 90 | <table border="1"> <tr> <th colspan="2">GEAR TYPE</th> </tr> <tr> <td>G</td> <td>GENERAL</td> </tr> <tr> <td>P</td> <td>POWERFUL</td> </tr> </table> | GEAR TYPE |  | G | GENERAL | P | POWERFUL | <table border="1"> <tr> <th colspan="2">RATIO</th> </tr> <tr> <td>10</td> <td>1/10</td> </tr> </table> | RATIO |  | 10 | 1/10 | <table border="1"> <tr> <th colspan="2">BEARING</th> </tr> <tr> <td>B</td> <td>BALL BEARING</td> </tr> </table> | BEARING |  | B | BALL BEARING | <table border="1"> <tr> <th colspan="2">SHAFT TYPE</th> </tr> <tr> <td>X</td> <td>DECIMAL</td> </tr> </table> | SHAFT TYPE |  | X | DECIMAL |
|----------------------------|---|-------------|--|---|---------|---|---------|---|---------|---|---------|--|-----------|--|---|---------|---|----------|--|-------|--|----|------|---|---------|--|---|--------------|---|------------|--|---|---------|
| FLANGE SIZE                |   |             |  |   |         |   |         |   |         |   |         |  |           |  |   |         |   |          |  |       |  |    |      |   |         |  |   |              |   |            |  |   |         |
| 6                          | 60 X 60   |             |  |   |         |   |         |   |         |   |         |  |           |  |   |         |   |          |  |       |  |    |      |   |         |  |   |              |   |            |  |   |         |
| 7                          | 70 X 70   |             |  |   |         |   |         |   |         |   |         |  |           |  |   |         |   |          |  |       |  |    |      |   |         |  |   |              |   |            |  |   |         |
| 8                          | 80 X 80   |             |  |   |         |   |         |   |         |   |         |  |           |  |   |         |   |          |  |       |  |    |      |   |         |  |   |              |   |            |  |   |         |
| 9                          | 90 X 90   |             |  |   |         |   |         |   |         |   |         |  |           |  |   |         |   |          |  |       |  |    |      |   |         |  |   |              |   |            |  |   |         |
| GEAR TYPE                  |   |             |  |   |         |   |         |   |         |   |         |  |           |  |   |         |   |          |  |       |  |    |      |   |         |  |   |              |   |            |  |   |         |
| G                          | GENERAL   |             |  |   |         |   |         |   |         |   |         |  |           |  |   |         |   |          |  |       |  |    |      |   |         |  |   |              |   |            |  |   |         |
| P                          | POWERFUL  |             |  |   |         |   |         |   |         |   |         |  |           |  |   |         |   |          |  |       |  |    |      |   |         |  |   |              |   |            |  |   |         |
| RATIO                      |   |             |  |   |         |   |         |   |         |   |         |  |           |  |   |         |   |          |  |       |  |    |      |   |         |  |   |              |   |            |  |   |         |
| 10                         | 1/10  |             |  |   |         |   |         |   |         |   |         |  |           |  |   |         |   |          |  |       |  |    |      |   |         |  |   |              |   |            |  |   |         |
| BEARING                    |   |             |  |   |         |   |         |   |         |   |         |  |           |  |   |         |   |          |  |       |  |    |      |   |         |  |   |              |   |            |  |   |         |
| B                          | BALL BEARING  |             |  |   |         |   |         |   |         |   |         |  |           |  |   |         |   |          |  |       |  |    |      |   |         |  |   |              |   |            |  |   |         |
| SHAFT TYPE                 |   |             |  |   |         |   |         |   |         |   |         |  |           |  |   |         |   |          |  |       |  |    |      |   |         |  |   |              |   |            |  |   |         |
| X                          | DECIMAL   |             |  |   |         |   |         |   |         |   |         |  |           |  |   |         |   |          |  |       |  |    |      |   |         |  |   |              |   |            |  |   |         |

## CONTROLLER (AC MOTOR SPEED CONTROLLER)

|          |          |          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|----------|----------|
| <b>G</b> | <b>U</b> | <b>A</b> | <b>-</b> | <b>C</b> | <b>-</b> | <b>6</b> | <b>A</b> |
|----------|----------|----------|----------|----------|----------|----------|----------|

| <b>INITIAL</b><br>G-SERIES | <table border="1"> <tr> <th colspan="2">CONTROLLER TYPE</th> </tr> <tr> <td>U</td> <td>UNIT TYPE</td> </tr> <tr> <td>P</td> <td>PLUG IN TYPE</td> </tr> <tr> <td>S</td> <td>Slow Start Slow Stop</td> </tr> <tr> <td>N</td> <td>Non Slow Start Slow Stop</td> </tr> </table> | CONTROLLER TYPE |  | U | UNIT TYPE | P | PLUG IN TYPE | S | Slow Start Slow Stop | N | Non Slow Start Slow Stop | <table border="1"> <tr> <th colspan="2">DISPLAY</th> </tr> <tr> <td>D</td> <td>DIGITAL TYPE</td> </tr> <tr> <td>A</td> <td>ANALOG TYPE</td> </tr> <tr> <td>S</td> <td>SEMI DIGITAL TYPE</td> </tr> </table> | DISPLAY |  | D | DIGITAL TYPE | A | ANALOG TYPE | S | SEMI DIGITAL TYPE | <table border="1"> <tr> <th colspan="2">VOLTAGE</th> </tr> <tr> <td>J</td> <td>1Ø 100V 50/60Hz</td> </tr> <tr> <td>U</td> <td>1Ø 110V 60Hz</td> </tr> <tr> <td></td> <td>1Ø 115V 60Hz</td> </tr> <tr> <td>L</td> <td>1Ø 200V 50/60Hz</td> </tr> <tr> <td>C</td> <td>1Ø 220V 50/60Hz</td> </tr> <tr> <td></td> <td>1Ø 230V 50/60Hz</td> </tr> <tr> <td>D</td> <td>1Ø 240V 50Hz</td> </tr> </table> | VOLTAGE |  | J | 1Ø 100V 50/60Hz | U | 1Ø 110V 60Hz |  | 1Ø 115V 60Hz | L | 1Ø 200V 50/60Hz | C | 1Ø 220V 50/60Hz |  | 1Ø 230V 50/60Hz | D | 1Ø 240V 50Hz | <table border="1"> <tr> <th colspan="2">OUTPUT</th> </tr> <tr> <td>NON</td> <td>SOCKET TYPE</td> </tr> <tr> <td>6</td> <td>6W</td> </tr> <tr> <td>15</td> <td>15W</td> </tr> <tr> <td>25</td> <td>25W</td> </tr> <tr> <td>40</td> <td>40W</td> </tr> <tr> <td>60</td> <td>60W</td> </tr> <tr> <td>90</td> <td>90W</td> </tr> <tr> <td>120</td> <td>120W</td> </tr> <tr> <td>180</td> <td>180W</td> </tr> </table> | OUTPUT |  | NON | SOCKET TYPE | 6 | 6W | 15 | 15W | 25 | 25W | 40 | 40W | 60 | 60W | 90 | 90W | 120 | 120W | 180 | 180W | <table border="1"> <tr> <th colspan="2">FREQUENCY</th> </tr> <tr> <td>NON</td> <td>50Hz &amp; 60Hz</td> </tr> <tr> <td>A</td> <td>50Hz</td> </tr> <tr> <td>B</td> <td>60Hz</td> </tr> </table> | FREQUENCY |  | NON | 50Hz & 60Hz | A | 50Hz | B | 60Hz |
|----------------------------|--|-----------------|--|---|-----------|---|--------------|---|----------------------|---|--------------------------|---|---------|--|---|--------------|---|-------------|---|-------------------|---|---------|--|---|-----------------|---|--------------|--|--------------|---|-----------------|---|-----------------|--|-----------------|---|--------------|---|--------|--|-----|-------------|---|----|----|-----|----|-----|----|-----|----|-----|----|-----|-----|------|-----|------|--|-----------|--|-----|-------------|---|------|---|------|
| CONTROLLER TYPE            |  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| U                          | UNIT TYPE  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| P                          | PLUG IN TYPE   |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| S                          | Slow Start Slow Stop   |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| N                          | Non Slow Start Slow Stop   |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| DISPLAY                    |  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| D                          | DIGITAL TYPE   |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| A                          | ANALOG TYPE  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| S                          | SEMI DIGITAL TYPE  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| VOLTAGE                    |  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| J                          | 1Ø 100V 50/60Hz  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| U                          | 1Ø 110V 60Hz   |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
|                            | 1Ø 115V 60Hz   |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| L                          | 1Ø 200V 50/60Hz  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| C                          | 1Ø 220V 50/60Hz  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
|                            | 1Ø 230V 50/60Hz  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| D                          | 1Ø 240V 50Hz   |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| OUTPUT                     |  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| NON                        | SOCKET TYPE  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| 6                          | 6W   |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| 15                         | 15W  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| 25                         | 25W  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| 40                         | 40W  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| 60                         | 60W  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| 90                         | 90W  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| 120                        | 120W   |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| 180                        | 180W   |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| FREQUENCY                  |  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| NON                        | 50Hz & 60Hz  |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| A                          | 50Hz   |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |
| B                          | 60Hz   |                 |  |   |           |   |              |   |                      |   |                          |   |         |  |   |              |   |             |   |                   |   |         |  |   |                 |   |              |  |              |   |                 |   |                 |  |                 |   |              |   |        |  |     |             |   |    |    |     |    |     |    |     |    |     |    |     |     |      |     |      |  |           |  |     |             |   |      |   |      |

# [ 電子ブレーキモーターの特 ]

## I. 電磁ブレーキモーターの要

- 交流無負荷作動型電磁ブレーキをモーターの後面ろに装着して電源切れると同時にMOTORが瞬時停止して負荷を維持します。
- 単相モーターブレーキはREVERSIBLE MOTORに繋がって、三相モーターにはINDUCTION MOTORに直結したモーターです。
- 動力源としてモーターを使うとき短時間にモーターを停止させ、その負荷をその位置で維持したい場合に使います。

INDUCTION MOTORでは電源をOFF時に瞬間的に停止しないで30~40回転、REVERSIBLE MOTORは5~6回転OVER RUNします。(ただし、モーター単品無負荷の場合)

- 瞬間的にモーターを停止したい場合にはブレーキパックを使います。

但し、ブレーキパックはモーターを瞬時停止することが出来る電磁ブレーキ回路ですが負荷を維持する力は持っていません。(モーター単品無負荷時OVER RUNは1回転未満です。)

- 負荷を維持する用途で使う場合には電磁ブレーキを装着して作動します。
- 電磁ブレーキモーターは電源OFFの時、モーター単品が無負荷の場合には1~4回転OVER RUNします。
- 頻繁な瞬時正逆回転が出来ます。簡単な切り替えで1分に6回停止が可能です。(但し、停止時間を3秒以上確保してください。)
- モーター、ブレーキ部が同じ電源で使えます。ブレーキ部に整流回路を内蔵してモーターと同じ交流電源を使います。

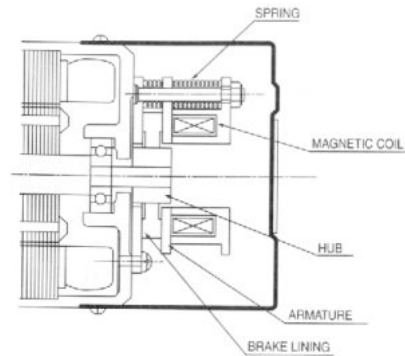
## II. 無励磁作動型電磁ブレーキType

### (1) 構造と動作原理

- (図1)は電磁ブレーキモーターの構造図を表したのです。当社の電磁ブレーキモーターは、無励磁作動型で、コイルに電圧を認可すると、スプリングで抑えられたアーマチュア(ARMATURE)が吸入されることによってスプリングを押し、アーマチュアとブレーキ・ライニングとの間に隙間が発生して、制動力が解除されてモーターシャフトの回転が自由になります。

### (2) 電磁ブレーキの特性

- 交流無励磁作動型電磁ブレーキとしてモーターと直結して電源が切れると同時にモーターは瞬時に停止し、負荷を維持します。維持力は2kgf・cm~10kgf・cmです。電源OFF時、維持力が作動するタイプで電源が切れたような緊急時に安全ブレーキとして最適です。



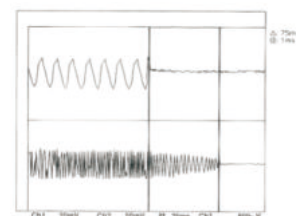
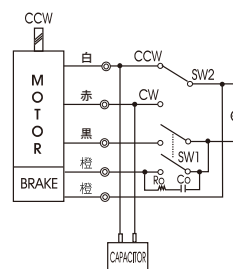
(図1) 電子ブレーキモーターの構造

### (3) 結線方法による制動時間の差

- 結線方法は(図2) のようにしますが結線を簡単にするために(図3) のような場合には(図2)

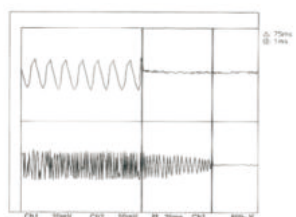
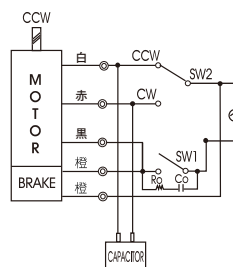
の接続場合と比較すると制動時間が50msecくらい長くなり、その分OVER RUNも増加します。

これは制動時にモーターの自己エネルギーが電磁ブレーキ電磁石の励磁巻線に作用し、電磁ブレーキの励磁を解除しても約50msec間電磁石が続いて作動してブレーキ作動が遅くなるためです。



停止時間 約75msec、SLIP約1.2回転  
測定MODEL K8RG25NU-B)

(図2)



停止時間 約124.50msec、SLIP約1.2回転  
測定MODEL K8RG25NC-B)

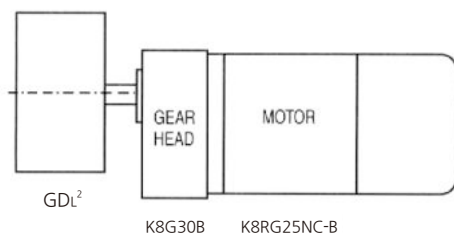
(図3)

### BRAKE電氣的仕様

| Voltage   | Size (mm) | Output (w) | Frequency (Hz) | Ampere (A) | Input (W) | Brake (kg·cm) | Torque (N·m) |
|---|-----------|------------|----------------|------------|-----------|---------------|--------------|
| Single-phase 110V/220V                          | 60        | 6          | 50/60          | 0.031      | 3.1       | 2             | 0.2          |
|   | 70        | 15         |                |            |           |               |              |
| Single-phase 110V/220V<br>↓<br>Three-phase 220V | 80        | 25         | 50/60          | 0.100      | 10.0      | 10            | 1.0          |
|   |           | 40         |                |            |           |               |              |
|   | 90        | 60         |                |            |           |               |              |
|   |           | 90         |                |            |           |               |              |



### III. 動作時間、制動特性



#### (1) 例

K8RG25NC-Bを例にK8G30Bを組合して慣性体 ( $GD_L^2=1000\text{kgf}\cdot\text{cm}^2$ )を駆動する場合、動作時間、制動時間、OVER RUNを算出すると(電源周波数が60Hzの場合)一時的に負荷の慣性モメント値をモーターシャフト値で換算するところで、

$$GD_M^2 = \frac{GD_L^2}{I^2} \quad [\text{kgf}\cdot\text{cm}^2] = \frac{1000}{30^2} = 1.1 \quad [\text{kgf}\cdot\text{cm}^2]$$

- ・ $GD_L^2$  : 負荷のFLY WHEEL効果  $[\text{kgf}\cdot\text{cm}^2]$
- ・ $GD_M^2$  : MOTOR SHAFTでのFLY WHEEL効果  $[\text{kgf}\cdot\text{cm}^2]$
- ・ $I$  : ギアヘッド減速比

S単位で慣性モメントは*i*で示し、次のような式で換算します。

$$i = \frac{Gd^2}{4g} \quad [\text{kgf}\cdot\text{cm}^2] \quad g : 9,80665[\text{m/s}^2]$$

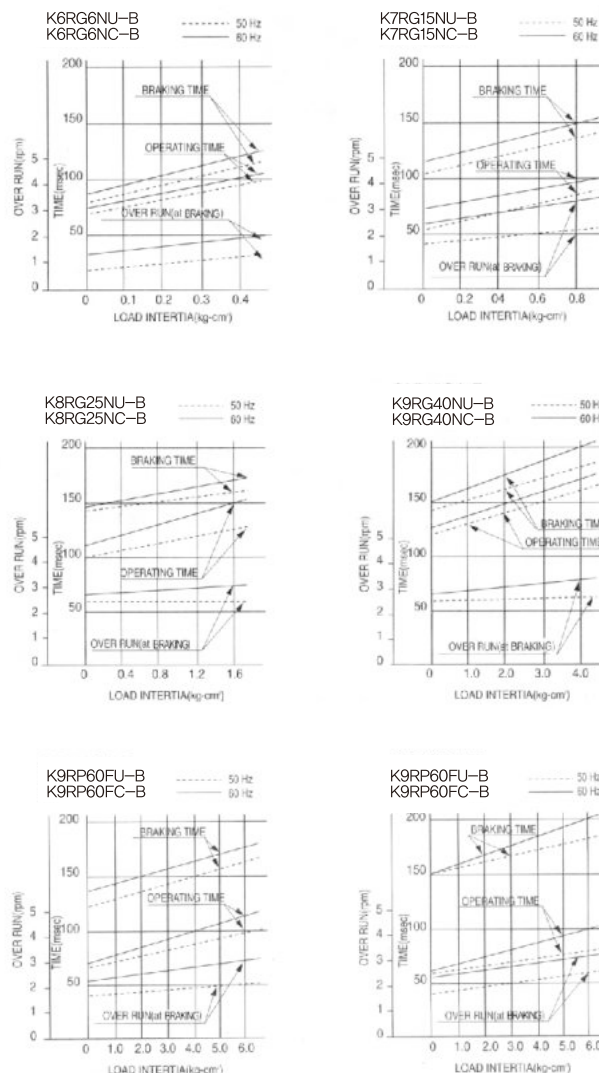
#### (2) OVER RUN

- 下記の図5のようにモーターシャフトのOVER RUNは $N_M=2.5$ 回転であるためギアヘッドの出力軸のOVER RUNは

$$N_G = \frac{N_M}{1} = \frac{2.5}{30} = 0.08 \text{ revolution } (28.8^\circ)$$

#### (3) 動作時間、制動時間

- 下の図5のように動作時間 $t_1=13$ [msec]、制動時間 $t_2=170$ [msec]になります。
  - ブレーキモーターの動作時間はモーターの動作時間に電磁ブレーキ開放時間を出したのです。
  - 従って予め電磁ブレーキを開放しておくともっと早くモーターを動作させられます。
- ブレーキを開放する時間は最小限モーターが動作する10msec前にしてください。



(図5) 動作時間と制動特性

#### GENERAL SPECIFICATION OF BRAKE MOTOR

| 項目     | 仕様   |
|--------|--|
| 絶縁抵抗   | 常温、常湿でモーターを定格運轉したあと、モーターのコイルとモーターケースをDC 500V MEGGERで測定して100kΩ以上であること   |
| 絶縁耐壓   | 常温、常湿でモーターを定格運轉したあと、モーターのコイルとモーターケースを1500V 50/60HzのRM電壓を1分間認可して異常のないこと |
| 温度上昇   | モーターを定格に運轉したあと、温度計法で測定して温度上昇値(ΔT)がA種65°C E種75°C B種85°C以下であること          |
| 絶縁等級   | E種(120°C)、B種(130°C)、UL規格認証品はA種(105°C)                                  |
| 過熱保護装置 | THERMAL PROTECTOR内蔵(自動復帰型) : 解放130°C ± 5°C 復帰82°C ± 15°C               |
| 使用温度   | -10°C~+50°C(UL、CE規格認定MOTORは-10°C~+40°C)                                |
| 使用湿度   | 85%以下(結露のない所)  |